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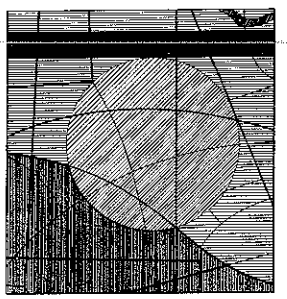

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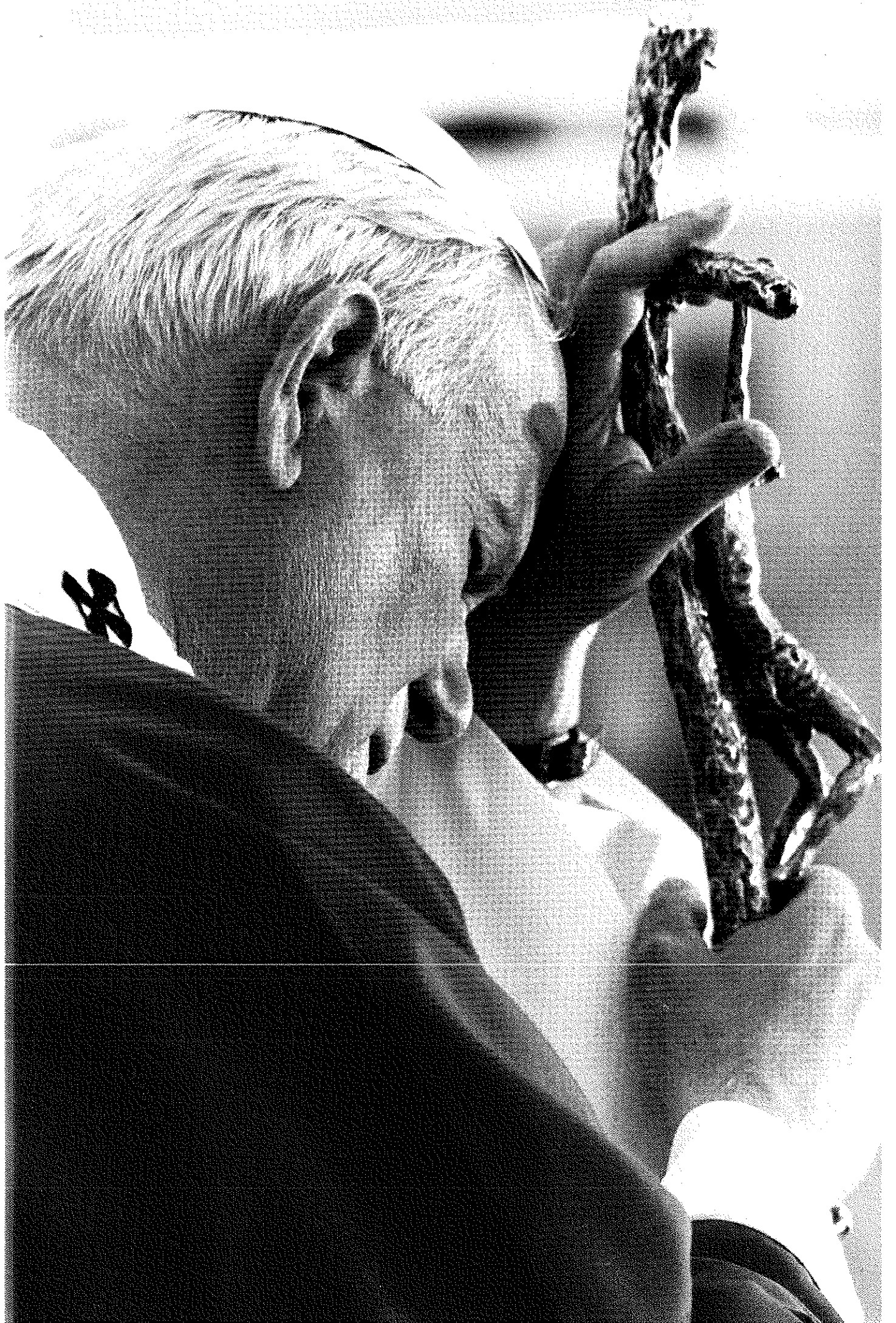
The illustrations in this issue have been taken from the volume La fabbrica del pensiero - dall'Arte della memoria alle neuroscienze ***(Milan: Electa, 1989), which represents a catalogue of the exhibition with the same name held in Florence, Forte del Belvedere, from March to June 1989, organized by the Ministries of Cultural Patrimony, Scientific and Technological Research, and Education, together with the National Research Council, the Fidia Pharmaceutical Company, IBM, and the University of Florence.***



Pontifical Appointments

The Holy Father has ***confirmed*** *the Reverend Father* ***José Luis Redrado Marchite, O.H.*** *as* ***Secretary*** *of the Pontifical Council for Pastoral Assistance to Health Care Workers for an additional five-year period.*

The Holy Father has ***confirmed*** *the Reverend Father* ***Felice Ruffini, M.I.*** *as* ***Undersecretary*** *of the Pontifical Council for Pastoral Assistance to Health Care Workers for an additional five-year period.*

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Our deepest gratitude goes out to all who have offered their services over the past five years. To those who have been confirmed in their posts and to those newly appointed we convey our heartfelt wish that they may devote themselves most fruitfully to the growth — in terms, above all, of quality and evangelization — of our Department.

In Studying the Mind the Whole Truth about Man Should Never Be Overlooked

1) This encounter, distinguished ladies and gentlemen, during the Fifth International Conference organized by the Pontifical Council for Pastoral Assistance to Health Care Workers, on the human mind, is a welcome and valuable occasion for me to express and confirm the close attention with which the Church follows the problems of health policy and care.

My praise and encouragement, then, go out to all of you — scientists, doctors, researchers, scholars, and pastors of souls — who devote yourselves with impassioned commitment to studying the very noble and profound subject of the human mind, wherein faith, in illuminating rational motivations, helps us to discern one of the highest confirmations of the divine origin of man. It is, indeed, a source of pride for you and a motive for admiration for all of us to recall the great and bold achievements in the progressive knowledge of the human psyche in this century. The boundless field of the neurosciences — from neurobiology to neurochemistry, from psychosomatic medicine to psychoendocrinology — offers research the possibility of approaching in a particularly penetrating way the threshold of the very mystery of man — a mystery St. Augustine so wonderfully expressed in the famous words: "Factus sum mihimetipsi quaestio" — "I have become a great problem for myself" (Soliloquia *II, 34).*

2) Precisely in view of the incomparable greatness of the human mind, the Psalmist prays as follows: "I look up at your heavens, shaped by your fingers, at the moon and the stars you set firm — what are human beings that you spare a thought for them, or the child of Adam that you care for him? Yet you have made him little less than a god, you have crowned him with glory and beauty, made him the lord of the works of your hands, put all things under his feet" (Ps *8:3-6; cf.* Jb *7: 17 seq.*).

For this reason, the orientation of Christian thought is constant and coherent in closely associating the loftiness of the human mind with a special divine intervention *(cf.* Gn *1: 26). "God, our Creator and Father", Lactantius explains, "gave man awareness and intelligence so that it would thereby be manifest that we are generated by Him, who is intelligence, awareness, and reason"* (De Opificio Dei, *I, 1-2). Moreover, is it not true that man, precisely because of the power of his mind, arrives at God? Passing beyond the limits of the universe, he not only securely reaches God, but can also enter into communion with him in prayer, which — according to the beautiful expression of St. John Damascene — is specifically an* ascensus mentis in Deum *— an "ascent of the mind to God"* (De Fide Orthodoxa, *III, 24).*

Furthermore, because of his likeness to God, revealed by the human mind, man — as the Second Vatican Council affirms — "is the only creature on earth that God has wanted for its own sake" (Gaudium et Spes, *24), in such a way that "all that exists on earth must be referred to man as its center and summit"* (ibid., *12). Accordingly, the full affirmation of the mind of man, of its functions and capacities, resides in the right-duty of mastering creation and itself in conformity with the finalities willed by the Creator (cf.* Gn *1: 28). It is the mind, then, which, while capable of reaching God, is at the same time the "master" of creation; these are two attributions of incomparable value, to the point of placing it above all the other created realities of the visible universe.*

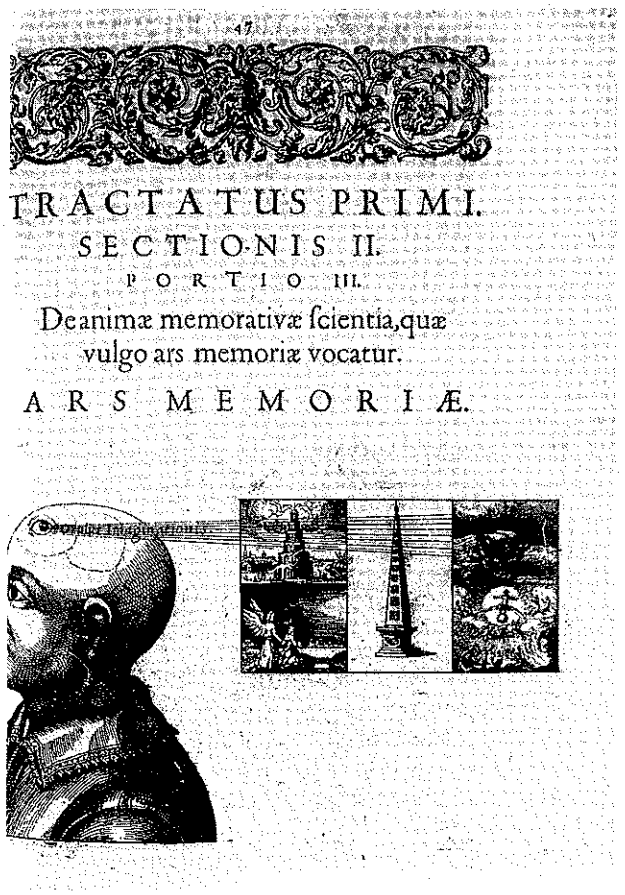
3) Distinguished ladies and gentlemen, the neurosciences, which are the field chosen for your advanced research — research, we may clearly affirm, opening up new horizons — cannot dispense with these essential and unrenounceable postulates. In other words, to study the mind we can never neglect the whole truth about man, *in his close-knit unity as a physical and spiritual being; though moving on an experimental basis, your research cannot overlook this sec-*

ADDRESS OF THE HOLY FATHER TO PARTICIPANTS AT THE FIFTH INTERNATIONAL CONFERENCE ORGANIZED BY THE PONTIFICAL COUNCIL FOR PASTORAL ASSISTANCE TO HEALTH CARE WORKERS

ond, qualifying dimension. The attempt to explain man's thought and free will in mechanistic and materialistic terms inevitably leads to the negation of the person and his dignity, with consequences which have cast grave and tragic shadows over human history in the past and in our own time as well.

Today there is talk of "artificial intelligence," in reference to the extraordinary possibilities of "electronic brains." It remains appropriate to recall, however, that at the root of information science and cybernetics stands the superior datum of human intelligence, *which, precisely because of its spiritual character and its consequent irreducibility to physical and chemical phenomena alone, in comprehending* freely judges, *in understanding* can also choose, *and in knowing* glimpses man's ultimate destiny.

*In this regard St. Augustine writes, "God has given the human soul the mind, therein reason and intelligence are almost asleep in the child, as if they really did not exist; with increasing age they must later awaken and develop so that the mind will be capable of acquiring science and doctrine, skilled in perceiving the truth and loving goodness" (*De Civitate Dei, *XXII, 24).*



But for the proper maturing and harmonious development of the human mind, and thus for the individual's full mental health, social relations hold great importance as well. Now, the element acting as mediator of a positive synthesis between the mind and social life is love. *Without love human intelligence is sterile and cold and inevitably withers in the end. "Faith itself," in the words of the Apostle Paul, "becomes efficacious through love"* (Ga 5: 7).

The high-level interdisciplinary dialogue, the exchange of knowledge and experience, and the constructive hypotheses you have formulated in the course of this International Conference, which is so representative of the different sciences dealing with the study of the human mind, cannot fail to foster greater individual and social sensitivity to the vast and complex problematic linked to this subject.

With the converging contributions of modern pharmacology, medicine, psychology, and psychiatry, therapies with gratifying results and increasingly broad applications have also been established. For the problems connected with the widespread prolongation of life there have also been highly significant pharmacological and psychotherapeutic achievements in recent years to support the efficiency of the human mind.

This praiseworthy effort by science will yield fruits which will be all the greater the deeper the conviction is that man's divine origin makes the whole human family a community of brothers and sisters *through the bond of mutual love. And there are numberless proofs — rigorously borne out by science — of the singular contribution love can make, both preventively and therapeutically, to overcome a good many mental disturbances, which are often caused by a disorderly organization of personal life and mistaken or deficient relations established with others.*

4) In the past and sometimes today as well, the various cultures have frequently reacted negative-to mental illnesses, leading to the isolation of the mentally ill *and their marginalization. This is a drama painfully observed by those, above all, who, aware of their illness or defenseless spectators of its worsening state, experience a solitude which is rendered more bitter by the reigning culture of efficiency and by a mentality which, in denying all value to suffering, sometimes burdens the mentally ill with the weight of derision and disdain as well. And how can we forget the ever-expanding groups of persons who, on account of increased longevity, find their condition of real weakness and lessened intellectual vivacity assimilated to that of the mentally ill or the partially infirm?*

It must be clear, first of all, that for themselves, for society, and particularly for the

Church, they are patients like anyone else struck by any illness whatsoever. Furthermore, though senectus ipsa morbus *remains true, the elderly possess capacities and gifts and residual energies — which are also the result of their experience — constituting authentic wealth for younger social groups.*

5) In passing on now to a consideration of the proper forms of care, I wish to stress the urgency of intense preventive action. *Medical science itself recognizes a very close relationship, for example, between the manifestation and worsening of some mental pathologies and disorders and*

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a lack of facilities and personnel for suitable prevention and effective therapy — to provide, in short, the kind of care which befits the dignity of the human person.

6) My most heartfelt appeal goes out, therefore, to public authorities, scientists, researchers, sociologists, and all men of good will that they commit themselves in convergent action to grasping better the extent and complexity of the problem of the mentally ill *and to preparing — by way of legislative provisions as well — effective instruments for intervention in full respect for the integrity and dignity of the ill.*

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the current crisis in values. This is confirmed — to cite one instance — by the interdependence of AIDS, drug addiction, and the disorderly use of sexuality. How can we remain silent over the continued aggression directed against serenity and mental balance constituted by social models leading to the instrumentalization of man and to dangerous conditioning of his freedom?

In addition, a good many mental illnesses — and on a large scale, as incontestable statistical data show — are frequently induced by long-standing and not yet rectified conditions of poverty, malnutrition, hygienic-sanitary deficiencies, environmental decay, and so forth. And, unfortunately, where awareness of these intolerable situations has become more intense, there is

The Church, which regards all the suffering with the same attention and loving concern, invites us to give priority in care *to those who, as a result of specific illnesses, experience* the greatest risk of marginalization and isolation. *The Church particularly addresses this invitation to the men's and women's religious Orders and Congregations which by an institutional charism assist the mentally ill, above all the most seriously ill. While recognizing and thanking them for the great good done in this sector, she exhorts them to persevere with renewed impetus in this delicate and most noble service. The Church conveys the same appreciation and solicitude to the priests who devote themselves to this apostolate, to the associations, volunteer groups, and*

Church movements, and to all who, making a truly Christian choice, take on this worthy task. Health professionals, doctors, nurses, and volunteers can feel and live out this arduous service as a privileged occasion to exalt the greatness of their profession and mission through medicine.

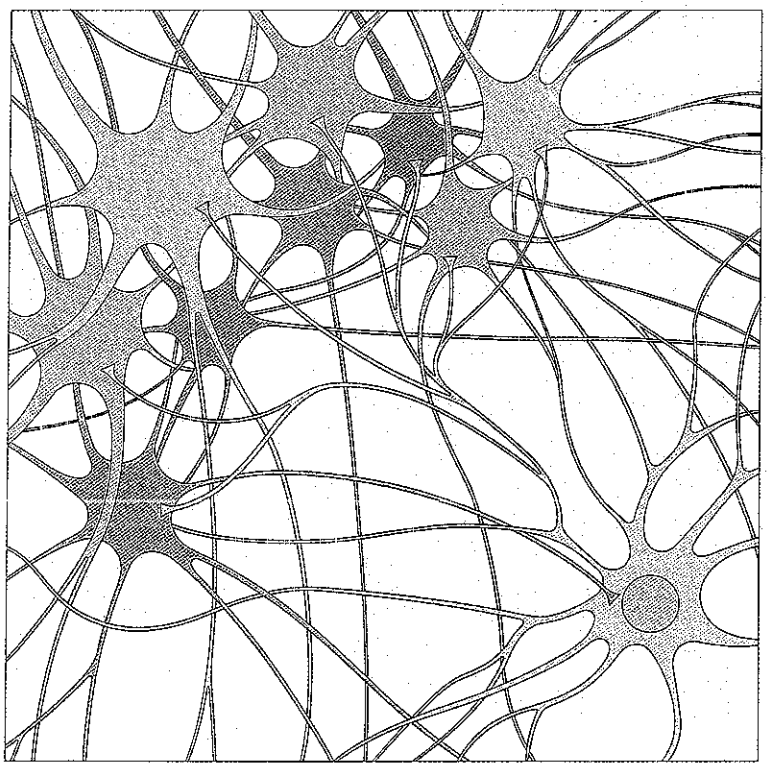
*I address a special word of esteem and affection to those families that, having been sorely tried by the mental illness of one of their members, agree to assist this person with love, living through this painful condition in humble discretion, but with an exceptionally strong spirit. May the Most Blessed Virgin transform this precious kind of solidarity into a gift for the whole Church and humanity. Christian love, witnessed to through service to those suffering in body and in spirit, draws us close to Christ, who, in becoming incarnate, chose the condition of a slave, of one marginalized and scorned (*Ph *2:7).*

7) If suffering is a mystery, it is particularly such when it strikes man's most noble faculties and, above all, the mind. While bowing before this mystery, we are called to grasp the lesson of life therefrom which leads us to do good with suffering and to do good to those who suffer (Apostolic Letter Salvifici Doloris, *30).*

All illness directly or indirectly attacks the human mind, which is the center of the person's feeling and understanding. Distinguished ladies and gentlemen, allow me at this point to address with the deepest affection those who, as a result of physical disabilities, advanced age, or their condition as terminal patients, undergo multiple experiences which debilitate their mental faculties, even very seriously. I hope your study and research on this most noble part of man will always aim at the person as a whole, since nothing in the person can be entirely saved unless the objective is the totality of his being.

With this wish, I wholeheartedly invoke the help of Almighty God for all of you while inviting you to regard the experience obtained in these days as a positive and encouraging occasion for consolidating your mutual relations, coordinating your contributions, and uniting your forces in the service of suffering man.

May the Most Blessed Virgin, "Sedes Sapientiae" *and* "Salus Infirmorum," *accompany your daily work, upon which, through her intercession, I implore an outpouring of heavenly blessings.*



Tribute to the Holy Father

G.B. MARINI BETTOLO
President of the Pontifical Academy of Sciences

In the name of all the participants in this fifth international conference on the great problems of the human mind, which has been organised by the Pontifical Council for Pastoral Assistance to Health Care Workers, I would like to offer you our devoted homage and our gratitude for your having consented to be present amongst us here today.

It would perhaps be more appropriate if this expression of our greeting were given by His Excellency Monsignor Fiorenzo Angelini, the President of this Pontifical Council, who has been the originator, promoter, and creator of this international conference. With great perception he has wanted, in giving me this task, to show his esteem and great friendship for those members of the laity — scientists, doctors, and scholars — who have taken part in these authentically ecumenical meetings with many priests, ecclesiastics, and members of religious orders and who co-operate actively with the Church.

The very delicate but suggestive subject of this conference, " the human mind, " has been debated and subjected to extensive examination during the course of these last few days by scholars and experts from all over the world with papers of exceptional quality. These speakers have been the promoters and agents of advances in knowledge in this field from the theological, moral, and philosophical points of view and from a scientific, medical, pastoral, and care perspective.

This contribution of thought in an interdisciplinary context, which has sought to consider the immanent and transcendent aspects to be found in the individual and in the human mind, first and foremost seeks to meet the needs of people who suffer.

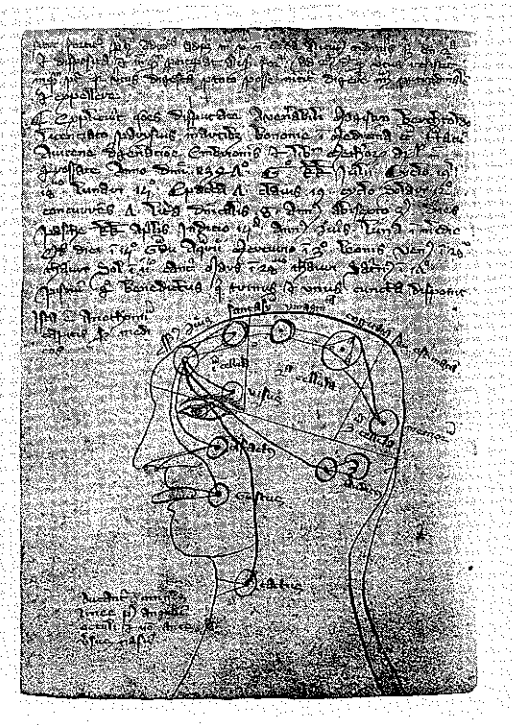
The speakers of this conference have devoted themselves to the human problem. They have dwelt upon this question and have shown how constant research can prevent and also treat mental illness. But they have also shown how the treatment of the sick person, in order to be successful, must of necessity take advantage of all the spiritual values as well: comprehension, affection, and love.

Taken as a whole, the results presented in this conference give rise to hope.

In order to turn this hope into a reality scholars and experts from all over the world, together with members of the clergy and religious orders, are today engaged in a labor of practical solidarity for the benefit and well-being of the human person.

Your Holiness, we await your words of comfort, support, and encouragement for an unceasing and tireless commitment to the promotion and defence of life.

Vatican City, November 17, 1990



Questions Involving Conscience As Well As Science

It would be superfluous to dwell upon the relevance of the theme which is considered by this, the fifth international conference organised by the Pontifical Council for Pastoral Assistance to Health Care Workers.

It is not only a question of relevance, but also of striking topicality. Whilst, in fact, we are witnessing an emergent phase of advanced research and study in the field of the neurosciences, there is at the same time a widely observed crisis of that " Age of Reason " of which the human mind was taken to be the supreme arbiter and reference point.

At an individual level there is an expansion in the illnesses which afflict the human mind, while at the social level there is a collapse of myths or the demonstration that concepts which powerfully separated the world of religion and faith from the world of rationality have very serious limits. These concepts had posited horizons which have disappeared or which are being slowly closed.

The subject of this fifth international conference is carefully considered in the words of its title. It opens with a verse from the first book of the Bible — it presents human beings as being created in the " perfect image and likeness of God " (Gn 1:26). This image and this likeness are identified first and foremost in the divine gift and the prerogative of the " human mind. " As is universely recognised, it is much easier to perceive the grandeur and the nobility of the human mind than it is to explain and demonstrate its origins, potentialities, and nature.

The classical perception which, in Plato's words, expressed the desire that either philosophers govern or those in government base themselves upon philosophy — this last being understood as rationality and wisdom — is today applicable on an infinitely wider scale: not only the question of the origins and structure of the human mind, but, above all, the purpose and the imperative aims of thought as considered in the general context of the destiny of man, both in the sense of individual man and in the sense of the family of man.

Christian faith, which is always directed towards illumination and not towards inhibiting or hindering the freedom of human thought, certainly also has a word to say to science — both to guide science in its researches and to give a reply to moral and ethical questions which enter into its province of concerns.

I will not dwell here upon the wide character of the subjects which will be considered over the next few days — the programme of the conference offers a complete and also logical picture of how the various themes are organised. This organisation seeks to give effect to special methodological criteria: it is not that we go from principles to then arrive at the phenomena but rather that we seek to draw questions from these last — questions which go beyond science and involve the conscience of man and, ultimately, his religious faith.

The affirmation and the belief that the human mind is a reflex, a spark, and bears the mark of divine intelligence can offer — or, more precisely, does offer — an opening of endless resources to the most specialised and widest branches of science. It does this because it advances the goal of science without imposing on it any impediment at all, unless one counts that impediment — which in fact is no impediment at all — of defending and protecting full respect for the dignity of the human person.

An immediate proof of the constructive and even exalting nature of this concept is to be found in the support that it is able to offer when one is dealing with illnesses of the mind or care for the mentally ill. Here science, when enlightened by Christian faith, sees human beings who need to be followed with the utmost care and concern.

As is shown by the subject of the various papers which will be given in the course of this fifth conference, and by the themes to be dealt with by the two round table debates, this meeting of

OPENING REMARKS ARCHBISHOP FIORENZO ANGELINI

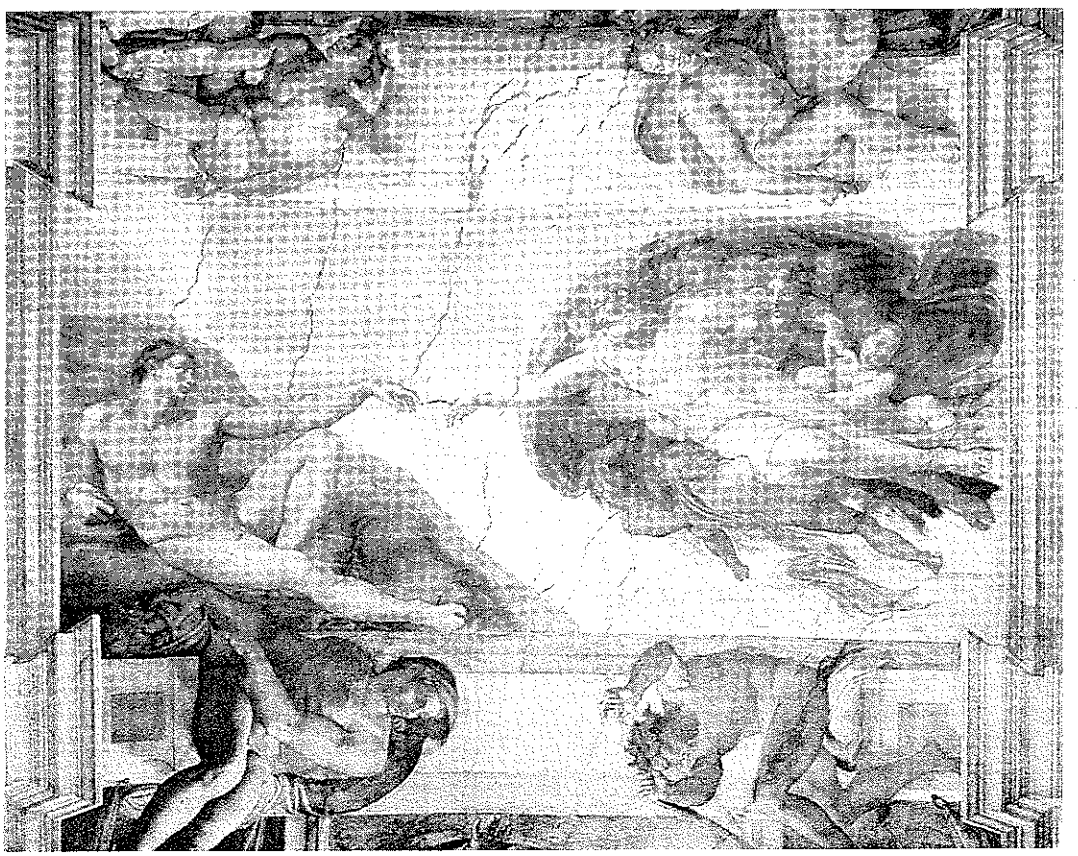
very many eminent scientists, researchers, and scholars who come from very different places and branches of knowledge seeks to offer a serious and organised contribution to an enterprise which is under way in so many parts of the world — an investigation of what we can call, not inappropriately, the mystery of the human mind.

The exhibition which accompanies this fifth conference visually brings out its importance and interest.

I would like now to thank the eminent speakers, the religious and other authorities who are present, and the many other participants.

The Pontifical Council for Pastoral Assistance to Health Care Workers, of which I have the honour to be president, comes to this, its fifth annual appointment, with the keenly-felt hope — which the reply which it has met with translates into certainty — that it can respond, through this initiative as well, to its founding goals and to the mandate entrusted to it by the Holy Father John Paul II, who, when he gave life some five years ago to this ministry of the Curia, forcefully reminded the world of the constant and ever-present solicitude of the Church for everything that concerns health policy and health care.

Archbishop FIORENZO ANGELINI
President of the Pontifical Council for Pastoral Assistance to Health Care Workers



The Mystery of the Human Mind

I. Preamble

One of the most significant anecdotes in the history of philosophy relates how Diogenes, in the full light of day and bearing a small lamp, was looking in every corner for something. To those who asked him what he was trying to find he replied ζητέω ἄνδεωπον — I am seeking the human being. Man is that mystery which remains mysterious in the light of day and in the light of our lamps: the unknown being, as Aleis Carrel said; the great abyss, as St. Augustine put it, using a word from the psalms. Our modern-day lamps are very sophisticated — the human sciences have discovered hitherto unknown continents in the geography of the human being and are attempting a full and complete demythologisation of the human mystery. But the abyss and its inscrutable darkness themselves grow with the growth of our knowledge. But to try to find out what man is, to look for the secret of our existence and essence, remains an irresistible impulse — something which belongs to the innate dynamism of our life. This conference, which addresses itself to " The Human Mind, " lights — if one may use the metaphor — the lamps of our thought, the lamps of science, with the aim of finding an answer to the challenge of our existence in today's context. The different lamps express their diversity in the interdisciplinary character of the debate. On the one hand, there is a need for a multiplicity of lamps in line with the different dimensions of human beings; on the other, the multidisciplinary approach should not end up in the fragmentation or atomisation of knowledge. On the contrary, it must remain open to the need to appreciate the unity of the object under consideration. It is evident that this unity is not merely the result of putting together the acquired achievements of different forms of analytical knowledge, and also that it is not the outcome of a syncretistic and eclectic process. But rather that it can only be considered by taking a global point of view as a point of departure — a point of view which is able to relate the anthropological question of the profound identity of man to the definitive meaning and the original truth of the mystery of human existence.

In order to avoid damaging misunderstandings, it should be stated at the outset that this global and truth-seeking approach does not seek to know or to judge all the particular aspects of reality and, as a result, it does not interfere with the partial and analytical approaches of the different branches of (both human and natural) science. But it upholds the legitimacy of opening the horizon of human knowledge to the dimensions and the deepest meanings of man and reality as a whole.

II. Thematic Development

1. Philological and Linguistic Considerations

In this inaugural speech I have ventured to make brief reference to the light that comes from biblical revelation — for the believer the great divine lamp whose beam reaches profound levels where our lights cannot penetrate. This beam does not eliminate the mystery but lets the luminosity of the mystery be seen. In the same way, this light does not substitute for our investigations but opens a point of convergence directed towards the integration of the particles of our knowledge. Since this knowledge is in a permanent state of development, so it is that the beam of biblical light points out ever new horizons and the integration of our knowledge is always to be renewed and deepened.

The breadth of biblical testimony means that in this brief opening address only very elementary references, which cannot aspire to cover all the ground, are possible. I would like to emphasise two aspects of the information given to us by the Bible. The first relates to the terminology of the Scriptures. It is striking that the anthropological terms of the Bible always indicate — at

OPENING ADDRESS BY JOSEPH CARDINAL RATZINGER

least in the Old Testament — the totality, the undivided unity of the creature "man," but that these terms involve man seen from different points of view. Four essential terms are employed in the Old Testament and used again in the New Testament: *basar, ruah, nefresh, leb,* translated by the LXX and by the NT with *sarx, pneuma, psiché, Kardia* (dianoia) and in the Latin vulgate with *caro, spiritus, anima, cor* or *mens*.

These are different locutions which indicate different component elements and aspects of man, but which nevertheless refer to the totality of his being. If *basar* expresses the contiguity of man with the material world — his mortality and transience, *ruah*, on the contrary, proclaims his difference from the material world and his affinity with God. *Leb* (*mens*, *kardia*) specifies this diversity as the transcendence of freedom and reason. In addition, it alludes to the synthesis of matter and spirit, and of reason and emotion, in human existence. It alludes to this reciprocal penetration of the dimensions of reality which is so emphatically significant for the mystery of this creature "man." *Nefesh*, finally, sees man as being involved in history because he bears a responsibility. In this variety of terms one can nevertheless observe globally that man finds himself at two irreducible but nonetheless inseparable levels: the level of immanence — which leads him to be united with the material world, and the level of transcendence as regards the terrestrial universe — which leads him to be connected to God.

2. *Aspects with a Theological Content*

The result of this very short analysis of linguistic and semantic premisses aimed at expressing the dialectic between the immanence and transcendence of man appears in a new light in the most profound phrase in biblical anthropology. This phrase is to be found in the first account of the creation of man: God created man in his own image and likeness (Gn 1:26.27). The meaning of the locution "image" is much discussed in biblical exegesis. It seems to me that the Fathers of the Church well identified the central point: "image" is a relational term and indicates that man is placed in relationship with God. The Old Testament sees man as a material being who transcends matter without ceasing to belong to it so as to place himself and construct himself in the relationship with God, in the dialogical contact and connection of communion with God. Further clarifications as to what constitutes the anthropological and metaphysical structure which makes this co-presence of immanence and transcendence possible are not to be found in the Old Testament. But it cannot be denied that the biblical message regarding man is open to such metaphysical inquiry.

The encounter with Jesus, which gave birth to the New Testament, opens up a new dimension. Jesus is the true image of God; his existence is entirely made up of connection and contact with the Father, and thus the mystery of love. This human existence is thus at the same time a divine existence: the image is God from God. Human existence reaches, therefore, its final destination in Jesus; the original scheme of man appears in Christ. The horizontal and vertical dimensions interpenetrate: he who is perfect connection and contact, in undivided relationship with God, also carries in himself the infinite opening of divinity. He embraces all creatures and invites them to a unity which does not destroy their own existence but, on the contrary, leads them to the complete fulfillment of their essence in the reciprocal communication of their gifts. In unexpected fashion, therefore, there is confirmation of the fact that man, who is a finished being, is *capax infiniti*. He is capable of reaching the truth, of reaching God — who is truth and love in person.

From these brief reflections one can proffer a conclusion on biblical thought: the concept of man present within the Scriptures does not ignore the complexity and the plurality of his di-

mensions but decisively affirms the unity of man. It stresses the salvific-historical perspective, and this understands man as a being who is in relationship with God, with other beings, and with the world within a plan of salvation and meaning which is fulfilled in history. But it does this without, however, excluding an evaluation and an investigation of man from the empirical point of view and from the perspective of his metaphysical structure.

3. Implications and Conclusions

Certain facts of great relevance emerge from this brief exposition of the cornerstones of Christian doctrine regarding man:

1) The richness of the semantic value of the concept of *mens*, *kardia*, and other notions which are employed to describe the reality of man displays the distance and the opposition between the Christian concept and reductions of a Cartesian-rationalistic or materialist-monistic kind. These latter simplify the anthropological question and reduce man either to mere material reality — and thus deny his opening to the transcendent or to the infinite, or introduce a dualism between spirit and matter into man which leads to a separation or to their extrinsic juxtaposition.

2) At the same time, a vindication of the character of the intentional infiniteness of the human spirit implies its constitutive relational dimension. And this relational dimension constitutes the unity of the person as such and the basis for every point of contact not only with God and the transcendent but also with all the empirical and experiential realities which surround and constitute man himself. He is called to carry out his vocation in the complex tissue of relationships which interlace within him — without becoming mixed up but at the same time without becoming radically separated from each other.

It is precisely this complex tissue of relationships which intertwine within man without adversely affecting his personal unity which shows that the thought of Christian Revelation is open to the progress of acquisitions and riches derived from forms of human knowledge which investigate the empirical, social-historical, and psychological dimensions of human reality, and at the same time guarantee the intimate unity of man against every form of monistic simplification and dualistic division. Man is constitutively open to truth, *capax Dei*, and destined to enter into interpersonal communion with God in the totality of his being.

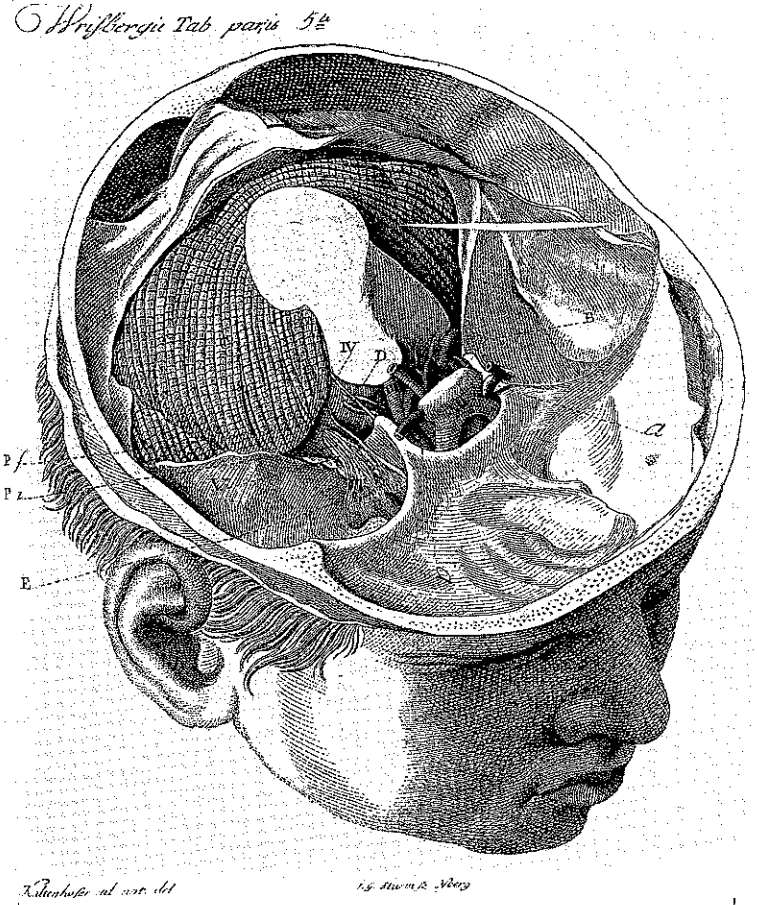
3) It seems, therefore, that from the point of view of theological synthesis, the human structure is essentially based on the category of the relational and achieves authenticity in tension towards communion. When one thinks that Christian revelation teaches that the final origin of man is to be found in a choice of love by God, who creates for encounter and communion, this conclusion should not create surprise. Perhaps, however, it is necessary to insist that such a relationship with God does not hide but, on the contrary, positively appreciates the singularity and differences involved. In the light of revelation the doctrine of man as " image of God " is more precisely expressed in man as " image by grace of the Trinity " — that ineffable unity of different persons.

Man, therefore, becomes himself, discovers his deepest identify, if and to the extent that he renounces self-affirmation and the cancellation of diversity so as to develop that offering which seeks to serve others and in so doing exalts originality.

The wish that I willingly address to this international conference is that in the conviction as to the essentially relational character of the human spirit, the disciplines involved in exploring this fascinating mystery may also converge — retaining nonetheless their specificity — in the investigation of the spirit's intelligence and comprehension, and thus contribute to the integral promotion of man and of his dignity as a being created " in the image and likeness of the Creator. "

JOSEPH CARDINAL RATZINGER
Prefect of the Congregation for the Doctrine of the Faith

"In the perfect image and likeness of God"



The Human Mind

GERALD M. EDELMAN

Brain, Mind, and the Center of Human Concern

We are in a most extraordinary time in the development of neuroscience. We find ourselves at a point at which we may be able to understand the basis in our brains of our nature as human beings and our nature as scientific observers. In this talk I briefly want to speak about some theories of the human brain and specifically about the relationship of psychology to neurobiology.

Whatever our beliefs, the brain must be considered the center of human concern. It is the source of our mind in society and it is the source of our will, our understanding, our memory, our introspection.

Let me take you to the very beginnings of Western science, at which time the mind was removed from nature by Galileo for methodological reasons and by Descartes for philosophical reasons. Since that time, in the nineteenth century, with the work of Charles Darwin, William James, and the physiologists of that century, the mind was put back into nature, and since that time, we have achieved an extraordinary knowledge of the workings of the human brain.

We still have to confront the problem of how the brain gives rise to understanding, thought, will and remembering — to the mind. The prevailing modern view is that the mind is like a computer and that nature is like a piece of tape. In this lecture I want to espouse an opposite point of view.

There are a number of contradictions in the evidence already available which indicate that we are not computers, and that indeed, a view of the brain more consistent with human individuality and with human freedom is required.

Here is a picture of the development of the brain from the earliest beginnings in the embryo. I show this picture only to indicate that at some point in the lives of the cells of the brain, each cell or neuron is a gypsy: cells move from layer to layer or from place to place in the brain and certain cells die in a way that is statistical and unpredictable, thus guaranteeing an individuality in the wiring of the structure of the brain that is not shared by computers.

As I said, the prevailing view is that of the brain as a so-called Turing machine or universal computer, a finite state machine that has an infinite tape which can read zeros and ones and move from the right to the left, reading its state, and a program that has conditions which define actions. Alan Turing proposed this idea and suggested that all computers could be considered Turing machines.

The structure of the brain, as hinted at by what I have already shown you embryologically, is inconsistent with this view. If you look at this picture of a single brain cell, a cortical neuron, it occupies about one cubic millimeter of volume, has an extraordinarily branched structure and overlaps with some of the ten billion other cells of your cortex (having at least one million billion connections) in such a way that no single cell could know what other cell was wired to it in a specific fashion.

If these structural problems are not daunting enough, I take you to psychology and consider perception. Perception is not necessarily veridical and it is context-dependent. A perceiving animal is capable of enormous generalization of a kind that a computer is not.

To make the picture more specific, it is now known, for nonlinguistic animals such as pigeons, for example, that if you condition a pigeon to a picture of a tree, it will recognize various trees in different contexts — trees nearby and trees at a distance — in subsequent pictures 85 to 87% of the time, after only four or five presentations. Therefore, the pigeon's brain is capable of a degree of generalization that a computer is not.

To summarize what I have said: the world is not a labeled place; the order of the brain shows enormous variance; perception is context-sensitive; motion is required for perception; and animals in their categorizations of the world given by perception are capable of enormous generalizing power, none of which is consistent with computation.

We must develop a theory that will explain these facts. I would like to propose to you a theory of selection based on the ideas of Charles Darwin in terms of the events taking place in the human body. This theory has three tenets corresponding to what I have already told you. The first tenet says that as neurons grow in the developing animal, they form connections that are selected as a result of events within each individual animal or embryo. As a result of that selection, a very large repertoire of diverse and absolutely individual connectivity is formed in each brain.

The second tenet of this theory says that, besides developmental selection, there is experiential selection, so that the connections between nerve cells, known as synapses, are strengthened or weakened

selectively, depending on the experience or the encounters of an animal with the world. Those which are selected are strengthened in such a way that they will function more efficiently than their competition, very much like natural selection in evolution. Instead of selection by replication and animal growth, selection in this case occurs by the amplification of these synapses. The selection that takes place is absolutely individual.

Finally, in order to map the world, the maps of the brains are connected by a series of reentrant fibers so that selection occurring in different maps can be related from one map to one another, allowing an animal to generalize and categorize the world. This theory of neuronal group selection has received some support recently, and I would like very briefly to say what this has been, to give my remarks an experimental flavor.

First of all, the developmental tenet. In our laboratory, a dozen years ago, we discovered some basic molecules that may be considered the "glue" of the body: cell adhesion molecules, which link one cell to another, one nerve cell to another, and which connect up the structure of the body in an essential fashion.

We have determined the structure of these molecules and their mode of binding. These molecules are interposed in the membrane of the cell and bind to each other. This binding is homophilic: a cell adhesion molecule from one cell binds to the same kind but not to any other kind from another cell. That kind of adhesion forms boundaries which give shape and anatomy to the body and to the brain.

The important point is that these molecules are not prespecified but are determined dynamically at the time of their binding.

If you look at the structure of such a molecule — this is the region where it binds to its identical partner from another cell — it has the most extraordinary property of resembling the antibody molecule. The antibody molecule developed later in evolution, so here is one of the extraordinary things that can happen when you do scientific experiments — an epiphany, if you will: genes specifying cell adhesion molecules are the evolutionary origin of the entire system of body immunity.

My main point, however, is that these molecules are dynamic in their expression, are arranged in cells as a function of place and are not predetermined. This provides evidence for the first part of the theory, developmental selection.

Now for the next part. The theory proposes that what is selected are groups of neurons linked to each other. It has now become quite clear that such neuronal groups exist. The evidence has come from a series of experiments performed in Germany by Gray and Singer and by Eckhorn and his colleagues, in which they recorded the activity of nerve cells in the visual part of the brain after presenting a signal to the eye.

These researchers recorded single cells. Shown here is the electrical activity of the cells after the presentation of a bar which was moving in a certain direction, and also the activity of groups of cells. What they discovered was that the activity of the groups of cells was exactly correlated in time with a 40-hertz oscillation, each single cell oscillating at this frequency. Thus the cells that responded were reacting in a group, a group that oscillated at 40 hertz in synchrony only when the signal was present. Furthermore, groups in distant parts of the brain oscillated with no change in phase when the signal was present, indicating that they must have been connected by reentrant fibers, as postulated by the theory of neuronal group selection.

The idea that the maps of the brain are generated by selection acting upon groups of neurons is further strengthened by studies of maps of the brain in monkeys done by Merzenich and his colleagues in California, in which the maps of the fingers and palm were analyzed. The electrical activity of the brain area responding to touch was mapped and was shown to be individual in each monkey. Upon cutting a nerve to a finger, all of these maps rearranged in a period of one to two hours — not just those subserved by the cut nerve — in a kind of Darwinian process in which the borders of the cells changed as different groups were selected.

And so we have ample evidence that the theory of neuronal group selection will hold. How does it hold with respect to the fundamental psychological problems related to memory and perception and understanding? Well, it is clear that the maps of the brain are multiple and are connected by different fibers. Cell groups that are selected in one map are correlated by reentrant connections with cell groups in another map. I would like to show you some pictures of an automaton called Darwin III, which we have simulated on a computer and which, according to the principles of this theory, will carry out primitive categorizations without a program.

Here is a diagram of this artifact, which has an arm and a single eye that is capable of seeing a rather restricted world of objects of about the same size as the creature; it has an oculomotor system that moves the eye, a reach system and a four-jointed arm which has nerves in its joints. All of these project to a reentrant set of maps in its "brain" (simulated on a computer). When the creature is born, as it were, and is presented with random images of objects that are not predictable, it can respond, move its arm, follow objects with its eye and then, with sufficient experience, reject those objects. Here is a picture of Darwin III after it has straightened its arm and felt a striped, bumpy object.

The important point is that these kinds of artifacts, designed according to the theory of neuronal group selection, will not function unless they are born with value. They *must* have some values — for example, that light is better than no light, touch is better than no touch, or darkness is better than light, and so forth; otherwise they do not function. But they do function specifically to categorize, for example, striped, bumpy objects, and when their reentrant maps fire, this arm will move, reject the object and finally push the object out of the way.

This artifact was tested with multiple objects — in this case, 55 objects that were striped and bumpy, or unstriped and smooth or bumpy, with eight trials for each set of objects. Some of the objects were rejected eight out of eight times, some were rejected seven out of

eight times, some were rejected four out of eight times, and some were rejected zero out of eight times. This artifact distinguished, without any instructions, between objects that were striped and bumpy and those that were not; however, each particular example of an artifact will perform these rejections in a different, individual manner, and if we remove its value circuits, it will not function. Of course, one reason for this performance is that synaptic changes occurred, leading to a form of memory.

And so we see that there are two views of memory. The one that is the accepted and received idea and assumes we are computers, which I do not believe, states that we are like Turing machines, that we have a syntax, that we are efficient, and that effectively we are noncreative and that our responsibility is equal to reliability.

According to the selectionist view I am espousing, it is semantics based on value, or meaning, that is important. We are inefficient, but we have paid that price in order to be creative, and our responsibility is the achievement of certain goals under value.

Indeed, as I have written elsewhere, with the development of the neurosciences it may be possible to understand the material basis of consciousness as reentry coupling our values and our past in a conceptual memory that is reentrantly connected to these perceptual categorizers. Although such categorizers are unconscious, they can in this fashion give rise to a scene that connects objects in the world within our mind.

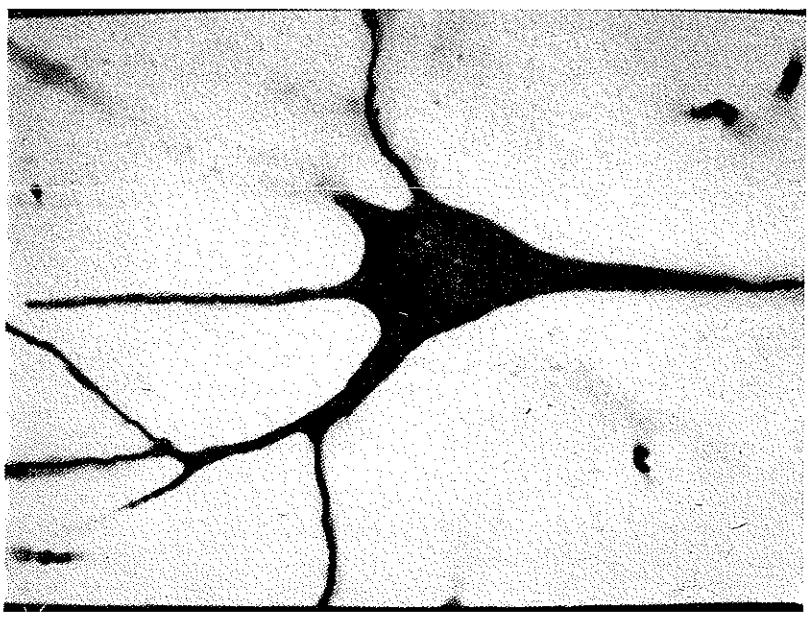
Alfred North Whitehead, the English philosopher, once said that William James was to the twentieth century what Descartes was to the seventeenth. James pointed out that consciousness was a process, and he pointed out that it was important to understand consciousness in terms of the workings of the brain.

I think that, with continued work in the neurosciences, we are going to understand consciousness in terms of the workings of the brain. We are going to find this out as a result of the thinking that has developed out of the ideas of William James and Charles Darwin, who explained, with his principle of natural selection, how we evolved.

To summarize, let me say that we are not machines, that we are not computers, and that the world is not a piece of tape. The evidence is already sufficient to indicate that our brains are made individually, that we have individuality, that we are capable of freedom, and that each individual is unpredictable, works under value systems, and is therefore unique and precious. Evidence is beginning to support the idea that a satisfactory theory of the brain, whatever it is, will be a selectional theory, not an instructional theory. It will depend on the unpredictable interaction of each individual with the environment and the history of which he or she is capable. If this is true, all aspects of perception will be to some degree acts of creation, and all acts of memory will be to some degree acts of imagination.

If it is the case, as I believe, that we will penetrate the mysteries of consciousness in terms of brain circuits, we must confront what Augustine attempted to confront with his deep introspection, and that is the nature of what it is to be human. Whether we believe that the disordering of the brain and its reentrant structure can lead to total oblivion and loss of consciousness or whether we believe the opposite, we together must undertake this extraordinary exploration of the brain, the center of human concern, the most important and complicated material object in the universe. Whether we be scientists or philosophers or theologians, all of us will have to recognize the extraordinary importance to human and social values of this exploration. I look forward very much to hearing from my colleagues about their contributions to it.

PROFESSOR GERALD M. EDELMAN
Nobel Prize Winner in Medicine, Professor of Neurobiology at Rockefeller University, New York, USA



FLOYD E BLOOM

The Mind-Brain Interface

It is a pleasure to have the opportunity to speak before this Pontifical Council about one of the more intriguing aspects of neuroscience research and of its implications for health care workers and their patients. The pursuit of a scientific documentation for the biological basis of mental activity remains one of the most profound questions in all of human biology. Clearly this has been a challenging topic, to which a brief twenty minute presentation can scarcely do justice, even if the factual basis were already solidly established.

Levels of Analysis in Brain Research

However, an approach to such important questions can begin by recognizing that neuroscience research is most often directed at one of 4 major levels of experimentation, namely the molecular level, the cellular level, the "system" or multi-cellular level, and the behavioral level. An artistic representation of the mentally-active brain would portray the cellular ensembles of interconnected neurons in the visual, motor, and somatosensory regions of the cerebral cortex, as the structural locations of these functions have already been well mapped in the normal human brain.

In pursuing the Mind-Brain interface, we seek most often to place responsibility for mental acts in discrete locations in the brain. Current analyses of such relatively simple functions such as how the brain reconstructs an image of the world around us through analysis and reintegration of light impulses falling on the retina to provide information about light-dark contrasts, size, shape, edges, motion, color, and context suggest that mentally pertinent systems require the simultaneous activity of several spatially separated neuronal locations connected into an integrative system through physical links or neuronal circuits.

These spatially separated systems are then animated by a program of cellular activity. It is at the interface between molecular and cellular activity that my research has most often been directed The interactions between neurons connected in functional circuits are based upon chemical signals of short term (a few thousandths of a second) and longer term (minutes to hours or longer) endurance. It is then these chemical signals, termed scientifically neurotransmitters, that provide the sequence of molecular events underlying the sequences of cellular events that culminate in the mental activity. Current thinking would presume that consequent modification of the functional, multi-cellular system engaged to perform the past operation facilitates its recall when the act is repeated. The scientific basis for portrayals of more complex brain mental functions, such as integrating visual and other sensory information into a recognized object, or creating an internal image of a changing object, cannot yet be easily conceptualized.

Neurotransmitters and the Molecular Basis for Cellular Communication

One additional aspect of useful background information relates to the known chemical varieties of neurotransmitters: Current evidence suggests that there are three main chemical types of transmitter substances: amino acids, amines, and peptides. The amino acids constitute the majority of the classical forms of excitation and inhibition through the brain. The amine systems provide an additional series of interneuronal signals that can regulate sensitivity of neurons to the amino acid and other transmitter signals and thus modify responsivity thresholds and durations, as well as the intracellular metabolic consequences of this activity. The neuronal peptides operate along with the amino acid and amine transmitters in ways that are still under intensive investigation; the peptide signals may also perform augmenting or metabolic actions.

Work on Simple Nervous Systems

Several strong lines of scientific documentation link molecular and cellular brain events to complex functions in animals that would seem to qualify as non-verbal mental acts. At the most simple levels these experiments correlate specific chemical changes in single nerve cells in relatively simple nervous systems with the ability of these organisms to express simple forms of learned and adaptive reflexive behavior. Such explanations provide a functional scheme, documented by solid experimental evidence, of discrete sequences of molecular events leading to enduring, but reversible, modifications of neuronal function as the basis for short-term memories. Since the functional and bio-

chemical mechanisms underlying these simple forms of learning are also well represented in the more complex brains of mammals, such actions and reactions could provide the basis for construction of more complex and more enduring mental events.

Work on Therapeutic Drugs Affecting Brain and Mind

Another strong line of evidence pertinent to the Mind-Brain Interface links molecular events between specific neurons at discrete locations in the brain with specific kinds of mental activity through a consideration of how drugs act on the brain. Certain well-studied drugs act on the brains of humans and non-human animals to produce grossly comparable changes in emotion and attention. Moreover, there is additional evidence on the probable modes of action for drugs that can restore emotional stability and clarify thought processes for the mentally ill.

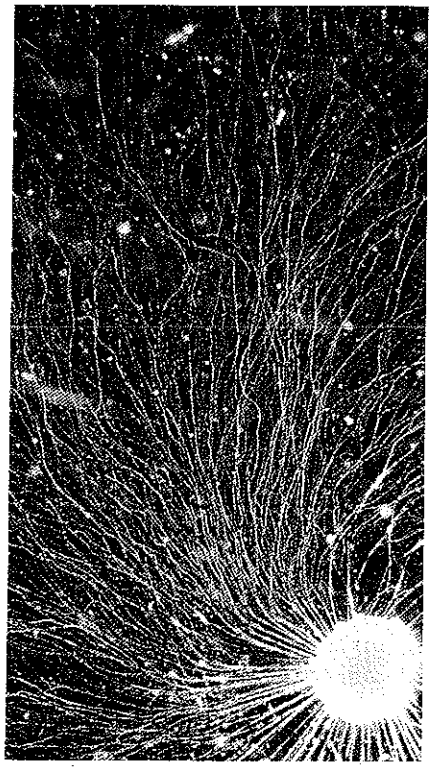
One additional aspect of background information should be mentioned at this point concerning the known chemical varieties of neurotransmitters. Current evidence suggests that there are three main chemical types of transmitter substances: amino acids, amines, and peptides. The amino acids constitute the majority of the classical forms of excitation and inhibition through the brain. The amine systems provide an additional series of interneuronal signals that can regulate sensitivity of neurons to the amino acid and other transmitter signals and thus modify responsivity thresholds and durations, as well as the intracellular metabolic consequences of this activity. The neuronal peptides operate along with the amino acid and amine transmitters in ways that are still under intensive investigation; the peptide signals may also perform augmenting or metabolic actions.

In a very simple schematic sense, the scientific evidence at hand now can establish the most likely neurotransmitter systems that mediate the effects of such attention-altering drugs as stimulants (dopamine and norepinephrine) sedatives (gamma amino butyrate), anti-depressants (serotonin and norepinephrine), anti-psychotics (dopamine), analgesics (endogenous opioids), and drugs that can reduce anxiety without depressing mental alertness or ability (gamma aminobutyrate, and endogenous benzodiazepines). Some of these linkages will be discussed by others in the Symposium as well. In each case, the therapeutic basis for these drug actions holds that the drugs either enhance or suppress natural chemical signals in the brain and thereby "correct" abnormalities characteristic of the mental illness.

More complex explanations must also be considered; however, for our present purposes these drug effects with biochemical and physiological consequences help to establish the biological linkages between brain and mind

Work on Addictive Drugs

To extend this consideration of brain-mind-drug interactions and to clarify the evidence relevant to the Mind-Brain interface, I will describe briefly some of our recent experimental work that has attempted to construct an internally consistent sequence of events at the molecular, cellular, and behavioral levels to explain the common features of drug dependence and the specific neuronal systems that establish the unique events of psychostimulant dependence as distinct from those mediating opiate dependence.



Within the previously mentioned chemical scheme of neurotransmitters, an abundance of evidence links the sites and mediation of cocaine actions to the amine transmitters, dopamine in the brain, and norepinephrine in the sympathetic nervous system, and the actions of the opiate drugs (heroin, morphine) to brain sites at which one or another of the several endogenous opioid peptides participates in the circuitry of discrete locations.

We have used the behavioral strategy of drug self-administration. In this system, animals are given the opportunity to self-administer drug-containing solutions, either orally or by implanted intravascular cannulae operated by animal-initiated movements. As we and others have pointed out (see Koob and Bloom, 1988), experimental animals with no previous drug experience will readily self-administer the same series of psychoactive drugs that are abused by humans, and do so with similar patterns of drug taking. We interpret this striking similarity to imply, first, that no pre-existing psychopathology or addictive vulnerability is required to initiate drug self-administration, and, second, that pursuit of the biological basis for how and where in the brain such drugs generate their reinforcing effects could provide insight into the normal functions of these drug sensitive systems.

Mapping Sites of Addictive Drug Reinforcement

The most complete lines of evidence describe the basis for cocaine and opiate action and dependence, although emerging evidence has begun to provide similar insight into some aspects of alcohol action and dependence. Within the time constraints, I shall briefly summarize the evidence on cocaine, a drug readily self-administered by humans, monkeys, and rodents. The neurobiological mediators of cocaine and other psychostimulant reinforcements appear to be the catecholamine transmitters: blockade of their synthesis or prevention of

their actions with specific antagonists will greatly reduce drug administration. Within the brain, dopamine-containing neurons of the ventral tegmentum and their tracts innervating the emotionally-regulating regions of the forebrain are required for these stimulants to be reinforcing: chemical lesions of these circuits will render an animal completely resistent to drug self-administration.

Selective Reversal of Addictive Behavior with Brain Manipulations

When access to the drugs is limited to several hours per day, animals and humans will show a stable level of drug intake, and will alter their rate of self-administration to reflect the concentration of the drug they are allowed to self-administer: lower drug doses leading to higher and more frequent rates of administration and vice versa. We have then employed this relationship to determine those sites in the brain at which micro-injections of drugs that antagonize dopamine or opiates will accelerate attempts to self-administer these drugs. Such studies indicate to us that antagonists micro-injections into one quite small region of the basal forebrain, termed the nucleus accumbens, is able to accelerate cocaine and opiate self-administration.

Cellular Correlates of Drug Action

At the cellular level, cocaine appears to enhance the depressant ability of dopamine to slow cellular activity within the nucleus accumbens through blockade of the normal re-uptake process by which synaptically released dopamine is normally conserved. Both of the major known types of dopamine receptor mechanisms have been linked to this enhancement of dopaminergic effects.

Distinct Molecular Systems Underlie Cocaine and Opiate Reinforcement

In animals dually addicted to both opiates and cocaine, dopamine receptor blockade or dopamine denervation of the nucleus accumbens can eliminate cocaine or amphetamine self-administration selectively without long-term disruption of heroin self-administration in experimental rodents. Thus, while the nucleus accumbens is a convergent target of circuits that can mediate either psychostimulant or opiate dependence, the specific transmitters involved in each drug are separable.

These systems normally mediate natural reinforcement

Across all levels of analysis, molecular and cellular mechanisms of the brain react to addictive drugs to initiate and maintain patterns of drug-seeking and self-administration behavior. We hypothesize that these patterns of behavior emerge primarily because the drugs are able to usurp the crucial natural reinforcement mechanisms by which organisms are encouraged to maintain their body through voluntary eating and drinking, and to perpetuate their species through reproductive behaviors.

Adaptive Reactions to Continued Drug Exposure

Once initiated, the pattern of drug-taking behavior may also be sustained by adaptive opposing regulatory effects that seek to dampen out these unwarranted exogenous intrusions on natural interneuronal signaling, establishing a new equilibrium in the mind-brain interface in the presence of drugs, functionally seen as drug tolerance. When the drug is unavailable, these adaptive processes remain active, resulting in the negative or aversive effects of drug withdrawal, which in their qualities and patterns are the opposite of the primary effects of the addictive drug. Relief of these negative symptoms then becomes an additional powerful motivator to seek and use the drugs.

Conclusion

While much more remains to be learned to understand the basis for individual and environmental interactions in susceptibility to addictive drug use, we believe that further research in this area will have important benefits for human health, the human condition, and the nature of the physical interface between brain and mind.

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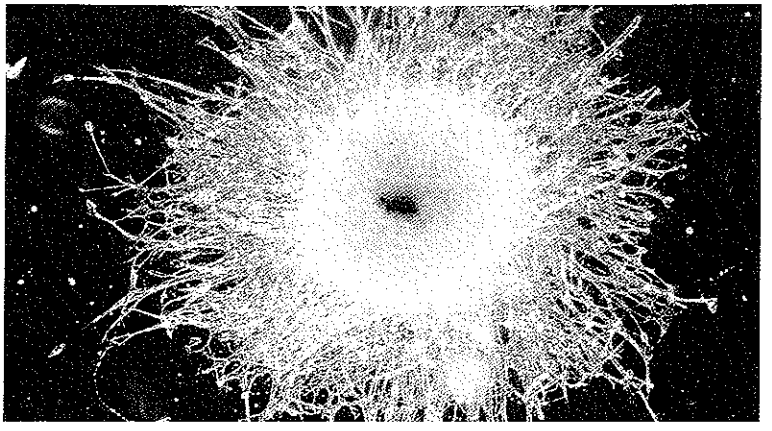

J.R. TATA

Brain Development and Molecular Genetics

Introduction

Nearly half the 100,000 expressible genes in man are active in the brain and nervous system, their expression in some being restricted to the central nervous system (CNS). It is, therefore, not surprising that many disorders of the brain can be traced to genetic defects (Rowland *et al.*, 1989). For example, from classical genetical analysis, nearly 60 neural diseases and mental disorders have been linked to the X chromosome alone (Davies, 1989). A substantial number of genetically identifiable diseases of the CNS are manifested during a critical, and often brief, developmental period. In mammals, this period spans foetal through neonatal development (Reinis and Goldman, 1980; Steward, 1989). Also important are factors originating from outside the brain but from within the developing organism or the mother. These include hormones, growth factors, extracellular matrix components and nutrients. Thus, the normal functioning of the adult brain, including mental activity, is critically dependent on a complex interplay between multiple genetic, developmental, and environmental factors.

Whereas the above delicate interplay has been well recognised in an extensive literature on the subject (see, for example: DiBenedetta *et al.*, 1980; Reinis and Goldman, 1980; Kandel and Schwartz, 1985; Dudai, 1989; Steward, 1989; Plomin, 1990), it has not been possible until recently to link directly a gene or genes with a given brain function and its associated disorder. The dramatic advances in the last decade in the technical applications of molecolar genetics now offer a most powerful tool for understanding of the developing and adult brain. Particulary worth mentioning are the techniques of recombinant DNA, gene sequencing, restriction fragment length polymorphism (RFLP), chromosome isolation and polymerase chain reaction (PCR). This technical revolution now makes it possible to identify the defective gene or its abnormal expression, as demonstrated for Huntington's disease (Gusella and Gillam, 1989), neurofibromatosis (Wallace *et al.*, 1990), and mental retardation (Davies 1989; Seltzer and McCabe; 1989; see several articles in Rowland *et al.*, 1989). It is in the early diagnosis of brain and mental disorders, rather than their therapy, that we are about to reap the biggest benefits of applications of molecular genetics.

Brain development

In mammals, the foetal, perinatal, and early neonatal period are most critical for the acquisition of normal structure and functions of the central nervous system (DiBenedetta *et al.*, 1980; Reinis and Goldman, 1980; Kandel and Schwartz, 1985). The growth, as judged by weight and cell number, of the human brain, which is very vigorous *in utero* and in the neonatal period, ceases by the age of 3 years. This pattern of increase in mass is paralleled by a qualitative one of structural and functional differentiation, easily seen as changes in enzyme concentration, neuronal connections and cellular morphology.

Earlier biochemical studies on ontogenesis had described how different constituents of the brain and nervous tissue were laid down during development. Particular attention was focused then on those components that were specific to these tissues, such as myelin proteins, cerebral lipids, etc. Later biochemical work concentrated on enzyme activities, followed by that on neurotransmitters, their targets, and the generation of second messengers. It soon emerged that many enzyme activities and other CNS-specific constituents did not only plateau with development but that some of these actually decreased or even disappeared. There is thus a delicate and intricate pattern of developmentally regulated activities.

Fig. 1 illustrates the ontogenic pattern for the onset and temporal modulation of a few of the numerous activities during mammalian brain ontogenesis. On the basis of our current knowledge of gene structure and function, this pattern reflects a finely tuned developmental regulation of gene activity. Such a regulation would involve a highly precise phenotypic switching mechanism during the early developmental period. A breakdown in any step in the pattern of programmed gene expression could result in permanent defect in one or more functions of the brain and nervous tissue, some to be manifested much later in life.

Cellular signalling and brain function

Evolutionary aspects

The evolution of the central nervous system is closely linked to that of cellular signalling mechanisms. This co-evolution can be vi-

sualised as the establishment of two different types of signalling networks. The first is that of signalling within the CNR via neurotransmitters, many of which are structurally related to plant hormones, evolutionary among the most primitive signalling molecules. Examples are the neurotransmitter serotonin, which is closely related to indoleacetic acid, a major plant hormone. Similarly, as agents of intercellular communication, many neuropeptides have ancient evolutionary ancestry (Tata, 1985; Siegel *et al.*, 1989; Steward, 1989). The other network to evolve concerns the right functional integration between the endocrine system and the neural control of the endocrine tissues. The latter have evolved as tissues specialising in the formation of one or two signalling molecules or hormones of growth factors which are released systematically and are recognised in their target tissues by the acquisition of specific receptors. Many of the hormones produced by endocrines or other specialised tissues act on the brain itself, controlling both its development and metabolic activity (Baulieu, 1978; Norman and Litwack, 1987). This circuit of controls is also integrated with environment factors, as exemplified in Fig. 2. Thus, in vertebrates, information about light, temperature, oxygen tension, nutrient supply, etc. is conveyed to the hypothalamus by electrical messages or neurotransmitters which are converted to chemical signals in this tissue. These are most often small peptides, such as the tripeptide thyrotrophin-releasing hormone (TRH) and the decapeptide luteinising hormone releasing hormone (LRH). They, in turn, are carried in the portal blood vessels to the pituitary, where they regulate the production of pituitary hormones, such as TSH, ACTH, LH, FSH, etc., each of which controls a specific endocrine organ. Interestingly, some of the protein hormones and neuropeptides secreted by the pituitary are encoded in the same gene, synthesised as a common precursor and then cleaved into individual components. The hormones ACTH and MSH and the neuropeptides andorphin and ankephalin, which act on pain centres in the brain, are thus encoded in the same gene.

Hormones produced by the target endocrine tissues, such as thyroid, adrenals, and gonads, have a profound effect on the development, behavioural imprinting, and metabolic activity of the brain. In the establishment of the diverse hormonal regulatory loops in which the brain is both a regulator and a target for external regulatory signals, it is the evolution of the hypothalamopituitary axis, as found in higher vertebrates, that has played a key role in the integration of networks of intercellular communication. The precise timing of laying down of such networks in the developing central nervous system is particularly crucial for brain function in adult life (Siegel *et al.*, 1989; Steward, 1989).

Hormones and brain development

We shall consider below two examples of the important roles played by the endocrine system during the foetal and neonatal periods in permanently determining the composition and function of the brain. The first is that of thyroid hormones in establishing correct levels of enzymes and other components of the brain, particularly those associated with metabolic ac-

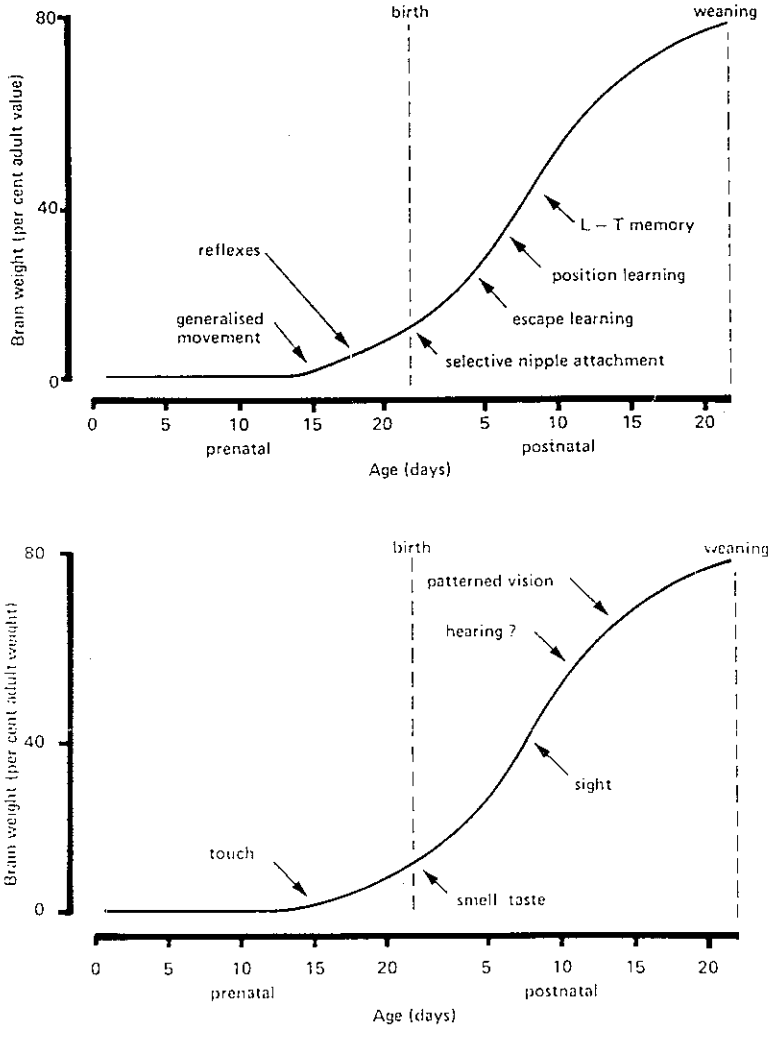

Fig. 1. Scheme summarising how brain weight before and after birth correlates with various functions associated with central nervous system activities during development of the mouse.

tivity and mental function. The other is the role of sex steroids during foetal and perinatal life in behavioural imprinting and sexual development.

Fig. 3 illustrates how changes in circulating thyroid hormone (T_4 T_3) levels during post-embryonic development are closely associated with the growth of the human brain (Morreale de Escobar *et al.*, 1983). Depending on the developmental stage, the foetus and neonate derives its thyroid hormones from both the maternal and its own thyroid gland. Only a narrow time window is available for the developmental actions of these hormones on the brain, any deviation from which would produce irreversible damage and abnormal functioning, such as cretinism, mental retardation, and growth arrest (Dussault and Walker, 1983; DeLong *et al.*, 1989). Not only are thyroid hormones necessary for the ontogenic acquisition of increasingly complex neural and mental activities, but they are also required for reorganisation of some parts of the developing CNS.

Another example of the important role of hormones in brain development is that of sex steroids in orientating sexual dismorphism during foetal and perinatal life

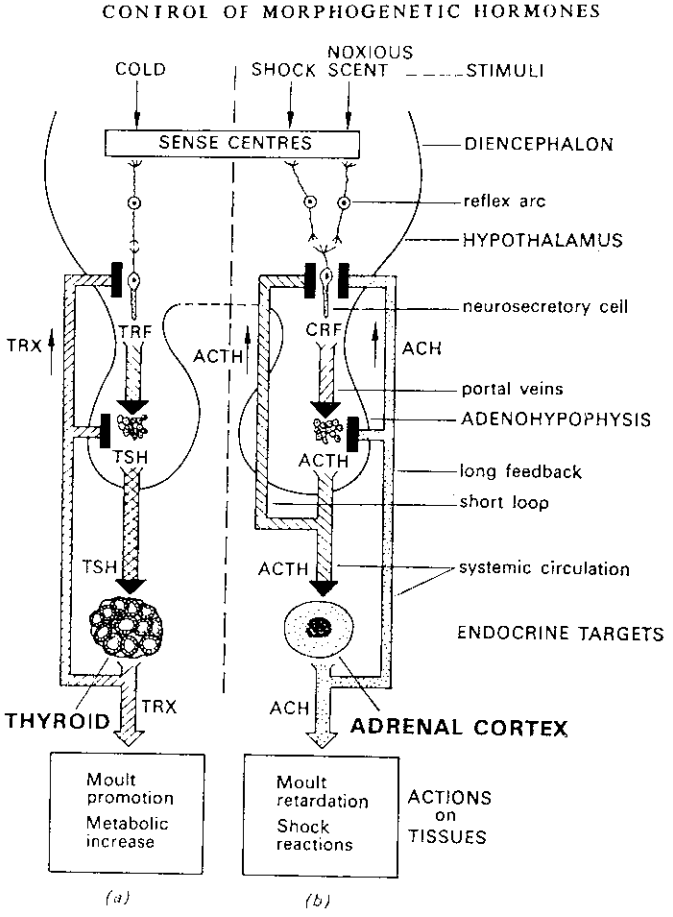

Fig. 2. Integration of nervous, neuroendocrine and hormonal activities. The schemes depict two examples of how external physical stimuli are converted to chemical signals as neurotransmitters in the brain, which then act on the hypothalamus and the pituitay. The latter tissue produces a group of peptide hormones; each of which then selectively regulates a different endocrine gland, as shown in this figure for the thyroid and adrenal glands. To complete the circuit, thyroid and adranal hormones would act, among other tissues, on the hypothalamus and pituitary to generate a negative feedback loop.

This hormonally regulated process is also termed sexual imprinting, with critical functions in irreversibily determining sexual and behavioral characteristics in adult life (McEwen, 1976; Kelly, 1985; Reinis and Goldman, 1980). An extreme example of this hormonal regulation is found in nonmammalian species, such as birds, reptiles, and amphibians, whereby a shift in the balance between androgen and oestrogen at a particular time in embryonic development will alter phenotypic (in contrast to genetic) sex later in development. Changes in the amount of androgen and oestrogen reaching certain regions of the brain of the developing mammalian foetus or in the early neonate will have far-reaching consequences in sexual and behavioural characteristics throughout the rest of life. These sites, characterised by the selective presence of androgen and oestrogen receptors (see below), are laid down in a spatially precise manner in the developing brain, as illustrated in Fig. 4. Again, an important feature of this imprinting phenomenon is the narrow time window development when specific sites in the CNS are highly sensitive to the action of sex steroid hormones. Among the many consequences of a disturbance in sexual imprinting that have now been recognised are absent or abnormal reproductive activity and accessory sexual tissue development, sterility, and excessively aggressive or submissive behaviour (Kelly, 1985).

The most important element in cellular signalling, irrespective of whether the signal is a hormone neurotransmitter or extracellular matrix, is the *receptor*. Although much information has been gathered about the functional characteristics of receptors over the last 40 years (Schulster and Levitzki, 1980), the exploitation of molecular genetics in the last decade has revolutionised our understanding of the structure and function of receptors and their genes, as well as offering the possibily of detecting genetic lesions.

Receptors

Since cell communication plays such an important role in many functions of the nervous system, it

is not surprising that increasing attention is being focused on signal receptors in the brain. Even before the advent of molecular genetics, it had been known from ligand binding studies that a large number of receptors for peptide hormones, growth factors, and neurotransmitters were localised on the target cell membrane (see several articles in Schulster and Levitzki, 1980). Receptors for the small molecular weight, lipophylic hormones, such as steroid and thyroid hormones, and morphogens, such as retinoic acid, are localised within the cell in the nucleus. The application of techniques of gene cloning, sequencing, and expression have allowed a first insight into the structure of the receptors and their function as signal transducers. It has led to the concept that many receptors have evolved as families of genes related to oncogenes.

Table 1 lists some membrane and nuclear receptors for signals that are important for brain development and nervous activity. A comparison of the sequences of genes coding for membrane receptors has revealed that many of those that recognize protein hormones and neuroactive peptides are cellular homologues of the viral v-*erb*-B oncogene. These include receptors for insulin epidermal growth factor and glucagon (Yarden and Ullrich, 1988; Hsuan *et al.*, 1989; Williams, 1989). Another important group of membrane receptors are those that specifically bind small molecular weight neurotransmitters, such as dopamine, ß-adrenergic compounds, and GABA (γ-aminobutyric acid) (Schulster and Levitzki, 1980; Deary *et al.*, 1990). Comparisons of the sequences of the genes, and of the deduced protein, have revealed a remarkable conservation of structure and function of membrane receptors. As illustrated in Fig. 5 for the ß-2 adrenergic receptor, the bulk of the membrane receptor molecule consists of 5-7 hydrophobic transmembrane segments, with the hydrophilic amino terminal end as the extracellular domain. The latter is the part of the membrane receptor involved in recognition and tight binding of the hormonal neurotransmitter signal molecule. The end result of the binding of such a signal to the receptor is often autophosphorylation of the receptor followed by the generation of "second messengers," such as cyclic AMP, inositol trisphosphate (IP_3), or calcium (Gill *at al.*, 1987; Sibley *et al.*, Hsuan *et al.*, 1989). This function is accomplished by the intracellular carboxy terminus of the receptor molecule, generally by activating adenyl cyclase or a lipase or the protein phosphorylation machinery.

The other well-characterised group includes intracellular or nuclear receptors related to the c-*erb*-A oncongene family (Green and Chambon, 1986; Carlstedt-Duke *et al.* 1988; Evans, 1988; Beato, 1989; Gehring *et al.*, 1989). These receptors are characterised by their direct involvement in regulating gene expression, not surprising since their ligands exert strong growth and developmental activity. These receptors have a common basic structure (Fig. 6) (Green and Chambon, 1986; Beato, 1989; Carlstedt-Duke *et al.*, 1988; Evans, 1988); a central, conserved DNA-binding domain, with small domains which function as activators transcription and translocation of the receptor from the cytoplasm to the nucleus. A large domain at the carboxyl end which recognises and binds the ligand (thus conferring biological

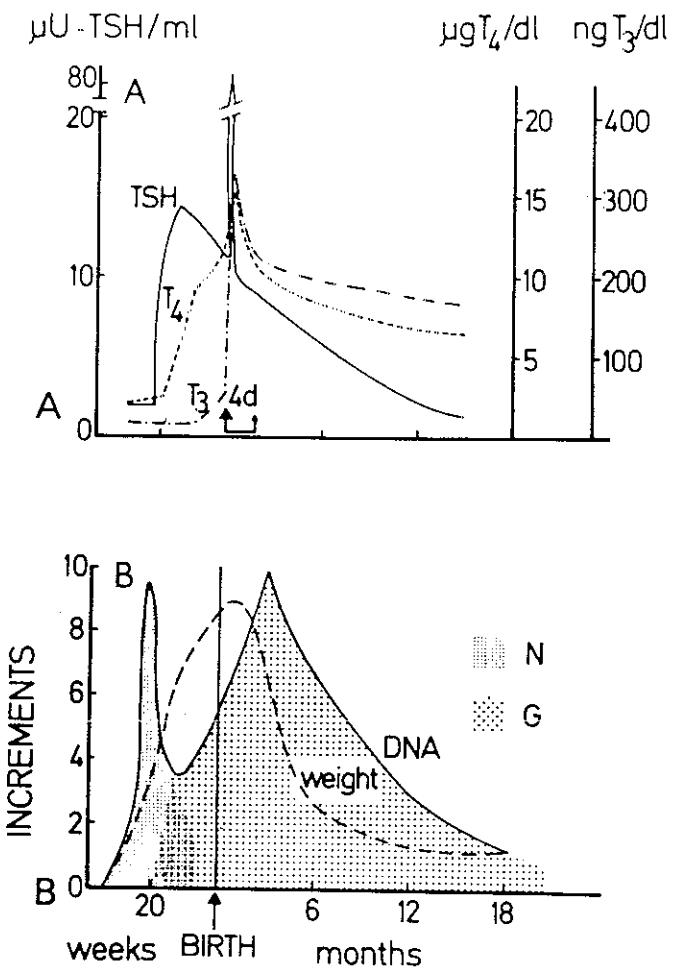

Fig. 3. A: Time course of changes in the amount of thyroid stimulating hormones (TSH) and thyroid hormones (T_4, T_3) in the blood of human foetus and neonate, about 20 weeks before and 18 month after birth. B: Rate of growth of the brain (as weight and cell no. [DNA]) during the same period of development.

specificity), which also comprises a region involved in dimerisation of the receptor molecules, thought to be important for its function. The N-terminal domain of variable size is the least well understood but it has been suggested that it may be involved in the interaction of the receptor with other transcription regulating proteins, the consequence of which would be to impart tissue and developmental specificity to the receptor.

An important unresolved question concerning receptors is to explain the high degree of tissue and developmental specificity of a given signal. Recent studies on cloned receptor genes have partly clarified this problem in that a diversity of receptor isoforms is generated by differential processing of the receptor gene products. For example, as depicted in Table 2, the isoforms α-1a, α-1b, α-2, and ß of thyroid hormone receptors are differentially distributed in different tissues, the major form in brain being the TR-ß (Izumo and Mahdavi, 1988/9; Koenig *et al.*, 1989; Murray *et al.*, 1988; Forrest *et al.*, 1990). Furthermore, TR-αa, a form also found in developing brain, inhibits transcription of thyroid hormone-regulated genes in the absence of the hormone but activates it when the hormone is bound to it (Koenig *et al.*, 1989). Numerous isoforms of retinoic acid receptor have also been described which are differentially distributed according to tissue and developmental stage (Ragsdale *et al.*, 1989; Zelent *et al.*, 1990). The above knowledge of tissue and developmental specificities or receptors and the possibility of discovering new receptors are directly attibutable to the recent applications of molecular genetics to biomedical sciences. Another emerging benefit of the application of this technology is the recognition that some well-known endocrinological and nervous diseases are caused by structural or functional defects of receptor genes.

Molecular genetics and disorders of the brain and nervous system

There is currently much effort in applying techniques of molecular genetics to the central nervous system and mental disorders. Most likely areas to benefit immediately

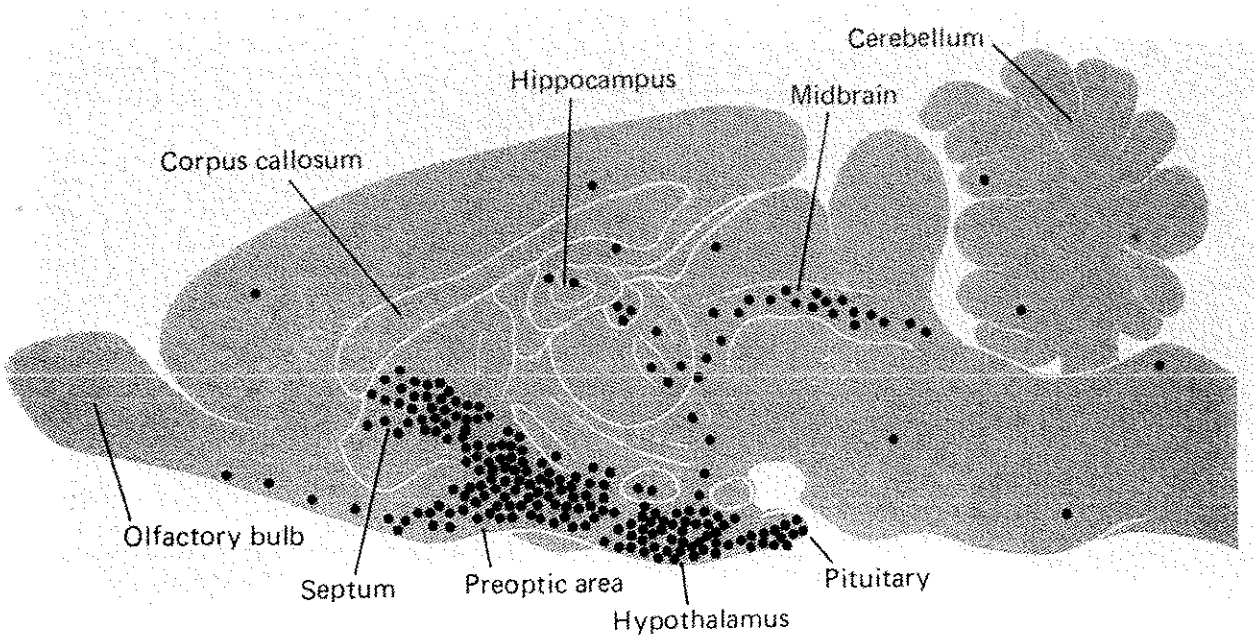

Fig. 4. Sexual differentiation of brain as depicted by the sites of localisation of oestrogen receptors in the rat. During a narrow time window around the time of birth, oestrogen receptors, decipted as black dots, are expressed in well-defined regions of the brain which are concerned with sex-determined patterns of development, behaviour and reproductive activity.

are the identification of gene(s) linked with a given lesion and the development of new methods for early diagnosis of these disorders. Less realistic, at least for the foreseeable future, is the prospect of gene therapy for disorders of the brain and mental processes.

Genetic diagnosis

There have been some dramatic successes in identifying genes associated with various genetically linked human diseases (see several articles in Rowland *et al.*, 1989). Only ten years ago it would have been unthinkable that the gene, its chromosomal location, and its linkages would be precisely located for diseases such as cystic fibrosis, Lesch-Nyhan syndrome, phenylketonuria, neurofibromatosis, and mental disorders associated with deficiency of ß-hexosaminidase and glycerol kinase and X-chromosome-linked lesions (Davies, 1989; Gibbs *et al.*, 1989; Gravel and Mahuran, 1989; Gusella and Gilliam, 1989; Woo, 1989; Wallace *et al.*, 1990). Interestingly, the human neurofibromatosis gene (Wallace *et al.*, 1990) contains two other genes nested within it which would explain the diversity of symptoms associated with this disorder. The same may hold true for the variety of symptoms associated with hereditary ataxias (Rosenberg and Grosman, 1989).

As our knowledge of the genes and protein structure of receptors increases, and consequently gene probes become more readily available, receptor gene defects associated with developmental and functional lesions of the brain will become increasingly amenable to analysis with molecular probes. Mutations in the gene encoding the insulin receptor in patients with genetically linked insensitivity to thyroid hormone have recently been discovered with specific molecular probes. The further possibility of identifying the thyroid hormone receptor isoforms specifically expressed in the brain, given the importance of this hormone in human brain development (Reinis and Goldman, 1980; Morreale de Escobar *et al.*, 1983; Dussault and Walker, 1983; DeLong *et al.*, 1989), are of considerable clinical significance in diagnosis and treatment of childhood developmental problems. Parkinson's disease and schizophrenia are known to be caused by a deficiency of the neurotransmitter dopamine in certain regions of the brain. What has not yet been established is whether this and related disorders could result from defective dopamine receptor. The cloning recently of the D_1 and D_2 dopamine receptor genes (Dearry *et al.*, 1990) means that molecular probes will soon be able to characterise such lesions and, hence, aid in initiating early therapy of these disorders.

It can be easily predicted that many more genes associated with brain and mental functions will be identified and structurally characterised in the next few years. Besides advancing our knowledge of how genes function in our body, the major benefit from these applications of molecular genetics lies in the early detection of disorders which manifest later in life. This in turn will allow the physician to initiate early treatment, often of crucial importance. Whereas such success with diseases resulting from defects in one or two genes has been and will continue to be achieved, the early precise diagnosis of disorders of processes dependent on multiple gene function is still not within our reach. For example, Alzheimer's disease may be one such multigene disorder, and several mental processes such as memory and learning ability and behaviour may also be controlled by the activities of multiple genes (Krebs and

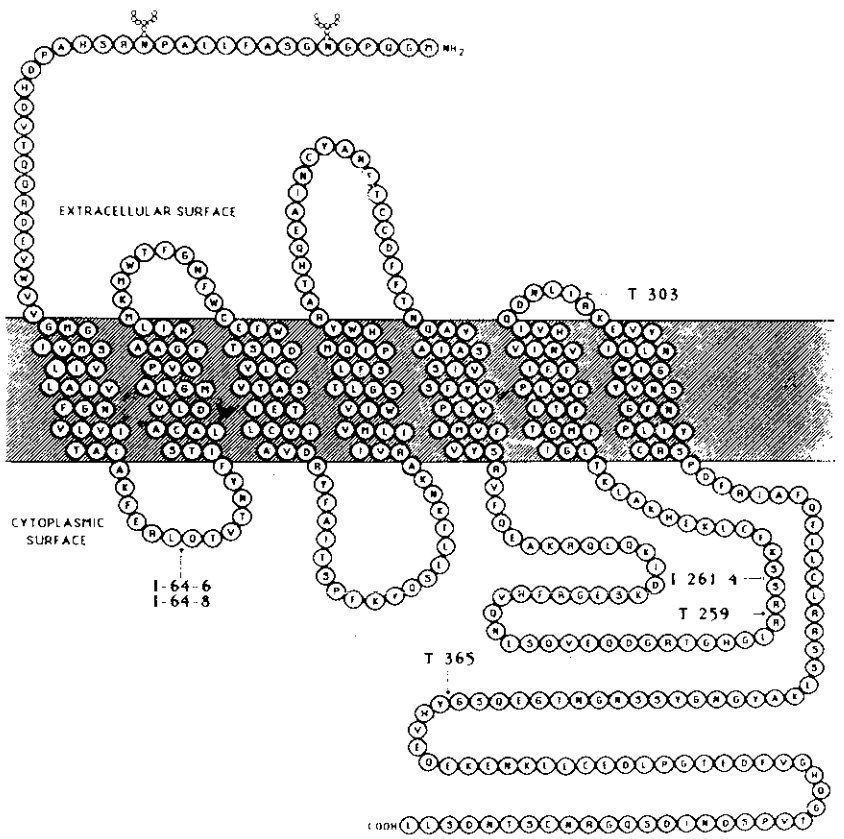

Fig. 5. A schematic view of the amino acid sequence and the integration into cellular membrane of the β-adrenergic receptor. The cental part of the receptor protein is characterised by seven hydrophobic, membrane-spanning domains, the extracellular NH_2-terminal part is involved with ligand binding, while the intracellular C-terminal end is involved with activating protein kinase.

Horn, 1990; Plomin, 1990). For molecular diagnosis of these conditions, we shall require further substantial technical advances. The availability of these powerful molecular probes as genetic diagnostic tests will raise many ethical questions, particularly as it concerns prenatal detection of defective genes (Howell, 1989; Wexeler, 1989).

Gene therapy

The successful introduction of new genes, or the replacement of defective genes with healthy genes, in plants and animals, has raised the possibily of gene therapy in man. That this is no longer in the realm of science fiction is borne out by the trials currently proceeding in the United States on replacement of the defective gene for adenosine deaminase (ADA) with a functional human gene in children with an immune deficiency syndrome. That such gene replacement therapy will be extended to correcting other genetic defects, such as diabetes and growth retardation, is easy to foresee. As regards gene replacement therapy in mental retardation, such treatment for severe cases of Lesch-Nyhan syndrome, resulting from an X- chromosome gene defect causing a deficiency in the enzyme HPRT, has already been considered (Macgregor *et al.*, 1989). The first successes with gene therapy in somatic tissues should dispel some doubts concerning the ethical acceptability of these procedures (Howell, 1989; Wexler, 1989). Where the scientific, medical, and religious communities will have to take a combined stance is regarding the introduction of genes into germ-line cells, i.e., the possibility of producing permanent and heritable changes in future generations of any organism. Whereas this technology will have beneficial effects in agriculture and ecological management, it is not likely to be readily accepted by society for gene replacement in man.

Conclusions

Many diseases of the brain and mental disorders have been traced to defective genes, either inherited or not. Recent advances in molecular genetics, which have given rise to such techniques as molecular hybridisation, polymerase chain reaction, and restriction of fragment length polymorphism, now allow us to locate defective genes on chromosomes and to have specific DNA markers. The latter will enable early diagnosis of illnesses such as Huntingdon's disease, neurofibromatosis, and Alzheimer's disease. These applications of molecular genetics are particularly useful for a function or disorder ascribed to a single gene, but are less useful in the role of inheritance in functions under multigenetic control.

The evolution of the brain and nervous system is intimately linked to that of intercellular communication, cellular recognition, and signalling. It is therefore not altogether surprising to find common basic mechanisms governing the actions of neurotransmitters and neuropeptides, on the one hand, and hormones and growth factors, on the other. Examples of the importance of the latter class of regulators are the control by thyroid hormones of foetal and neonatal brain development, the crucial role of sex hormons on behavioural imprinting, and the action of nerve growth factor in acquisition of neural functions. The key element of signalling

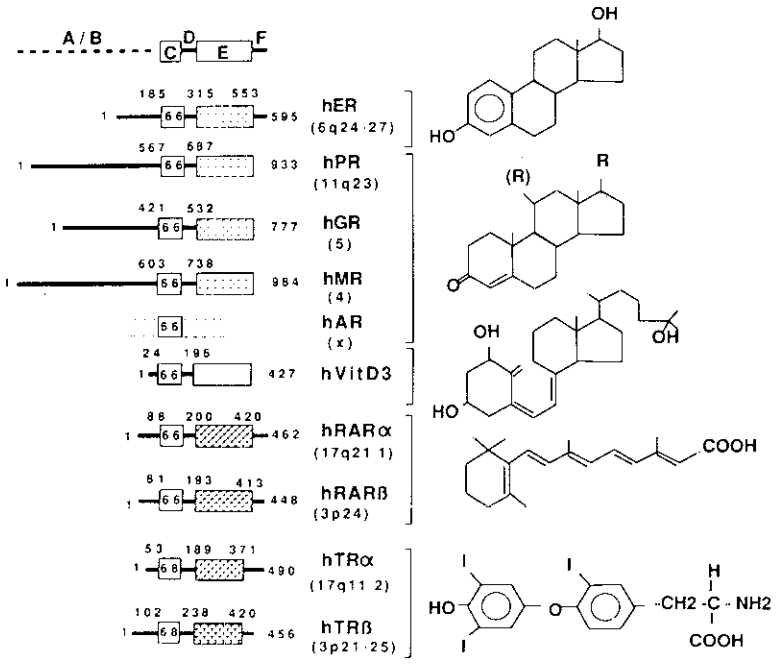

Fig. 6. Schematic depiction of the domain structure of the family of genes encoding nuclear receptors for steroid and thyroid hormones, retinoic acid and vitamin D_3. The region C, which is the most hygly conserved among all receptors, codes for the DNA binding domain. The C-terminal end of the receptor is involved with ligand binding, being, different for different hormone but conserved in different species for the same hormone. The N-terminal end is the most divergent, immunogenic and which is thought to determine interaction with other proteins.

Table 1. Membrane and Intracellular Receptors for Hormones, Neurotransmitters, and Other Signals Important for Brain Development and Function

Isoform	Hormone Binding
Insulin	Thyroid Hormones
Epidermal Growth Factor	Oestrogen
Enkephalin	Androgen
GABA	Glucocorticoid hormone
β-adrenergic	Retinoic acid
Dopamine	Vitamin D_3

mechanisms and target recognition is the receptor for the signalling molecule or ligand. In this area of research, exploitation of molecular genetics will play an increasingly important part in furthering our understanding of the intricate network of intercellular communication, which is the basis of so many activities of the central nervous system. Several genes encoding receptors for neurotransmitters, neuropeptides, hormones, and growth factors have now been cloned and analysed, which has already allowed us to have useful insights into how cellular communication is organised at the molecular level. What is now emerging is the existence of subtypes or isoforms of receptors that are exclusively expressed in the brain and which are developmentally regulated. This understanding of receptor biology would not have been possible without the recent advances specifically in recombinant DNA technology and more generally in molecular genetics.

Where molecular genetics will be making a major contribution to neural pathophysiology in the future will be in the recognition of disorders due to defective receptor structure and function, which, in turn, will lead to better drug design and improved therapy. We shall soon see the advances in this brain branch of biomedical science translated in to early diagnosis of several genetically linked neural and mental diseases.

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Table 2. Some Isoforms of Rat Thyroid Hormone Receptor

Isoform	Hormone Binding	Activation of Transcription	Tissue Distribution
α1	+	+	Heart, brain, not in brain
α2	-	Inhibits α1 and β1	Brain
αVI	-	Not known	Mainly in brain
αVII	-	Not known	Mainly in brain
β1	+	+	Most tissues
β2	+	+	Only in pituitary

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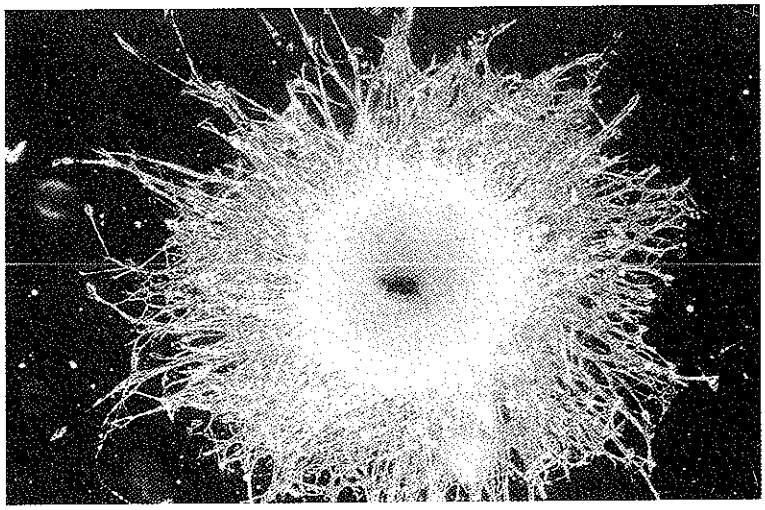


PIERRE J. MAGISTRETTI

The Biological Bases of Thought: The Language of Neurotransmitters

Introduction

To even try to address a topic such as "the biological basis of thought" is a daunting task. Some believe in such a biological basis; others, however, reject it on various grounds. Even if one embraces the hypothesis that biological mechanisms underlie the process of thinking, a scientist can best try to address it through the bias of the biological processes he (or she) studies. Constructing neural networks as models, following the fate of nerve cells during development, and recording electrical activity of the brain with electroencephalography are some of the strategies that neuroscientists use to study brain function. In our laboratory we examine the chemical processes through which nerve cells communicate. Drugs that alter behavior and the flow of thought have been shown to interfere at the molecular level with the process of cell-to-cell communication in the brain. It is the purpose of my lecture to describe the "language of neurotransmitters," i.e. the mechanisms of intercellular communication in the brain. It is our belief that understanding these mechanisms and correlating them with the behavioral effects of neuroactive drugs, will help us in the endeavour of grasping the biological basis of thought.

The study of neurotransmitters is part of the general topic of intercellular communication. Neurotransmitters are the molecules through which neurons communicate with their target-cells. These target-cells can be other neurons, endocrine or muscle cells. Neurotransmitters are released from axon terminals and exert actions upon the target-cells of neurons from which they are released. Therefore, a fundamental notion is to be held, inherent in the neurotransmitters' nature: it is the principle of neuronal individuality, of which the corollary is the existence of a spatial discontinuity between neurons and their target-cells. This implies the existence of a signal which is emitted from axon terminals and received by target-cells. Today, this notion appears obvious: nevertheless, it was at the center of a very animated controversy at the turn of the century and through the first decades of this century. Indeed, two theories were opposed:

One was the so-called "neuronal theory," according to which each neuron is an individual cell, distinct from its target-cells; this implied spatial discontinuity and, therefore, the necessity of an intercellular signal.

The second theory was the "reticular theory," according to which neurons constituted an anastomotic network without spatial discontinuity. Obviously, this type of ordering did not imply the formulation of the neurotransmitter concept because information could be transmitted directly throughout this network.

The principal promoter of the neuronal theory, which, clearly, is the one reflecting reality, was the Spanish histologist, *Santiago Ramón y Cajal*. By the skillful use of the "silver impregnation technique," which had been developed by the Italian histologist *Camillo Golgi,* he could irrefutably demonstrate the neuron's individuality. As for most discoveries, the credit is to be attributed not only to one person: *His* and *Koelliker* had already sketched it; and one of the first defenders of the neuronal theory was the great Swiss psychiatrist *Auguste Forel,* who, in 1887, published an article in *Archiv für Psychiatrie* in which this theory was clearly formulated.

Amongst the promoters of the reticular theory, one finds the Austrian psychiatrist *Sigmund Freud,* who, before becoming interested in the human mind, studied the histology of the nervous system. The most ardent defender of the reticular theory, nevertheless, was *Camillo Golgi*. This is, of course, an irony of history! *Golgi* had developed the technique of silver impregnation, which allowed *Cajal* to establish the neuronal theory! *Golgi* remained, nevertheless, faithful to the reticular theory until the end. In fact, and in spite of the accumulation of irrefutable demonstrations, the reticular theory resisted until the thirties, as illustrated by *Cajal's* book *Neuronismo o reticularismo*, written in 1932.(1) In this book *Cajal* collects the objective evidences on the anatomical unity of neurons. The final proof was yet introduced by electronic microscopy, which allowed the visualization of the synaptic articulation.

A second controversy, this time on the very nature of the signal emitted by neurons, rose later: there were, on the one hand, the defenders of "chemical neurotransmission," according to which neurons secrete molecules acting on their target-cells, other neurons for example; on the other, the defenders of "electrical neurotransmission" stated that the signal involved in neurotransmission was of an electrical nature, an electric potential, for example. Thanks to the

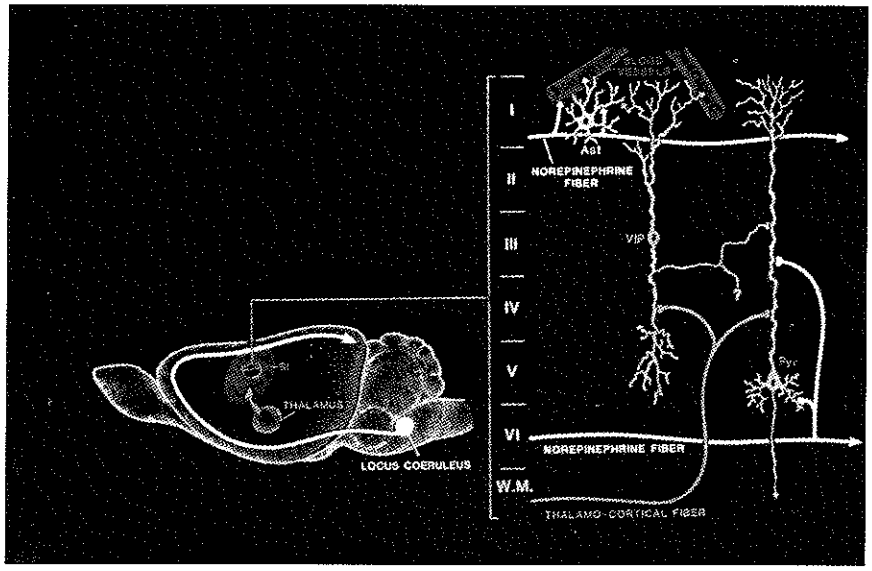


Fig 1. Schematic representation of neurons containing norepinephrine (left panel) and VIP (right panel)
Ast = astrocyte - Pyr = pyramidal cell

works of two scientists, *Sir Henry Dale* and *Otto Loewi,* the veracity of the " chemical neurotransmission " theory was established in the twenties and thirties. One should note that, already at the beginning of the century, *T.R. Elliott* proposed, on the occasion of a report to the Physiological Society, on May 21, 1904, the following: " ... Adrenalin might then be the chemical stimulant liberated on each occasion when the impulse arrives at the periphery (of the nerve). " (2)

Here is an unequivocal formulation of the chemical nature of neurotransmission!

As a conclusion of this brief historical overview, I wish to quote two reports appearing in 1943 in the same issue of the *Journal of Physiology* (volume 101). These reports were submitted within the interval of a few days between 16 September and 31 October 1942, by *Feldberg* and *Eccles*. They proposed with equal weight the two contrasting theories on the chemical or electrical nature of neurotransmission (3, 4):

W. Feldberg: " ... Evidence for the theory of chemical transmission by acetylcholine across ganglionic synapses points to the preganglionic nerve endings as the seat where the acetylcholine is liberated. "

J. C. Eccles: " ... It has been shown that synaptic transmission may be mediated by the local negative potential (the synaptic potential) which is set up by a nerve impulse incident on a nerve cell. "

At the end of the forties, *Eccles* accomplished what some called " a conversion " and became one of the principal promoters of the chemical neurotransmission theory; he conducted a series of elegant and conclusive experiments, which have proved the cogency of this theory. For these he received the Nobel Prize in 1963.

The study which had brought the demonstration of the chemical nature of neurotransmission was essentially related to two neurotransmitters: norepinephrine and acetylcholine, both the principal neurotransmitters of the autonomic nervous system. But from the end of the forties up to the present time, the vocabulary of neurotransmission, i.e. the number of identified neurotransmitters, has exponentially increased. Large credit for the discovery of the new elements in the language of neurotransmitters is to be given to *Vittorio Erspamer* and *Viktor Mutt*. Both scientists are the " fathers " of many amine and peptide neurotransmitters originally isolated from such diverse tissues as toad's skin or mammalian gut! Hence a neurotransmitter function has been established for serotonin, histamine, and dopamine (which like norepinephrine, are monoamines) and also for certain amino acids such as glutamate, aspartate, GABA, glycine and taurine (Table 1). Nevertheless, the explosion took place with the discovery, in the middle of the seventies, of peptides with a neurotransmitter function (Table 2). Peptides are an amino acid sequence of three, in the case of TRH, to forty for GRF, for example. Certain peptides were already known before their identification in the nervous system, either as circulating hormones or as mediators of intercellular communication in the gastro-intestinal tract (CCK, VIP); others were known as hypothalamic releasing factors (CRF, GRF).

Table 1. " Classical " neurotransmitters

Amino acids	Amines
Aspartate	Acetylcholine
GABA (γ-aminobtyric acid)	Dopamine
Glutamate	Histamine
Glycine	Norepinephrine
Taurine	Serotonin

Figure Legends

Criteria for a neurotransmitter function

In view of the plethora of molecules identified recently in the nervous system, a question comes immediately to mind: what criteria should be fulfilled to ascribe a neurotransmitter function to a molecule? The first criterion, of course, is that the molecule should be contained in neurons; that is the case, for example, for norepinephrine, which is localized in neurons of the *locus coeruleus* in the brainstem; from here axons project globally to virtually all levels of the neuraxis, in particular the cerebral cortex (Figure 1, left panel). Other neurotransmitters, such as, for example, VIP, or " Vasoactive Intestinal Peptide, " are contained, within the ce-

rebral cortex, in a population of locally projecting interneurons (Figure 1, right panel). Recently, the coexistence of two, or even three neurotransmitters within the same neuron was demonstrated. This notion of " co-localization " provides the substrate for functional interactions between co-localized neurotransmitters at the pre- and postsynaptic level.

The example of VIP

In order to illustrate the criteria for the establishment of neurotransmitter function, I will take an example that we have studied in detail, i.e., VIP. VIP is a 28 amino acid peptide, which was originally isolated in the gastro-intestinal tract by *Viktor Mutt* and *Sami Said* and, as was the case for numerous peptides of gastro-intestinal origin, it was subsequently identified in the nervous system. Within the central nervous system, VIP is particularly concentrated in the cerebral cortex, the region where we have studied it.

As a first criterion the presence of VIP was demonstrated within a defined population of cortical neurons. VIP neurons are bipolar cells with a radial orientation. These interneurons exert local actions, within cortex columns (5). These morphological characteristics distinguish (VIP neurons) from those containing norepinephrine (Figure 1); their cell bodies are localized in the brainstem, and their axons project to the cerebral cortex, where they adopt a horizontal trajectory. Thus noradrenergic axons can influence globally (as opposed to the local effect of VIP neurons) functionally distinct regions of the central cortex (Figure 1).

A second criterion for a neurotransmitter function is the demonstration of its release from presynaptic terminals. VIP, measured by radioimmuno-assay in the extracellular medium, is released by a depolarising stimulus, such as, for example, an increase of extracellular potassium. This release is entirely dependent on the presence of calcium in the extracellular medium (6, 7).

Once released, the neurotransmitter is recognised by supramolecular complexes called receptors, located on the membrane of postsynaptic neurons. The identification of specific receptors is a third criterion for a neurotransmitter function.

Another criterion, possibly the most significant in the context of the language of neurotransmitters, concerns the action that a neurotransmitter circulates (Figure 2). In some instances, the action of a neurotransmitter is a change in permeability for a given ion in the postsynaptic membrane. In this case, the receptor is directly coupled to an ionic channel. Depending on the ion for which the permeability has been increased, the post-synaptic neuron will be either depolarized or hyperpolarized. For VIP, the signaling process is more complex. VIP receptors are coupled to an enzymatic cascade which triggers a series of intracellular processes. Through a protein called G-protein, because it binds GTP, the receptor occupied by VIP stimulates an enzyme, adenylate cyclase, which catalyzes the formation of a second messenger, cyclic AMP (Figure 2). It is called a " second messenger, " in contrast to VIP or other neurotransmitters, which are the " first messengers. " The increase in cyclic AMP causes the activation of a protein kinase, in this case called protein kinase A, because it is cyclic AMP dependent. Activation of this protein kinase triggers a number of cellular effects. Unfortunately, we have to admit that our knowledge of the actions resulting from cyclic AMP increases, and indeed for other second messengers (see below) in neural cells, is relatively limited; we still have to go a long way to understand the language of neurotransmitters!

We have, however, demonstrated that cyclic AMP increases result in the stimulation of glycenolysis in the cerebral cortex (8). This action allows the mobilization of energy substrates from glycogen, which constitutes the main energy reserve of the nervous system. This action of VIP takes place in glial cells, one of the various cell types which, in addition to neurons, make up the nervous system. If one correlates the morphology of VIP neurons (Figure 1) with the biochemical observation indicating glycogenolytic action, it appears that VIP neurons are local regulators of energy metabolism in the cerebral cortex.

Other rules in the language of neurotransmitters have recently emerged. Thus, certain receptors are coupled through a G protein to other enzymatic cascades such as

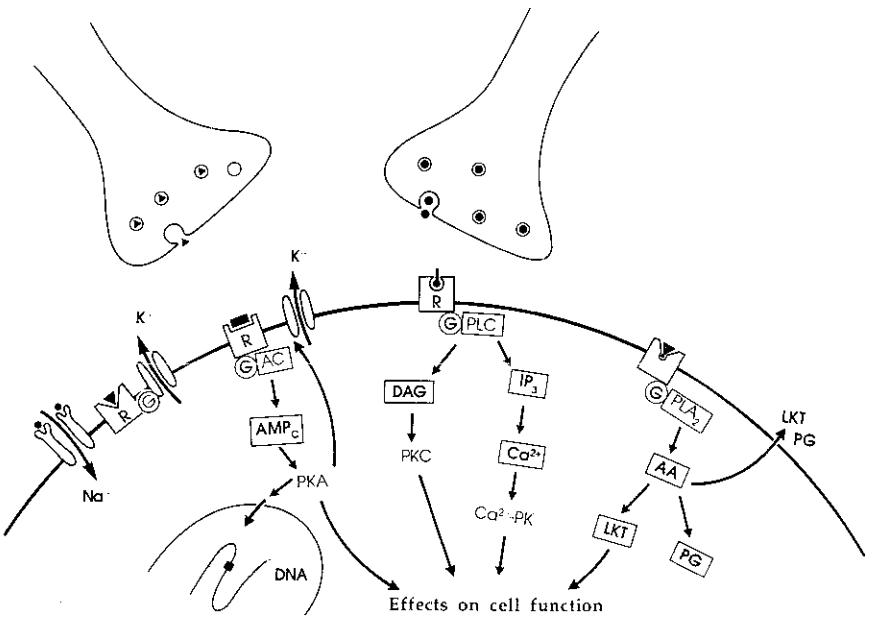
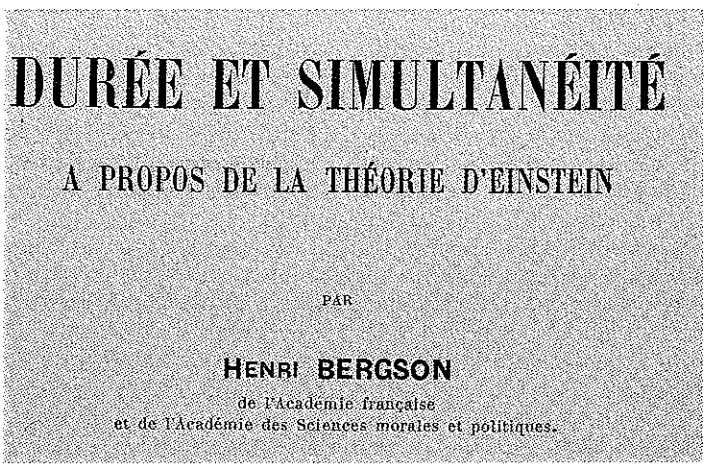


Fig. 2. The language of neurotransmitters!
R = receptor; G = GTP = binding protein; AC = adenylate cyclase; AMPc = cyclic AMP; PKA = protein kinase A; PLC = phospholipase C; DAG = diacyglycerol; PKC = protein kinase C; IP_3 = inositol triphosphate; Ca^2+PK = Calcium-calmodulin dependent protein kinase; PLA_2 = phospholipase A_2; AA = arachidonic acid; LKT = leukotrienes; PG = prostaglandins


DURÉE ET SIMULTANÉITÉ

A PROPOS DE LA THÉORIE D'EINSTEIN

PAR

HENRI BERGSON

de l'Académie française
et de l'Académie des Sciences morales et politiques.

Fig. 3

those triggered by phospholipase C, which, when activated generates two " second messengers ": diacylglycerol, and inositol trisphosphate (Figure 2). The latter molecule mobilizes calcium ions from intracellular stores and acts in turn, as a " second messenger. " Finally, there is a third enzymatic cascade, only recently characterised in the nervous system, but well known for its role in inflammation mechanisms: it is the cascade which, following receptor occupancy, leads to phospholipase A2 activation. This enzyme releases arachidonic acid from membrane phospholipids, forming, under the effect of other enzymes (cyclooxygenase and lipoxygenase), either prostaglandins or leucotrienes (Figure 2).

A summary of transduction mechanisms in the central nervous system is depicted schematically in Figure 2.

Duration and simultaneity

I would like to approach an important dimension in our understanding of neurotransmitter actions: it is the dimension of time. To this end I take the liberty of using the title of the work by *Henri Bergson* (*Durée et simultaneité*) because it illustrates the two terms that I consider essential in the " language of neurotransmitters " (Figure 3). One can easily grasp the notion that a neurotransmitter acting on a receptor which is directly coupled to an ionic channel will exert its effect more rapidly than a neurotransmitter coupled to a complex transduction mechanism that triggers an enzymatic cascade. In the first instance, the neurotransmitter exerts its action on the order of a millisecond, while for the second one, for example, VIP stimulating cyclic AMP formation and glycogenolysis, the time-scale is on the order of seconds or even minutes. Recently evidence has emerged indicating that the cyclic AMP cascade, (and in fact other second messengers) regulates DNA expression. Such an action will result in effects occuring after various hours and even days or weeks (Figure 2). The dimension of duration is, therefore, extremely important in our understanding of neurotransmitter actions.

The second dimension contained in the title of *Bergson's* work is simultaneity. Each neuron receives thousands of afferents, each axon terminal containing one and possibly two or three neurotransmitters. Several of these axon terminals simultaneously release neurotransmitter(s) on a target-neuron, allowing interactions to occur. For example, when we simultaneously apply VIP and NA to the cerebral cortex, the amount of cyclic AMP formed is 4 to 5 times greater than the algebraic sum of the individual effects of VIP and NA.[9] This observation illustrates the existence of synergistic interactions between two neurotransmitters (first messengers) in the formation of second messengers.

Other molecules with neuromodulatory functions

Recently, modulatory actions of interleukins and prostanoids on neurotransmitter function have been demonstrated.

Interleukins and prostanoids are predominantly synthesized by a particular cell type of the nervous system, the astrocytes. Astrocytes are glial cells and have been long

Tabel 2. Neuropeptides

ACTH	Leu-enkephalin
Angiotensin	LHRH
Bombesin	Lipotropin
Bradykinin	Met-enkephalin
Calcitonin	Motilin
Carnosin	α-MSH
Cholecystokinin	Neuropeptide γ
CRF	Neurotensin
Delta Sleep Inducing	Oxytocin
Dynorphin	Pancreatic peptide
β-Endorphin	Proctolin
Gastrin	Secretin
GH	Somatostatin
Glucagon	Substance P
GRF	TRH
Insulin	Vasopressine
Kyotorphin	VIP

considered " the silent partners of neurons "; they do not seem to be so quiet, since they can modulate the action of neurotransmitters by releasing molecules that act as local modulators. Thus, " classical " neuron-neuron neurotransmission seems to be influenced by molecules of glial origin. In other words, glial cells also have " something to say " in the language of neurotransmitters!

It is now clear that, in addition to neurotransmitters identified by the criteria outlined earlier, other molecules only recently identified in the nervous system seem to play an important role in cell-to-cell communication. In particular, molecules such as prostanoids and cytokines (e.g., the interleukins), which had previously been identified for their function in inflammatory and immune processes,(11) respectively, are produced by neural cells and can modulate the actions of neurotransmitters.

Conclusion

I have outlined some of the elements and rules of the " language of neurotransmission. "

This language may produce marvelous poems in a gentle, powerful, and elegant human mind; pathological processes can turn this language into the hardly intelligible jargon that we witness in psychiatric disorders.

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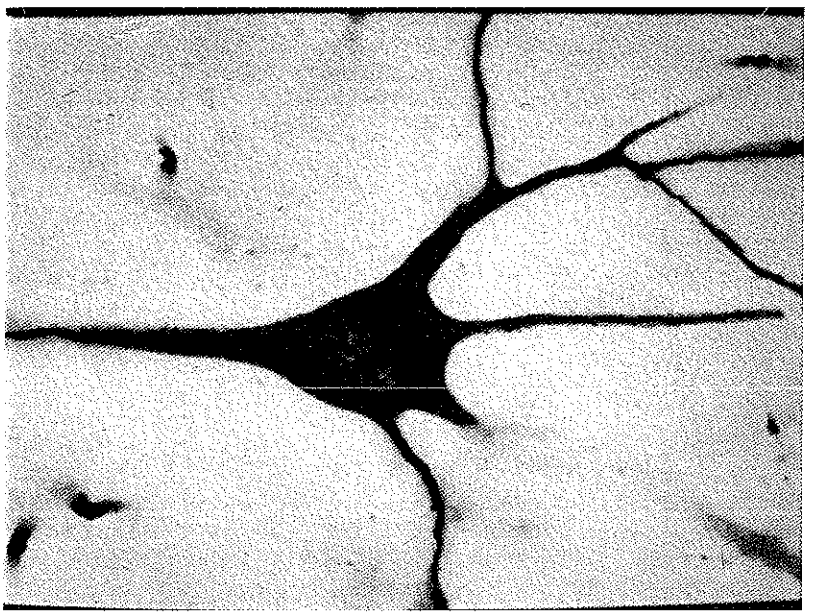


ERMINIO COSTA

Endogenous GABA Receptor Modulation and Anxiety Regulation

Introduction

The brain can anticipate events and thereby prepare the organism to respond to the events it predicted. An emotional impact is associated with this anticipation. Such emotions are often grouped under the term of " anxiety. " There is an individual variability in the quality and intensity of emotions accompanying anticipation. When this emotional component becomes an important part of the daily emotions, one reaches the borderline of psychopathology. In fact the anxiety disorders are recognized nosological syndromes characterized by a predominance in the daily behavior of fears, phobias, panic, and compulsions.

As in every behavioral output, also in the physiology and psychopathology of anxiety it is not easy to single out the neurochemical processes that participate in the emotional response. Nevertheless, there is some consensus for the view that anxiety disorders often include abnormalities in the function of the synaptic transmission mediated by γ aminobutyric acid (GABA).

GABA is the most prominent brain transmitter mediating inhibition of neuronal activity. The GABAergic synapses are present in every brain structure: from the cortical areas to the spinal cord; it is believed that they represent about 33% of all the synapses present in the human brain. Because of this ubiquity, GABAergic synapses can regulate the firing rate of every neuronal system in the brain.

Hence if anxiety disorders were to be related to an alternation of the GABAergic system one might surmise that a secondary change in the function of many other transmitters might be associated with the primary disturbance of the GABAergic system. Hence it should not be surprising that, for instance, the symptoms of some anxiety disorders such as obsessive-compulsive behavior partially remit following medications targeted to serotonergic synapses, and the intrusive thoughts associated with posttraumatic stress disorders respond to drugs targeted to adrenergic synapses. However anxiolytic benzodiazepine (BZ) derivatives which specifically modulate the receptors for GABA ($GABA_A$ receptors) owe their success in the therapy of anxiety disorders to their uncontested efficacy and rapid onset of action Though the biological basis of anxiety and anxiety disorders is not known the therapeutic efficacy of BZ in several anxiety disorders and the ability of negative modulators of $GABA_A$ receptors to evoke panic attacks strongly suggest that a critical insufficiency of GABAergic function might be operative in the emotional physiological-pathological and pathological syndromes associated with brain anticipatory activities.

GABA receptors

There are two classes of GABA receptors (A and B). $GABA_A$ receptors gate Cl^- fluxes across the neuronal membrane and are frequently responsible for inhibitory hyperpolarization. $GABA_B$ receptors are metabolotropic receptors that mediate Ca^{2+} and K^+ fluxes regulation via the formation of second messengers.

$GABA_A$ receptors are heteroligomeric proteins (probably pentameric) and include recognition sites for the primary transmitter and for various classes of allosteric modulators which facilitate or reduce the efficacy of GABA action on $GABA_A$ receptors.

Since $GABA_A$ receptors span the neuronal membrane we can distinguish three domains: extraneuronal, transmembrane, and intraneuronal (Fig. 1).

Endogenous peptide modulators act on recognition sites located in the extraneuronal receptors domain, neurosteroids synthesized in glial cells act on the transmembrane domain. Probably also the intraneuronal domain participates in this allosteric modulation following phosphorylation and dephosphorylation at specific phosphorylation consensi.

The concept of allosteric modulation of receptor function holds that endogenous compounds can increase or decrease transmitter efficacy in the absence of a direct agonistic action on channel function via binding to a receptor site different from that occupied by the transmitter. $GABA_A$ receptors are heteromaric proteins — that is, they include in their structure two or more different subunits (α, β, γ). There is an apparent variability in structural selection which confers a functional variability to various $GABA_A$ receptor subtypes with regard to their responsiveness to allosteric modulators acting on extraneuronal $GABA_A$ receptors domains. Although the precise nucleotide and deduced aminoacid sequences of many of the various molecular forms of α, β, and γ are known, the exact quaternary structures of the native $GABA_A$ receptor

subtypes are unknown. Experiments with various receptors conformations obtained with recombinant DNA technology, shows varying Cl^- channel function and sensitivities to modulatory agents, including drugs such as BZ. Since differences are described in the regional brain distribution of mRNAs for various $GABA_A$ receptor subunits, it is likely that drug specificity might be obtained because coupled with the observed differences of the relative affinities of drugs for various $GABA_A$ receptor subtypes. Hence one may examine novel strategies for the discoveries of drugs to be used in anxiety disorders.

Pharmacology of $GABA_A$ receptor modulation

Heterogeneity of BZ recognition sites located in $GABA_A$ receptors has been suggested to be responsible for the different pharmacological profiles of the most used BZ. However, it is not probable that a given $GABA_A$ receptor is selectively associated with the elaboration of specific emotions although one might surmise that such specificity could derive from the fact that GABAergic neurons of a given brain area may express more abundantly a given $GABA_A$ receptor conformation. In fact, information available indicates that though a given neuron expresses more than one $GABA_A$ receptor subtype it may include a higher abundance of certain subtypes. These considerations should not encourage us to think that BZ specificity for a given $GABA_A$ receptor may be a realistic goal, but may encourage the study of BZs with low intrinsic activity that are selective for a group of $GABA_A$ receptor subtypes. These not only might confer selectivity in the pharmacological profiles of given BZs, but also may limit the dependence and tolerance liability of anxiolytic drugs. Both problems are a current source of concern in the clinical use of BZ. A concurrent effort might be directed to the development of anxiolytic medications that maintain acceptable efficacy and yet produce less pronounced sedation, memory deficit, noncoordination of movements, and ataxy.

Mitochondrial Benzodiazepins Receptors (MBR)

Diazepam and many other BZs used clinically in addition to an affinity for $GABA_A$ receptors possess an affinity for another BZ recognition site located in the outer membrane of selected mitochondrial populations (MBR).

The MBR is abundant in brain glial cells and in endocrine tissue steroidogenic cells and appears to regulate mitochondrial steroidogenesis by gating cholesterol access to specific cytochrome P_{450} enzymes which by side chain cleavage transform cholesterol into pregnenolone, the parent molecule for every steroid hormone present in our body. Glial cells produce pregnenolone sulfate (negative modulator) and probably also hydroxy 5α-pregnone-20 one (positive modulator), which allosterically changes GABA action at $GABA_A$ receptors.

Considering glial steroidogenesis with regard to the physiology of $GABA_A$ receptors one can surmise that the level of production of neurosteroids with positive modulatory action may reduce emotional response associated with brain anticipatory activities and that the contrary may be true if steroids with negative modulatory action are produced in excess. This working hypothesis requires further testing, but increases our hopes for a therapy of anxiety disorders targeting this indirect regulatory mechanism of GABA action on $GABA_A$ receptors.

This emerging field of endeavour should be evaluated vis-à-vis the mode of action of BZ and other anxiolytic drugs. One can now distinguish several classes of drugs with respect to their mechanism of action on anxiety disorders: 1) selective positive or negative modulators acting on the extraneuronal domain of $GABA_A$ receptors; 2) selective positive or negative indirect modulators acting on the MBR; 3) non-selective modulators acting both on the extraneuronal domain of $GABA_A$ receptors and on MBR; 4) antagonists inhibiting the physiological modulation of MBR; 5) antagonists of the physiological modulation of the extraneuronal $GABA_A$ receptor domain.

In fact, the therapeutic implications associated with these various mechanisms are of considerable importance. While extraneuronally located allosterically modulatory sites confer a receptor specificity to the

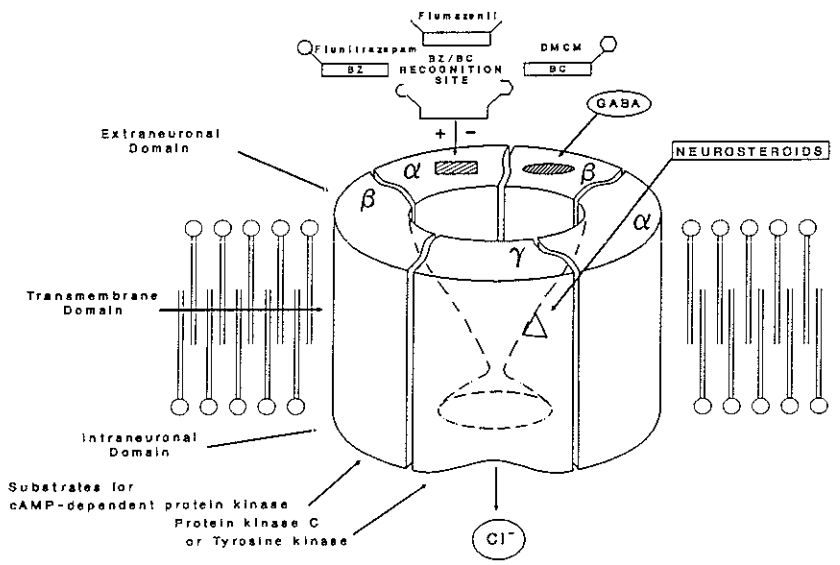


Fig. 1

drug action related to the structural diversity of $GABA_A$ receptors, the activation of steroidogenesis does not have a selectivity for $GABA_A$ receptor subtypes. In fact, as discussed earlier (Fig. 1), neurosteroids act on the $GABA_A$ receptor transmembrane domain and lack specificity for variation in the quaternary or tertiary structure of $GABA_A$ receptors. In practical terms this means that steroidogenesis activation is a generalized response which cannot be targeted to specific brain structures.

However, there might be a specific extracellular signal which, like pituitary hormones for the endocrine tissue, may activate steroidogenesis by acting on a membrane receptor of glial cells. If there is a diversity in this signaling, it may imply specificity for a given nucleus, brain structure, etc.

Endogenous modulation of $GABA_A$ receptors

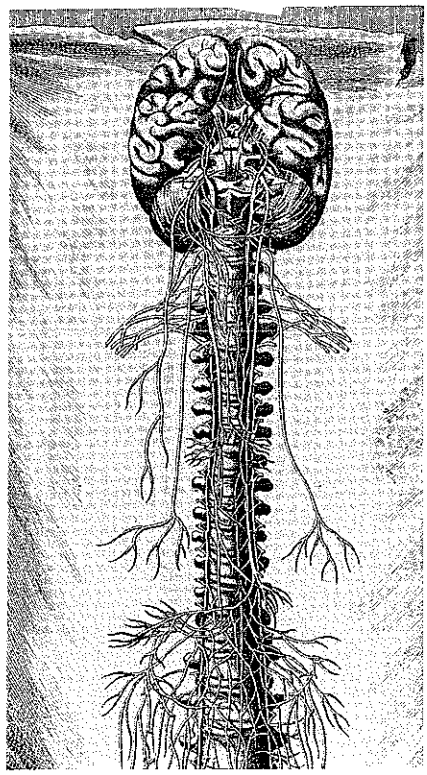
Several lines of investigation indicated that there are three classes of endogenous modulators of $GABA_A$ receptors produced and/or stored in brain structures. These are 1) peptides (DBI), 2) organic compounds of unknown structure which appear chemically related to anxiolytic BZs (endozepines) because they crossreact with antibodies raised against halogenated synthetic BZs and displace them from their recognition sites located on $GABA_A$ receptors and on mitochondria, 3) neurosteroids which are produced by mitochondria located in astroglia cells and oligodendroglia.

1) *Peptides*

Diazepam Binding Inhibitor (DBI) was originally identified in human and rat brain extracts by its ability to displace 3H diazepam from the BZ recognition sites associated with $GABA_A$ receptors. Histochemical studies have shown DBI to be present in selected populations of neurons and in glial cells. DBI and its processing products (DBI_{33-50}, ODN) (DBI_{17-50}, TTN) in the brain appear to have two distinct actions: ODN negatively modulates $GABA_A$ receptors and TTN stimulates mitochondrial steroidogenesis following its binding to MBR.

The structure of DBI appears to be rather well preserved through phylogenesis. Human DBI has a high degree of homology with rat DBI. This peptide appears to be present in selected neuronal population of amygdala, hippocampus, thalamus, and cortex. Moreover, a high concentration of DBI mRNA and DBI are found in glia cells. The peptide is present in the spinal fluid (SF); an increase in SF DBI content was found in patients with a possible malfunction of GABAergic mechanism such as patients with hepatotoxic encephalopathy (HE) and severe depression. In the latter group of patients the increase is positively related to the increase in corticotropic releasing factor (CRF) inviting speculation on a possible role of DBI in the regulation of mitochondrial neurosteroidogenesis in endocrine tissues.

In HE patients the increase of SF DBI is associated with an increase in the SF content of DBI processing products, suggesting that perhaps DBI is overproduced and there is a stimulation of neurosteroidogenesis. This neurosteroid overproduction can positively modulate GABA action on $GABA_A$ receptors. Such an hypothesis could explain why the treatment with the BZD antagonist Flumazenil has a beneficial effect in many HE patients.



The evidence of a DBI role in steroidogenesis raises the possibility that the increase in SF DBI observed in depressed patients with severe anxiety may cause an excessive production of pregnenolone sulfate, which by negatively modulating GABA action on $GABA_A$ receptors could increase anxiety levels in these patients.

Recent studies have shown that in glial cells TTN and DBI can increase the cholesterol flux to a specific cytochrome P_{450} enzyme located in the inner mitochondrial membrane, where they produce cholesterol by side chain cleavage of cholesterol. Thus it is possible to postulate that DBI synthesized and stored in glial cells might then be operative in regulating emotions associated with anticipatory brain activity, via the stimulation of mitochondrial pregnenolone sulfate biosynthesis. This hypothesis needs experimental confirmation.

2) *Endozepines*

Several laboratories have identified the presence in extracts from animal and human brains of diazepam and desmethyldiazepam. The identification of diazepam and its metabolites was helped by the presence of halogens substituting for H in the basic 1,4 benzodiazepine, a heterocyclic ring structure. The origin of these compounds and their biosynthetic pathway in animals or plants remain mysterious. However, a simple environmental contamination is unlikely, as benzodiazepin-like material has been identified in brain specimens stored when the synthesis of halogenated benzodiazepines was not yet operative. Though halogenated benzodiazepines are certainly present in the brain, they may be related to environmental contamination, for they appear to be present only in trace amounts. In fact, their content cannot account for the significant biological activity described for brain BZD-like material. The chemical structure of these endogenous compounds that are benzodiazepine-like in structure and biologically active have not yet been identified

and that are termed "endozepines." However, nonhalogenated 1,4 benzodiazepines can be naturally synthesized by several fungi and bacterial species; this might be a source of the brain endozepines or they may be synthesized in the brain by a similar pathway. However, it is possible that endozepines may be synthesized also in animal and human tissues, where they may play a role in neurosteroidogenesis regulation and thereby in the brain they might directly and indirectly modulate $GABA_A$ action. The endozepine SF levels are also increased; thus an action of DBI and endozepines on GABAergic tone via their action on steroidogenesis and on $GABA_A$ receptors might be important in explaining the beneficial action of Flumazenil in the treatment of hepatic coma.

The structural identification of endozepines will provide new insights into the endogenous regulations of GABAergic transmission and its consequences in relation to the etiology of anxiety disorders.

3) *Neurosteroids*

As described earlier, these $GABA_A$ receptor modulators are produced by glial cells and act indiscriminately on various $GABA_A$ receptor subtypes modulating the GABA action positively or negatively.

It is possible that extraneuronal chemical signals (endozepines) activate mitochondrial steroidogenesis via MBR. Moreover, it is also possible that other extraneuronal chemical signals may act on the glial cell membrane and activation MBR via the conversion of DBI from an inactive to an active state; such conversion appears to be mediated in endocrine tissues by cyclic AMP and protein kines A activation. Such a model is suggested by evidence that in steroidogenetic cells the pituitary hormone activates steroidogenesis via a protein regulated by CAMP, protein kinese A

Conclusion

Though we cannot yet formulate molecular mechanisms that explain normal and abnormal emotions associated with brain anticipation of events, we can indicate that abnormalities of $GABA_A$ receptor modulation by endogenous unrestricted, DBI and endozepines may represent important tools that may foster the beginning of our understanding of the molecular basis of anxiety disorders.

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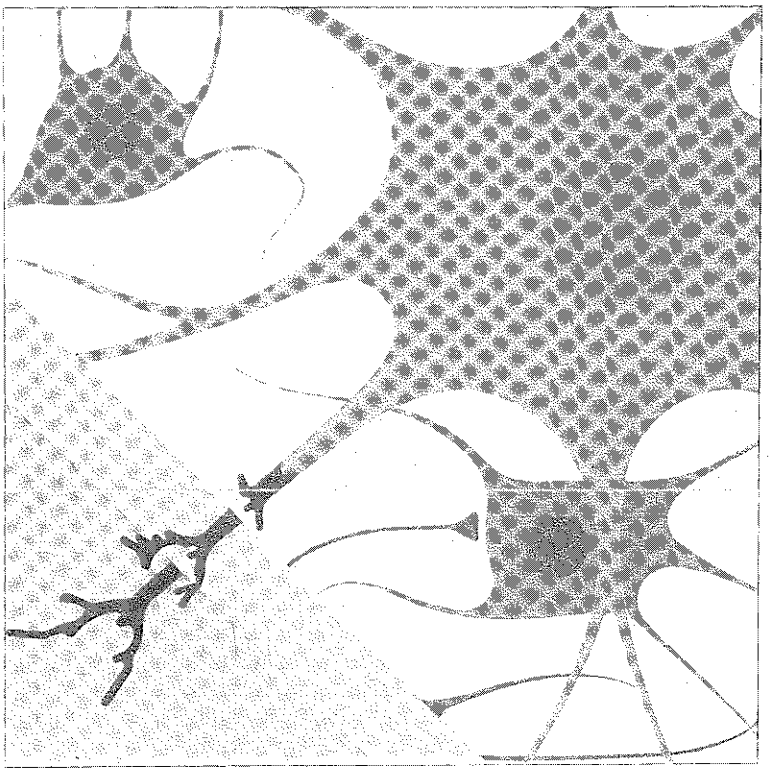


MARCUS E. RAICHLE

Looking at the Brain at Work

Introduction

Substantial evidence supports the hypothesis that the human brain is structurally and functionally modular. One of the great challenges in neuroscience is to understand how this modularity is organized in support of mental activity. Such an understanding must at least accompany, if not precede, a knowledge of how specific components of a mental operation are implemented in individual modules (e.g., local ensembles of neurons). Modern imaging techniques substantially improve our ability to identify and study widely distributed component modules supporting specific mental operations. One approach is the measurement of local brain blood flow with positron emission tomography (PET). This technique is especially important because it permits an examination of these distributed modular relationships in the normal human brain.

Interest in the relationship between brain blood flow and local functional activity has spanned nearly a century. The initial interest crystallized when Roy and Sherrington published their seminal 1890 paper, in which they put forth the suggestion that there exists an "automatic mechanism" that provides for a local variation in blood supply in accordance with local variations in the functional activity of the brain. Subsequent experiments in laboratory animals and humans led to comfirmation of these pioneering observations and to the establishment of one of our most sensitive and accurate means of studying the functional anatomy of the normal human brain in vivo (see Raichle 1987 for review of this literature).

In this paper I will briefly outline a strategy employing PET measurements of *changes* in local brain blood flow. These measurements are obtained by subtracting measurements made in a control state from those made in a functionally activated state in the same subject. These measurements are then averaged across subjects (and occasionally within a subject) to improve the signal to noise properties of the resulting image. From such data emerges a map of the distributed modular brain organization underlying normal human cognition and emotion.

The technique

Emission tomography is a technique that produces an image of the distribution of a previously administered radionuclide in any desired section of the body. Positron emission tomography (PET) uses the unique properties of the annihilation radiation that is generated when positrons are absorbed in matter (Raichle 1983) to provide an image that is a highly faithful representation of the spatial distribution of the radionuclide at a selected plane through the tissue. Such an image is effectively equivalent to a *quantitative tissue autoradiogram* obtained with laboratory animals, but PET has the added advantage that it is noninvasive; hence studies are possible in living animals, including humans. PET has been used in humans to measure brain blood flow, blood volume, metabolism of glucose and oxygen, acid-base balance, receptor pharmacology and trasmitter metabolism (for an introduction to this literature see Raichle 1986). In this paper I will focus on the measurement of brain blood flow and its use in mapping the local functional activity within the normal human brain.

Our strategy for the functional mapping of neuronal activity in the human brain with PET is composed of a number of important elements. These include the deliberate selection of blood flow measured with the PET adaptation of the Kety autoradiographic technique (Herscovitch et al., 1983; Raichle et al., 1983; Herscovitch et al., 1987), or estimated from the radioactive counts accumulating in brain tissue during 40 seconds following the intravenous bolus administration of $H_2\,{}^{15}O$ (Fox et al., 1985), as the most accurate and flexible signal of changes in local neural activity that can be detected with PET (Fox et al., 1988). Linearly scaled images of blood flow or radioactive counts in a control state are subtracted from images obtained during functional activation in each subject (i.e., paired image subtraction). The control state and the stimulated state are carefully chosen so as to isolate, as far as possible, a single mental operation (e.g., Petersen et al., 1988). By subtracting blood flow measurements made in the control state from each task state it is possible to identify those areas of the brain concerned with the mental operation unique to the task state. This extends to our work a strategy first introduced to psychology by Donders in 1968 in which reaction time was used to dissect out the components of mental operations (Donders, 1969). In our work we can now do so in terms of

specific regions of the brain. These subtraction images form the basis of a data set that is composed of averaged responses across many individual subjects or across many runs in the same individual. Image averaging dramatically enhances the signal-tonoise properties of such data. This enables us to detect even low-level responses associated with mental activity (Mintun et al., 1989; Fox et al., 1988).

Functional mapping studies

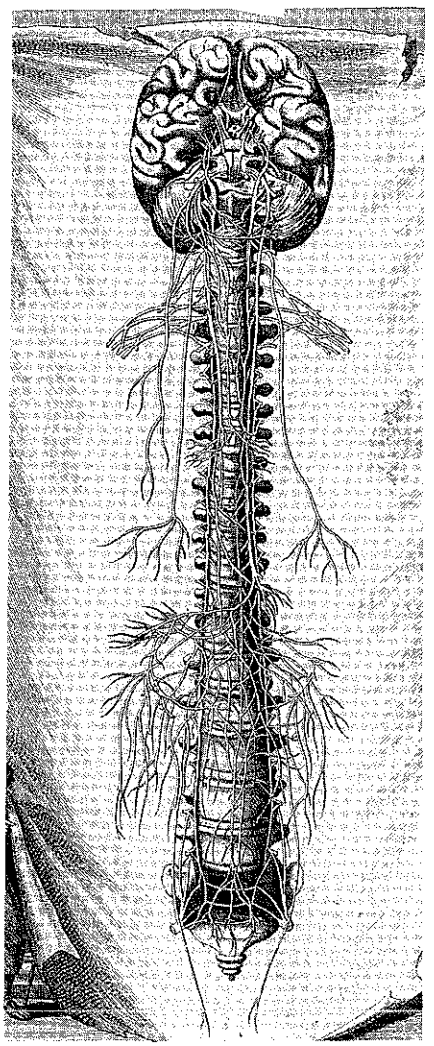
Anatomy of Single Work Processing

For several years now we have been examining the cortical anatomy of single-word processing (Petersen et al., 1988; Petersen et al., 1989; Petersen et al., 1990) as an initial step in the study of language. Because of the great complexity of language, restriction of our efforts to an understanding of the processing of individual words seemed warranted. Furthermore, the design of tasks appropriate for such studies with PET was greatly aided by extant knowledge in cognitive psychology, linguistics and clinical neurology (e.g. LaBerge and Samuels, 1974; Colheart, 1985; Damasio, 1984).

In this project we used four behavioral conditions in each subject to form a three-level subtractive hierarchy in which each task state was intended to add a small number of mental operations to those of its subordinate (control) state.

In the *first level* comparison the visual presentation of single words without a lexical task was compared to visual fixation on a small cross-hairs on a television monitor without word presentation. Words were presented for 150 msec at the rate of one per second on a television screen during the 40 second measurement of blood flow. No motor output or volitional lexical processing was required in this task; rather, simple sensory input and involuntary word-form processing were targeted by this subtraction.

The areas of the brain identified as active during the passive viewing of words appear to support two different computational levels, one of passive sensory processing in the primary visual cortex and a second level of modality-specific word-form processing in extrastriate areas. The main regions activated were in striate cortex bilaterally and extrastriate areas, several on the left and the right. The primary striate responses were similar to those produced by simple sensory stimuli such as the checkerboard pieces used in our earlier experiments (Fox et al., 1986; Fox et al., 1987). The regions in the extrastriate cortex became candidates for a network of cortical modules that code for the visual word therefrom. Subsequent experiments (Petersen et al., 1990) demonstrated that the area located in the region of the left gyrus fusiformis and gyrus lingualis (i.e., Brodmann's areas 19 and 37) was activated by words and nonwords obeying rules of English and not by consonant letter strings or false fronts. Taken together, the several regions of striate and extrastriate cortex activated by passive visual words appear to combine, functionally, to analyze visual symbols and distinguish between those that behave according to rules of the English language and those that do not.



Words presented auditorily with subjects passively fixating on the visual cross-hairs activated an entirely separate set of areas in temporal cortex bilaterally (Petersen et al., 1988; Petersen et al., 1989; gyrus temporalis superior and supramarginalis) which were conspicuous by their absence during the presentation of words visually. Only when subjects were asked to judge whether pairs of visual words rhymed were responses seen in these areas (Petersen et al., 1988; Peterson et al., 1989) emphasizing the functionally flexible nature of these modular relationships.

In the *second level* comparison subjects were asked to repeat the words presented auditorily or visually. The control state for the PET blood flow subtraction was the passive presentation of auditory or visual words. Areas related to motor outpur and articulatory coding were activated (Petersen et al., 1988; Petersen et al., 1989). In general, similar regions were activated for the auditory and visual presentation. Some reactions appeared in the primary sensorimotor mouth cortex bilaterally, the supplemen-

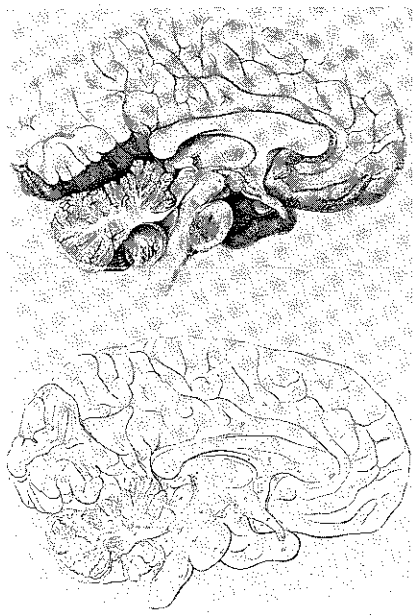
tary motor area or SMA, and in insular cortex bilaterally. The left insular response is near Broca's area, a region often viewed as specifically serving language output. But similar insular activation was also found when subjects were instructed to simply move their mouths and tongues (unpublished), arguing against specialization of this region for speech output.

In the *third* and final *level* of comparison subjects were asked to speak a verb for each noun presented, either auditorily or visually, again while monitoring a fixation point. Responses were identified in two areas of cerebral cortex as well as for both auditory and visual word presentation. A left prefrontal area (Brodmann areas 45 and 46) was identified that participates in an undefined way in the process of semantic association. The second area in the anterior cingulate gyrus (Brodmann area 32) is probably part of an anterior attentional system engaged in selection for action. This localization of function was suggested by the performance of converging experiments detailed elsewhere (Posner et al., 1988; Pardo et al., 1990).

Responses in the cerebellum, especially in the right lateral cerebellar hemisphere, were also detected in this task. Because we had subtracted the motoric aspects of simply saying words this result strongly suggests that the cerebellum plays an important role in high level information processing involving a novel task that engages the left prefrontal cortex. This is the first direct evidence in support of the hypothesis that the cerebellum plays an important role in high level information processing in humans as suggested by others (Leiner et al., 1989; Berntson and Torello, 1984; Bracke-Tolkmitt et al., 1989).

Finally, one additional preliminary (unpublished) observation may be of importance in understanding the information processing role of the responses observed in this task. Specifically, the responses in left prefrontal cortex and anterior cingulate cortex were only present when subjects were first exposed to this task (i.e., when it was novel and required active attention). Practice generating verbs to a specific list of nouns resulted in disappearance of the left interior prefrontal and anterior cingulate responses. These results suggest a role for these areas of cortex in the *acquisition* of a new skill, in this case linguistic.

What do such results suggest about the modular organization of the human brain for tasks associated with single word processing? They suggest a *flexible* modular organization consisting of multiple routes. For example, there is no activation in any of our visual tasks near Wernicke's area or the angular gyrus in posterior temporal cortex unless a specific phonological judgment must be made (i.e., rhyme judgement). Visual information from occipital cortex appears to have access to output coding without undergoing phonological recording in these areas in posterior temporal cortex. Further, tasks calling for semantic processing of single words activate frontal cortices (i.e., left prefrontal and anterior cingulate) and the cerebellum, rather than posterior, temporal regions. Finally, sensory-specific information appears to have independent access to semantic and output codes; simple repetition of a presented word failed to activate the left-frontal semantic areas.



The Anatomy of Anxiety

The studies that I have discussed have included mental operations devoid of any obvious emotional valence. It is clear, however, that the cognitive activities of our daily lives are colored by feelings such as elation, sadness, and anxiety. Are these simply emergent properties of the brain or do they represent the coordinated activities of separate brain regions? The limited information we have from research on animals and lesion studies in humans argues that what we experience as emotions are the result of a specific system within the brain (LeDoux, 1987). Until the advent of PET, however, no information was available on the normal human brain to test this hypothesis. Our studies began with a disease called *panic disorder* (Diagnostic and Statistical Manual, 1980; Reiman et al., 1984; Reiman et al., 1986; Reiman et al., 1989) and eventually led to studies of emotion in normal human subjects (Reiman et al., 1989).

Panic disorder is a condition of young adulthood characterized by recurrent anxiety attacks in the absence of a frightening stimulus (Diagnostic and Statistical Manual, 1980). It is a common disorder affecting 2-5% of the general population. Infusion of sodium (DL) lactate precipitates an anxiety attack in most but not all persons with this disorder and rarely does so in normal controls (Pitts and McClure, 1967), suggesting a neurobiological basis for the problem. Despite this observation the pathophysiology of this condition remains obscure.

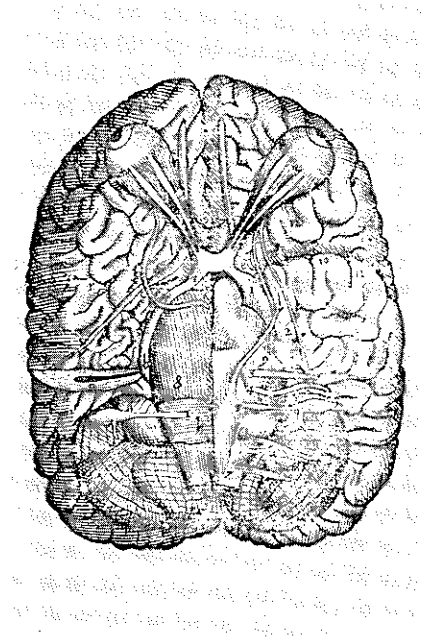
Our initial studies (Reiman et al., 1984; Reiman et al., 1986; Reiman et al., 1989) focused on resting state abnormalities in blood flow and metabolism and revealed an asymmetry in the parahippocampal gyrus with the right side significantly higher than the left in patients with the clinical diagnosis of panic disorder who were vulnerable to lactate-induced panic. In addition, whole brain oxygen consumption was significantly higher in these patients. This initial study was important in pointing to the existence of a localized abnormality in the limbic system of patients *predisposed* to lactate-induced panic attacks.

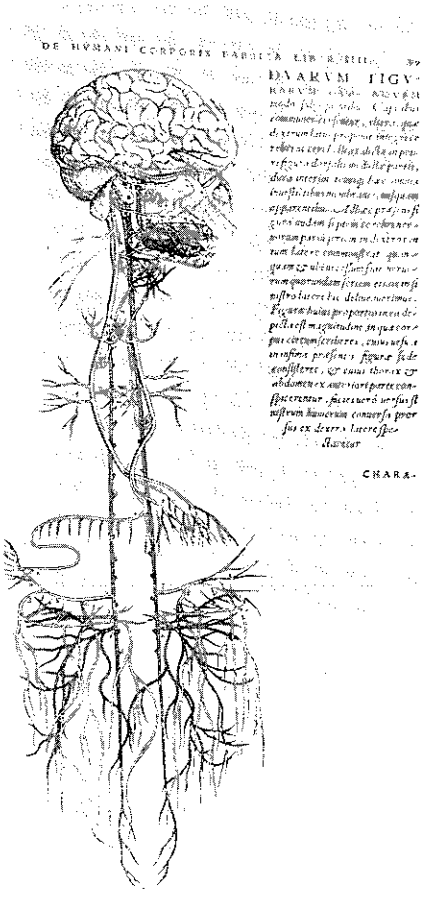
Infusion of sodium (DL) lactate did not produce any change in local

blood flow in the normal controls or the 9 patients who did not respond clinically to lactate with a panic attack (Reiman et al., 1989). In those patients who exhibited a full-blown panic attack PET measurements of local blood flow changes in the brain revealed striking increases in the tips of the temporal lobes bilaterally. No change occurred in the region of the parahippocampal gyrus, where differences from normals were noted in the resting state.

In a companion study we investigated the regions of the brain involved in the production of normal anticipatory anxiety (Reiman et al., 1989). Identical with the changes we observed during the lactate-induced panic attack we observed striking increases in local blood flow in the tips of the temporal lobes bilaterally (Brodmann area 38). Taken together these observations provide strong converging evidence for the involvement of the right and left temporal poles in the production of an abnormal and a normal form of human anxiety.

These findings are consistent with the results of stimulation and lesion studies in humans and experimental animals. Stimulation of temporopolar cortex influences the autonomic functions often associated with the anxious state (Wall and Davids, 1951; Penfield and Jasper, 1954; Kaada, 1960; Mesulam, 1986). In addition, temporopolar stimulation produces a syndrome in the awake animal characterized by behavioral inhibition, apparent hypervigilance, and altered facial expressions seeming to reflect "arousal, attention, or anxiety" (Kadda, 1960). Finally, temporopolar stimulation produces the experience of fear in patients with temporal lobe epilepsy (Penfield and Jasper, 1954), although some investigators suggest that this affect may be mediated through the spread of electrical activity to the amygdala (Kadda, 1960; Gloor et al., 1982). Bilateral lesions of temporopolar cortex in monkeys attenuated the expressions of fear in repose to normally threatening situations (Kluver and Bucy, 1939; Kling and Steklis, 1976). These bilateral lesions also lead to marked social withdrawal (Kling, 1987), an observation of possible relevance to the common complication of agoraphobia in patients with panic disorder (Diagnostic and Statistical Manual, 1980). Our findings may also be relevant to certain clinical observations. For example, fear is commonly experienced in association with temporal lobe seizures (Halgren et al., 1978; Gloor et al., 1982; Strauss et al., 1982; Wall et al., 1985), and some patients develop anxiety attacks in association with anterotemporal lobe pathology (Wall et al., 1985; Wall et al., 1986; Ghadirian et al., 1986).





In our patients with panic disorder and a sensitivity to lactate-induced panic attacks it is of interest to consider the possible role of the abnormality in the parahippocampal gyrus to their vulnerability to lactate-induced panic attacks. Our hypothesis is that this abnormality effectively lowers the threshold for the initiation of the symptoms of anxiety. Consistent with this hypothesis would be an increase in neuronal activity and, hence, blood flow in projections from the parahippocampal region during a panic attack. Interestingly, temporopolar cortex receives projections from the region of the parahippocampal gyrus (i.e., area TH), in which we have identified a resting state abnormality. The details of these abnormal relationships must obviously be worked out, but the results we have obtained so far provide us with an anatomical focus for such work.

Not only are similarities between normal and pathological anxiety important to note, but also possible differences in the data as the basis for future experiments. In addition to the prominent responses in the tips of the temporal lobes bilaterally, a number of other responses (both increases and decreases) were found in our data. Most must await further information before we will understand their potential significance. However, one finding is worth noting at this time, the amygdala, a structure that figures prominently in theories of the neurobiology of anxiety (LeDoux, 1987). The amygdala only appears in normal anticipatory anxiety and only on the right. One interpretation of this difference is that the amygdala, being in a position to implement cross model associations, is concerned with a relationship between the memory of an electric shock and

the knowledge of electrodes on the fingers poised to administer a shock. In a sense it reflects an internal process relating a present danger to the expression of anxiety. In the case of panic disorder there is no obvious present danger triggering the attack. A further question is why is the response in the amygdala only on the right? Electrodes were placed bilaterally. Could it be that the relationship of the electrodes to the anxiety needs no semantic encoding and, therefore, only requires the right hemisphere, as suggested by the work of Levy and her colleagues (Levy and Trevarthen, 1977; Levy and Trevarthen, 1972). Such an hypothesis must be tested through additional research. One prediction of such an hypothesis would be that stimuli requiring semantic encoding to stimulate anxiety would selectively engage the left amygdala.

Conclusions

This review is intended to demonstrate that a combination of cognitive and neurobiological approaches to the study of normal human subjects, aided by modern imaging techniques, can give us important new information about the flexibile, distributed, modular organization of cognition and emotion in the human brain. Progress in our evolving understanding of the implementation of mental activities in the human brain will depend upon an appreciation of the distributed nature of the processing. Inferences drawn about the role of specific local neuronal ensembles in particular mental activities must be guided by the knowledge that an ensemble may be only a part of a very distributed network in which areas of the brain contribute highly specialized component functions. Continued progress in this type of work should serve to enlighten us about the solution to the problem of mind-brain interaction that has intrigued us for so long. Finally, one must hope that the insights gained will provide a more rational basis for the understanding and treatment of some of man's most devastating diseases.

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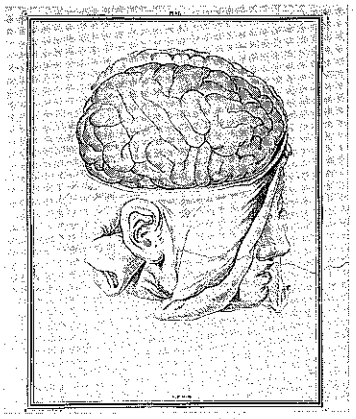

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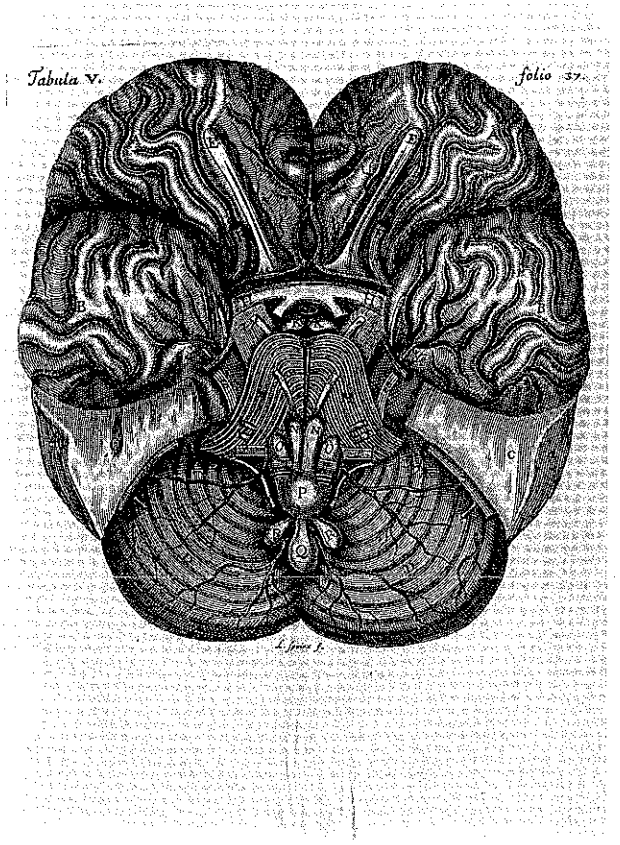


MICHAEL S. GAZZANIGA, ANDREW THOMSON JR.

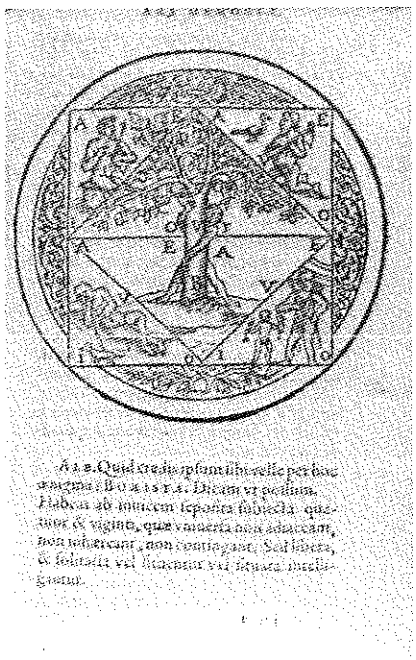
Functional Plasticity in the Central Nervous System: The Role of the Interpreter

Introduction

The conundrum for brain scientists in their drive for structure-function correlates is the stark realization that individuals vary widely in their psychological nature. How could this be when all of our brains are remarkably alike? Even the fine structure of the human nervous system is highly similar, with the same chemicals guiding the micro-functioning of each and every one of us. While there is little exact knowledge about the extent of similarity at the microneural circuit level, the major connections and organizational principles of the human brain are the same for everyone. Just as the structurally regular, reliable, and stable kidney reflexively rids our body of unwanted chemicals, the brain's neurons generate our mental processes. Consequently, it would seem the pursuit of basic structure-function correlates seems like a reasonable and desirable enterprise even though the pursuit transparently flies in the face of our rich psychological diversity.

The hunt for structure-function correlates in the brain is constantly fortified by dramatic examples of regularity and success in studying the way animal brains "see" or "hear" or "move" or whatever. Some animal brain models that are proposed by neuroscientists even seem to apply to the human condition, and the findings are imported and generalized to the human. Additionally, modern human brain imaging techniques now appear to allow for these same structure-function correlates, especially in combination with careful clinical studies of patients with altered brains. Indeed, a good part of my own professional career has been consumed by trying to tighten these correlations where possible with the hope of contributing to our understanding of human conscious experience.

Yet, there is this nagging issue: psychological diversity demands an explanation. Leaving the problem of modern human brain science in terms of structure-function correlates is not only simplistic, it is misleading. The *functional plasticity* that exists in each of us, the capacity that appears to ride over the rigidity of our nervous systems and allow for an almost infinite response to fixed and constant environmental stimuli is a capacity that must be addressed for any ideas about understanding the human condition. Humans, unlike animals, have a greater functional plasticity and appear to have repertoires for responses that go beyond the simple variability in capacity that allows for species adaptation to changed environments. Overall, animals are in a very rigid relationship with the environment. Humans are less so and the question is, why?



One of the clues for me came from studying split-brain patients. It took almost 15 years before I stumbled on perhaps the most obvious and the most important finding coming out of split-brain research. It became clear that the human brain has a special capacity that resides in the left hemisphere — the "interpreter." This powerful system is at the core of what allows for functional plasticity in the human brain. Without it, we would be little different from animals. With it, we become wonderfully inventive

General Background

It was almost 30 years ago that I sat in an isolated room at Caltech examining a human who had undergone brain bisection. The testing procedures were crude by modern standards, but the idea was clear. A war veteran had had his two half brains disconnected in an effort to control his epilepsy. It was a radical procedure, by anybody's standards. Yet, because of the flurry of animal experimentation that had been carried out around that time, the idea of seeing something dramatic seemed a possibility. But seeing what?

The antecedent animal work had shown that on sectioning the nerve fibers which interconnected the two half brains and eyes of cats and monkey each half was found to be bewilderingly unique. Information that had been trained to one half brain was not known to the other. It was as if, literally, the left half of the brain did not know what the right was doing. Cats and monkeys trained to recognize a symbol as being rewarding in one eye, did not know the value of the symbol with the other. In the somatosensory domain, tactile discriminations learned with one paw were not known to the other. Ronald Myers and Roger Sperry, the co-discovers of this fact, had laid the groundwork, in the phylogenetic sense, for the human work. Could the two cerebral hemispheres of a human, if disconnected, behave as if each had its own controls for perceptual and cognitive activity?

The prospects of this simple idea being true were considered remote, a fact that half explained why a new graduate student was assigned to the task of examining the first patient! Weeks before W.J.'s hospitalization, Joseph Bogen, the neurosurgeon who assisted with the operation, and I had examined the patient in detail. With his brain not yet operated upon, he behaved as would any normal being. If information was lateralized to one half brain, the other knew of it instantaneously. The great cerebral commissure that connected the two half brains worked and kept each half brain up to date with what was known by the other. Or, so the story line went.

But months before the first case (W.J.) appeared, another patient with a partial section had been tested by a research fellow. Nothing spectacular had been learned, a profile of results that was consistent with an earlier history of commissure section in humans. In short, the general idea in the lab was that humans were somehow different from animals. These views all changed that afternoon. But first the original facts, facts that were reported by my mentor, Roger Sperry, in 1964.

Initial Impressions:

Case W.J., after his split-brain surgery and, like all subsequent cases of relevance, normally named and described information presented to his right visual field, that is to say, when information was made available to his left hemisphere. What was surprising was his seeming lack of response to stimuli presented to his left visual field, which of course, were available only to his surgically isolated right hemisphere. At first glance, it was as if he were blind to subjective visual stimuli presented to the left of fixation. But we were prepared for that possibility and I had designed the tests to allow for a manual response to occur. Almost immediately it was obvious that while the left talking hemisphere could not report on these stimuli, the right brain with its ability to control the manual responses of the left hand, could easily react to the simple visual stimulus. In that dramatic afternoon the modern era of split-brain research was born.

We first took a very big and simple cut on the data that was starting to pour during those early years. Dividing the hemispheres in order to control intractable epilepsy found each half brain behaving independently of the other. Information experienced by one side seemed unavailable to the other. Moreover, each half brain seemed specialized for particular kinds of mental activity. The left was superior for language while the right seemed more able to carry out a variety of visual-spatial tasks. We had separated structures with specific functions. We talked easily about separated consciousness and did so without defining our terms. We did that by design since no one seemed to know exactly how to define human consciousness. We simply listed capabilities of each side of the brain and rhetorically asked, whether anyone, considering this data, wouldn't argue for the same?

The capacities that were possible from the left hemisphere were no surprise. However, when we discovered some patients were able to read from the right hemisphere and were able to take that information and choose between alternatives, the case for a double conscious system seemed good indeed. We could even provoke the right hemisphere in the sphere of emotions. I carried out dozens upon dozens of studies

over five years on these patients and all pointed to this dramatic state of affairs. After separating the human cerebral hemispheres, each half brain seemed to work and function outside the conscious realm of the other. Each could learn, remember, emote, and carry out planned activities.

It was this set of data that was reported in 1964. The suggestion was made at that time that evidence was in hand that opened up the difficult problem of whether or not each of the separated hemispheres had its own free will, its own conscious reality. These were early questions and deserved being asked, given the results.

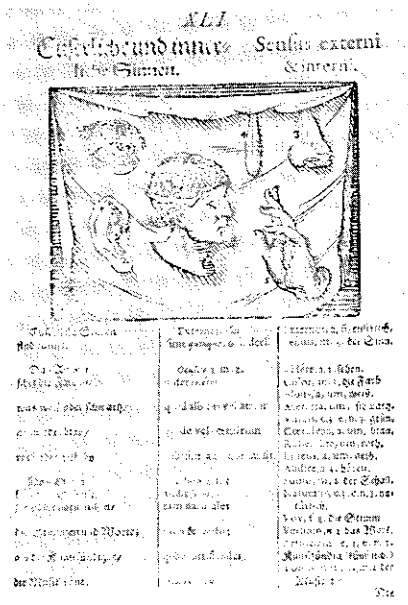
Confirmatory and Continuing Studies

With time, more patients, and more studies, the original picture became modified. The new observations not only challenged the simple view of hemispheric functioning and ideas about double consciousness, they also offered a new conceptual framework which threatened still further the existing concepts about the unity of conscious experience and that all human action was generated by a single rational process. In brief, the studies we carried out on a series of new patients operated on in the Eastern United States confirmed the broad outlines of the original California series that spelled out the basic properties of each hemisphere and the dramatic disconnection effects seen with these patients. In fact, three of our patients were more advanced in right hemisphere capacity than the two earlier California cases, N.G. and L.B. Two of the three cases, P.S. and V.P., were able to speak as well as comprehend simple language in their right hemisphere.

The capacity of these patients, however, stood in marked contrast to other new patients who possessed little or no right hemisphere language. These patients were also very poor at carrying out other perceptual and cognitive tasks. This contrast led us to the view that language was central and critical for cognitive functioning in the right hemisphere. It was also at this time that we discovered perhaps the most important aspect of the dominant left hemisphere, a capacity that just may go a long way in defining the difference between human beings and animals. As already mentioned, I have come to call this special left-brain system the "interpreter." How it functions is best understood in the light of new views on how the human brain is organized.

Up until the mid-seventies, the idea was that each half-brain had the full biological complement of "stuff" that allowed for the essentials of human conscious experience. While language and speech gave the left hemisphere the edge, its superiority was thought to be more quantitative than qualitative. The notion the left hemisphere possesses some special capacity other than language and speech was not yet known.

It was at about this time that all sorts of cognitive processes were beginning to be broken down into their component processes. For years the big units of psychological life, like "visual or auditory perception" or "semantics and syntax" or "attention," were dealt with as whole units in brain science. They were not seen as final products of interacting and interconnecting sub-processes. There was a seemingly vast yet unified system in the brain that produced our personal conscious reality. It was somehow assumed that splitting the brain revealed secrets about this system, in that it had been duplicated by mother nature and could exist independently if the hemispheres were divided. The initial idea, it now appears, was too simple.



The new discoveries suggest the brain is indeed organized in a modular fashion with multiple sub-systems active at all levels of the nervous system and each processing data outside the realm of conscious awareness. These modular systems are fully capable of producing behaviors, mood changes, and cognitive activity. This activity is monitored and synthesized by the special system in the left hemisphere, the "interpreter." The right hemisphere does not have such a system, as it does not have other aspects of a logical-deductive system. In short, the new studies had shown us the simple idea of a double consciousness was an error. While many basic functions were bilaterally represented, ones essential for human thought were not.

The modular organization of the human brain has now been fairly well accepted. The functioning modules do have some kind of physical instantiation, but the brain sciences are not yet able to specify the nature of the actual neural networks involved for most of them. What is clear is that they operate largely outside the realm of awareness and announce their computational products to various executive systems that produce behavior or cognitive states. Catching up with all of this parallel and constant activity seems to be a function of the left hemisphere's interpreter module. Watching the interpreter work under strict experimental conditions is most dramatic.

I first revealed the phenomenon over 15 years ago using a simultaneous concept test. The patient is shown two pictures, one exclusively to the left hemisphere and one exclusively to the right, and is asked to choose from an array of pictures placed in full view in front of him the ones associated with the pictures lateralized to the left and right brain. In one example of this kind

of test, a picture of a chicken claw was flashed to the left hemisphere and a picture of a snow scene to the right hemisphere. Of the array of pictures placed in front of the subject, the obviously correct association is a chicken for the chicken claw and a shovel for the snow scene. P.S. responded by choosing the shovel with the left hand and the chicken with the right, i.e., the right hemisphere matched the snow scene. When asked why he chose these items, his left hemisphere replied "Oh, that's simple. The chicken claw goes with the chicken, and you need a shovel to clean out the chicken shed." Here, the left brain, observing the left hand's response, interprets that response into a context consistent with its sphere of knowledge — one that does not include information about the left hemifield snow scene.

Another example of this phenomenon of the left brain interpreting actions produced by the disconnected right brain involves lateralizing a written command, such as "laugh," to the right hemisphere by tachistoscopically presenting it to the left visual field. After the stimulus is presented, the patient laughs and, when asked why says: "You guys come up and test us every month. What a way to make a living!" In still another example, if the command "walk" is flashed to the right hemisphere, the patients will typically stand up from their chair and begin to take leave from the testing van. When asked where he or she is going, the left brain says, "I'm going into the house to get a Coke." However you manipulate this type of test, it always yields the same kind of result.

There are many ways to influence the left brain interpreter. As already mentioned in the foregoing, we wanted to know whether or not the emotional response to stimuli presented to one half brain would have an effect on the affective emotions tone of the other half brain. In this particular study, we showed under lateralized stimulus presentation procedures a series of film vignettes that included either violent or calm sequences. In these studies we used an eyetracking device which permits prolonged lateralization of visual stimuli while the eyes remain fixated on a point. The computer-based system keeps careful track of the position of the eyes so that if they move from fixation the movie sequence is electronically turned off from further view. For example, in one test a film depicting one person throwing another into a fire was shown to the right hemisphere of patient V.P. She reacted "I don't really know what I saw; I think just a white flash. Maybe some trees, red trees like in the fall. I don't know why, but I feel kind of scared. I feel jumpy. I don't like this room, or maybe it's you getting me nervous."

As an aside to a colleague she then said out of my ear shot, "I know I like Dr. Gazzaniga, but right now I'm scared of him for some reason." Clearly, the emotional valence of the stimulus has crossed over from the right to the left hemisphere. The left hemisphere remains unaware of the content that produced the emotional change, but it experiences and must deal with the emotion and give it an interpretation.

The same kind of phenomenon is observed when more neutral stimuli are presented to the right or left hemisphere such as scenes of ocean surf, nature walks and the like; the patient becomes calm and serene.

Taken together, these examples show that both covert as well as overt responses are interpreted.

It is interesting to note that while the patients possess at least some understanding of their surgery, they never say things like, "Well, I chose this because I have a split-brain and the information went to the right, non-verbal hemisphere." Even patients who have higher IQ's than P.S. based on IQ testing, view their responses as behaviors emanating from their own volitional selves and, as a result, incorporate these behaviors into a theory to explain why they behave as they do. Certainly, one can imagine that at some future point a patient might be studied who chose not to interpret such behaviors because of an overlying psychological structure that prevented the response. Or, one can imagine a patient learning by rote, as it were, what a "split-brain" is all about and why, therefore, a certain behavior most likely occurred. With that set they may well not offer an explanation.

There are occasions where a patient, having trouble controlling his left arm due to a transient state of dyspraxia, will tend to write off anything it does under the direction of the right brain, thereby making the foregoing test inappropriate for demonstrating the phenomenon. In such situations, a single set of pictures is presented and only one hand is allowed to make the response. Thus, in this test the word "pink" is flashed to the right hemisphere and the word "bottle" is flashed to the left. Placed in front of the patient are the pictures of at least 10 bottles of different color and shape. When this test was run on J.W., on a particular day when he kept saying his left hand does what it wants to do, he immediately pointed to the pink bottle with the right hand. When asked why he had done this, J.W. said, "Pink is a nice color."

The kind of thing we see in these special patients and under these kinds of laboratory conditions can be related to many everyday experiences. Consider how often we go to bed in a good frame of mind (or the opposite) only to awake feeling depressed and cranky (or the opposite). The cognitive data structure, which is to say the facts about one's life, haven't changed during the

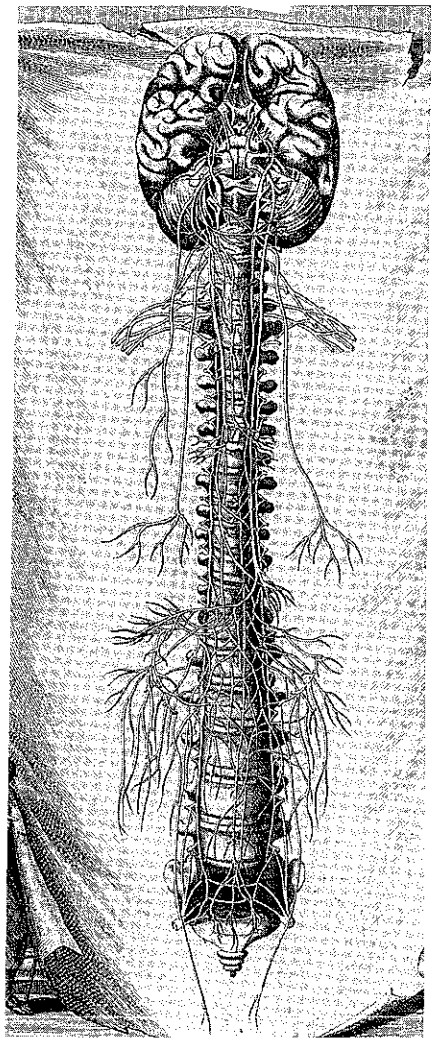
night; why the change in mood? Could it be that a set of prior memories have become activated and have unleashed biochemical mechanisms that give rise to a specific mood state? The idea here is that the left brain interpreter would try to make sense out of these feelings, and may well and somewhat gratuitously attribute a cause for them to otherwise innocent concepts also existing in the conscious realm at that time.

Current and Ongoing Studies: The Properties of the Interpreter

As we came to appreciate the power of the interpreter and its central role in human behavior, we began a series of studies that tried to examine whether it was inexorably linked to language mechanisms per se. Certainly language was the vehicle through which the interpreter expressed its actions. But was it a property of language structures or not? We had seen right hemispheres become more responsive when language was incorporated into their structure. Was this a clue?

In the patients studied to date, the interpreter has been most consistently represented in the left hemisphere and not in the right. In trying to understand this phenomenon we examined more closely both the language structures of the right brain in these special patients and also whether or not these patients could carry out out simple problems solving tasks. Consider the following.

As already mentioned, split-brain patients without right hemisphere language have a limited capacity for responsiveness to patterned stimuli which ranges from none to the capacity to make simple matching judgments above chance. In the patients with the capacity to make perceptual judgments not involving language, there was no ability to make a simple same-different judgment within the right brain when both the sample and match were lateralized simultaneously. In other words, when a judgment of sameness was required for two simultaneously presented figures, the right hemisphere failed. This profile is commonly seen in patients of all kinds, including patients of similar and sometimes greater overall intelligence than those who possess some right hemisphere language.



This minimal profile of capacity stands in marked contrast to the patients with right hemisphere language. The right brain of these patients is responsive and their overall capacity to respond both to language and non-language stimuli has been well catalogued and reported. In the East Coast series of patients this included Case J.W., who understood language and who had a rich right brain lexicon as assessed by the Peabody Picture Vocabulary Test as well as other special tests. At the same time, J.W. has no capacity to speak out of the right brain. Studies on Cases V.P. and P.S. revealed these patients were able to both understand language and speak from each half brain. Would this extra skill lend a greater capacity to right brain's ability to think, which is to say interpret the events of the world?

The basic picture that emerges is that while the right hemisphere can possess an extensive auditory and visual lexicon, and in some cases can even speak, it is severely limited in its capacity to use syntactic information in comprehension. Thus, the right hemisphere has difficulty understanding semantically reversible active and passive sentences and recognizing the differences between phrases like "the flying planes" and "flying the planes." Recently, however, we have shown these same right hemispheres are quite capable of judging whether or not a spoken sentence is grammatical. It can be critical without being knowledgeable! In short, the right hemisphere can judge the grammaticality of an utterance, but it can not use syntactic information to place constraints on understanding word strings.

Nonetheless, it turns out that the right hemispheres of both patient groups are poor at making simple inferences. For example, when shown two pictures, one after the other, such as a picture of a match and a picture of a wood pile, the right hemisphere cannot abstract their causal relation and choose the proper result, i.e. a picture of a burning woodpile. In other testing, simple words were serially presented to the right brain. The task was to infer the causal relation that obtains between the two lexical ele-

ments and pick the answer from a list of six possible answers printed and in full view of the subject. A typical trial would consist of words like "pin" and "finger" being flashed to the right brain with the correct answer being "bleed." While the right hemisphere could always find a close lexical associate of all of the words used when tested separately, it could not make the inference that "pin" and "finger" should be result in the answer "bleed." The successful completion of a task under these conditions must mean the left hemisphere was controlling the response. Still, the right hemisphere was free to inspect and watch how the task was done.

In V.P. the tests were pursued and further simplified. Instead of two words being flashed to either the left or right visual field, one word was spoken and the other was then lateralized to either the left or right brain. Thus, the word "pin" would be spoken, followed by the word "finger" being flashed. This simplification seemed not to make a difference. The right hemisphere remained poor at carrying out the task.

From these tests we suggest language is called upon to label and express the computations of other cognitive systems. The simple language systems of these right hemispheres are not able to perform cognitive activities in and of itself. The systems that do generate cognitively based inferences are not present in the disconnected right hemisphere.

The Interpreter in Everyday Life

The model of the interpreter is simple but powerful. Consider an everyday example such as the case of Harry. Let's say he experiences a chemical imbalance in his brain. This may be due to an over or underproduction of a certain chemical. Such happenings are now known to occur frequently in all of us as a reaction to environmental stimuli, the reaction of a previously silent brain structure, or for no discernible reason. The brain change produces a different feeling in Harry, a feeling that must be interpreted. The human mind seems intent on interpreting everything as a matter of course, and thus it is a part of Harry's psychology to find a cause for his changed state. He assesses his outside environment, his inside thoughts, and comes up with a theory as to why he has this unfamiliar feeling.

The human mind does not say, "I feel this way because of brain chemistry." It speeds right past that account and goes on to identify a potentially malleable cause. That interpretation itself becomes an event in Harry's life, and as such it becomes a memory. Harry's brain is working normally when it comes to memory, so Harry stores this information. His interpretation becomes a part of his life experience.

Let's say Harry stored the idea that being in crowds makes him nervous. He developed that idea because when he was in a crowd before his brain state changed and he suddenly felt anxious. Scientists now know what biochemical events occur that suddenly unleash that feeling. But even though Harry may know about such things at an academic level, his internal interpreter asks "Why?" Looking around, he deduces that the cause must be crowds. Eventually, Harry develops a phobia for crowds since he does not like feeling anxious.

Summary and Conclusions

In the twenty-five years since the first report on split-brain research was presented, much has been learned and the overall power of the observations has been deepened. The initial characterization of how dividing the cerebral hemispheres of the human brain produced two neural systems that functioned essentially independently has given away to the more complex view.

A variety of new split-brain studies, as well as studies from other areas of human brain research, has revealed the human brain to have a modular organization. This means structure-function correlates for a number of mental operations have been successfully made. When considering the sub-processes involved in language, for example, most of the modules are found in the left brain. Those processes involved in attention appear to be divided into anterior and posterior systems. Processes involved in the detection of upright faces seem assignable to the right hemisphere. And so on.

The discovery of modules for specific mental duties and for how modules interact to produce specific mental capacities would suggest that if a disconnected half brain did not possess certain processes, it ought to be correspondingly deficient. Recent studies have shown this to be the case with the disconnected right hemisphere, severely limited in the kinds of mental operations it can carry out. In particular, mental activities involving simple inference are not possible even in right hemispheres that do possess some language capacity. Further, even though what it can accomplish may by done independently and outside the realm of awareness of the left hemisphere, it does not seem to have the capacity to interpret self-generated events or events occurring in the world.

It is the interpretive function of the left hemisphere that appears central to functional plasticity. Indeed, it is this system that may well allow the human to obtain a degree of independence from the environment we all apparently enjoy. The interpreter, with its grand capacity for inference, which is to say, for developing hypotheses about personal events and events in the external world, serves as the system that initiates our belief formation process. With inferences made, and interpretations rendered, the event becomes a part of the memory system. As such it can be called upon and tested by each of us. Through psychological processes that have been well described by others the value of the memory trace of the hypothesis can be deepened or trivialized. If it is deepened, it can guide one's behavior and thoughts for years, and sometimes at the expense of rationality. And, of course, the validity of the established belief can vary widely depending on a multitude of considerations related to prior experience.

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MICHEL JOUVET

Sleep: The Other Side of the Spirit

Sleep and mind — these two phenomena are apparently contradictory! On the one hand, we have the likeness between Sleep and Death — illustrated by Hypnos and Thanatos, the twin brothers of Greek mythology; on the other, the Mind, this witness to higher nervous activity during the state of wakefulness.

This contradiction is probably at the origin of the concept of Mind. Let us imagine the first hominids taking refuge in a grotto in eastern Africa. They already possess a rudimentary language and think, but do not yet think about thinking..... A person who was dreaming awakes and relates that during the night he has gone out of the grotto and flown like a bird. His companions gaze at him in astonishment and incredulity. The same phenomenon takes place over and over again. How much time was needed in order for the principal question at the root of humanity to arise one day: there must exist something immaterial, "the Mind or the soul," which is basically different from the material body. In effect, the Mind, tireless and invisible, can remain awake during sleep. It goes where it wishes, to different places and periods, to the past or the future, and can deliver to the brain fantastic images of its circumnavigation, or of its dialogue with the Gods or the Demons, while the body, immobile and weary, is overwhelmed by sleep.

Human thought must certainly have wavered between two aspects of the individualization of sleep — the movement of the wandering soul that leaves its body to abandon itself to nocturnal roaming and the movement of the gods and demons who come to visit sleeping man and grant him their revelations..... But it seems likely, as Spencer and Malinovski feel, that sleep was at the root of belief in the soul, the spirit, the gods, and the demons that are discovered under multiple and varying aspects with the rise of every civilization and religion. The same holds true for prophetic dreams. The dreams of Jacob, the Pharaoh, and Nebuchadnezzar in the Old Testament; the dreams of Joseph, the Magi, and the flight into Egypt in Matthew's Gospel. Along with the dreams of Buddhism: of Maya, Buddha's Mother, Coudhodana, his Father, or Gopa, his wife. The same applies for the dreams of Islam, the most famous of which is Mohammed's trip on his mare Elborak. Later, the founders of religious orders, such as Macarius, Francis of Assisi, Don Bosco, and St. Bruno, entered into a privileged relationship with God by way of dreams as well.

This metaphysical current in dreams still exists today. The fellahs of the Nile Delta wrap their heads in turbans to keep their souls from abandoning their bodies during dreams, and in the Masai tribes of Kenya, it is forbidden to wake up a sleeping person brusquely out of fear that the wandering spirit will not have time to return to the body (cf. bibliography on this topic in reference no. 1)

It is certainly not up to the neurobiologist to describe the history of dreams, this first aspect of the unconscious uncovered long before the concepts of consciousness and unconscious on a cognitive and affective level. The neurobiologist's province is the still-impossible job of trying to explain with our current knowledge the Mind's nighttime machinations.

First of all, we must find our place among the different "schools" studying consciousness, inasmuch as this placement is responsible for our definition of Mind.

For our study neither behavioralism (which eliminates the problem of the mind or consciousness) nor functionalism (which is interested only in performance and is perfectly happy to accept that a calculator is conscious) is appropriate; nor is panpsychism admissible. In the absence of proof enabling us to conceive of immaterial external influences capable of acting on the brain and thus violating the laws of thermodynamics, for the moment we situate ourselves within the so-called "psychoneural identity" school and are therefore opposed to Cartesian dualism, in its original sense and more recent development.

By Mind we mean the functioning of higher nervous activity: the perception or apperception of the environment, the representation of absent beings (forming mental images), which enables one to foresee certain complex responses, communication with one's fellows. In short, in man, reflexive consciousness: "I am thinking about thinking"; consciousness: "I am thinking"; the unconscious: "I have carried out this complex act without thinking about it." We recognize that certain aspects of consciousness can exist in all the homeotherms, from birds (the Gabon gray parrot is able to recall 1200 words, more than a five-year-old child can) to the mammals (bibliography in ref. no. 2) Self-awareness (to recognize one's face in a mirror) is

manifested in the chimpanzee, but does not exist in the gorilla. Reflective consciousness is no doubt limited to man in a state of wakefulness (I am aware of being aware) and to man in a dream state. As we shall see further on, in this latter instance reflective consciousness may be subject to strange distorsions.

The diverse synchronic operative modes of consciousness are prolonged by a diachronic trail in relation to memory. In general, we can easily recall our thoughts and our conscious acts, whereas associations of ideas enable us to discover the origin of certain unconscious acts.

Neurobiology of the "Mind" During Wakefulness

Before dealing with the problem of the Mind during sleep, we must summarize by contrast what we know about its correlates (of the set of conditions) which we observe when a man or a cat performs a conscious operation during the state of wakefulness (for example, attention). We speak precisely about correlates or conditions, for there is still nothing capable of assigning necessary and sufficient causality to becoming aware.

Conscious attention seems to be accompanied by three major conditions:

1) Awareness simultaneously requires the integrity of some cortical areas (particularly the parietal cortex); indeed, there is no evidence of perceptive ability in subjects affected by a diffuse cortical lesion;

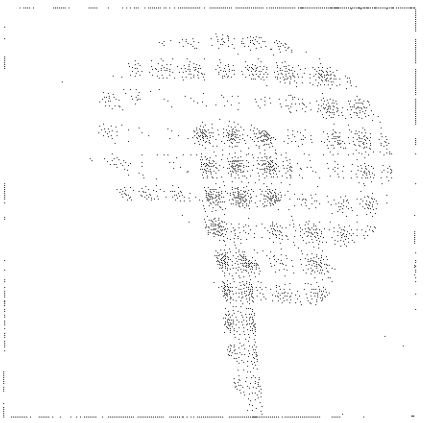
2) The integrity of the cortex is not yet sufficient. There is a need for a certain degree of excitation of the numerous modules constituting the basic element for cortical functioning. This level of excitation is manifested in special brain electrical activity (the reaction of wakefulness), which, in man, may be registered in the scalp and in animals by way of electrodes placed directly on the cortex. Cortical activation due to attention — whether provoked by a signal from the external environment or the result of the return of signals generated by the cortex (mental images) — is not a strictly cortical phenomenon, but needs the active intervention of subcortical systems. These systems, spaced out from the bulb to the hypothalamus, release neuromediators (catecholamine, indolamine, histamine, acetycholine, neuropeptides), which "activate" che cortical modules according to complex hierarchies and modalities (see ref. 3).

3) Finally, conscious attention is accompanied by special energy phenomena brought to light by PET (positron emission tomography). During this state, cortical modules consume more glucose. There seems, however, to be a severing between the consumption of glucose and that of oxygen, so that cortical areas are able to use the anaerobic route (lactate production) in the course of attention(4).

To summarize, during the waking state conscious attention at the same time needs a relative integrity of the cerebral cortex associated with the stimulating action of brain trunk structures. This process needs increased energy in the form of glucose, which can be metabolized anaerobically.

Sleep States and the Mind

For most homeotherms, birds and mammals, there is a now-classical opposition between two *states* of sleep characterized by behavioral, electrophysiological, and energy factors which are different: slow-wave sleep and sleep with rapid cortical activity, also known as paradoxal or rapid-eye-movement (REM) sleep. The relations of these two states to the Mind must thus be studied subsequently.



Slow-Wave Sleep

This is characterized by the disappearance of two major conditions accompanying the state of conscious wakefulness.

1) On the one hand, cortical electrical activity is no longer rapid. It slows down and is invaded by automatic activity of thalamic origin (sleep zones). It is recognized that thalamic-cortical circuits in such a condition impede every possibility of conscious integration or perceptivity (3). Slow high-voltage waves initiated in the cortex in accordance with unknown mechanisms appear as the depth of sleep increases.

2) Slow-wave sleep is also accompanied by a marked decrease in the consumption of glucose and oxygen by the cerebral cortex (5), while energy reserves are stored in the glial cells in the form of glycogen (6).

The Mind During Slow-Wave Sleep

A first observation is necessary. This was expressed quite well by Cambridge theologian Ralph Cudworth in 1678 (7), as a reply to Descartes: "It seems to be plausible that there may exist a vital energy without clear consciousness and explicit attention or self-perception. In the first place, the philosophers who have made the essence of the soul reside in reflection, and the essence of reflection, in clear and explicit consciousness cannot at all bring us to believe that the human soul during deep sleep, lethargy, or apoplexy...can never remain even for a single instant without explicitly conscious reflection. If it were so, according to the principles of their philosophy, they would *ipso facto* have to cease to exist.... It is certain that our very soul is not always conscious of what is in it. For

the geometer who is sleeping does not for this reason cease to have in himself, in a certain sense, all of his geometrical theorems, just as the musician, when asleep, retains in himself all his musical aptitudes and melodies...."

We have thus known for some time that the memory can withstand deep sleep (and that it can even persist in animals in the absence of all brain electrical activity in hypothermy).

What remains of consciousness, perception, or apperception of the external environment? It has been proven that learning ceases completely during sleep and that "hypnopaedia" is an illusion, although sleep *after* learning may have a beneficent influence. In effect, our data regarding the course of consciousness during sleep are essentially derived from studies on man awakened from slumber while being electroencephalographically monitored. These experiments have been carried out for thirty years in a number of laboratories. It has, however, been rather clearly established that a subject brusquely awakened during the sleep preceding the night's first dream is unable to recall the slightest thought and often cannot even guess how long he has been sleeping — which seems to express a suspension of all consciousness, including consciousness of being asleep (a snoring person does not know he is snoring). In 30% of the cases it is, however, possible to obtain recollection of thought of an abstract kind, completely different from the formulation of oneiric images. The subject then believes he has been dreaming, but is unable to describe his dream (see ref. 8).

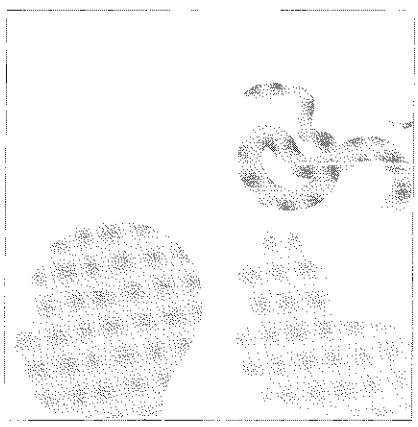
The Problem of Somnambulism (9)

Considered rare, but not pathological — inasmuch as it may present itself in 10% of cases in children and adolescents under age fifteen — somnambulism turns up during slow-wave sleep. This has been proved by telemetric electroencephalographic recordings. A sleep-walking child is capable of getting out of bed, opening a door, and going to look for food. When brusquely awakened, the somnambulant subject does not know why he finds himself standing up and has lost all memory of the episode.

Somnambulism is thus a good example of a lack of psychoneural correlation which promps humility in the neurobiologist: in fact, in spite of the presence of cortical slow waves (and, therefore, by way of contrast, in the absence of cortical activation, which has been regarded by us as a condition for conscious attention), complex behavior directed towards a goal may be observed. For a behavioralist, this conduct might be interpreted as involving awareness similar to waking consciousness. Closer analysis discloses that memorization of sleepwalking behavior has not taken place

At the conclusion of this initial analysis, neurobiology (and particularly clinical neurophysiology) must confess that the relations between sleep and awareness are ambiguous and that the following *provisional* conclusions are plausible.

During slow sleep (which precedes the first dream phase), there is no evidence of the existence of reflective consciousness — or of the awareness of sleeping. *No one can say: I am thinking about sleeping*, and even less: I am thinking about thinking about sleeping (in this regard, see Sartre's analysis of consciousness during drowsiness) (10).



The brief reawakening provoked in a person who was sleeping (which is accompanied by cortical activation) may be sufficient to allow access to nonreflective consciousness (I believe I was thinking about something).

The perception by the sleepwalker — capable of opening and closing a door — is a good example of unconscious perception. Somnambulists, including adults, never say to themselves, "I am thinking about walking in a state of somnambulism," and, when awakened, they never recall their attack.

Let us admit, then, that unconscious perception not accompanied by mnemonic integration can sometimes exist in the absence of cortical activation during sleep.

Paradoxal Sleep and Oneiric Consciousness

Paradoxal (REM) Sleep

Paradoxal sleep in man is a periodic phenomenon turning up ninety minutes after drowsiness — that is, after about eighty minutes of slow-wave sleep. It is characterized by the activation of the electroencephalogram, whose appearance becomes similar to what we have during waking attention (or the state of very slight drowsiness: "descending stage 1"). This phenomenon is accompanied by rapid eye movement, postural atony, and erection. A paradoxal sleep phase lasts twenty minutes. These phases take place every ninety minutes and are separeted by slow-wave sleep. During a night of sleep there are thus four or five phases of paradoxal sleep (about one hundred minutes — that is, 20% of the total duration of sleep). At the outset this phase of sleep is regarded as a state of light sleep analogous to drowsiness (emerging state 1). We now know that it is a *state* as different from sleep as sleep is different from waking(11).

In Man Dreams Occur During Paradoxal Sleep

Since the beginning, man has been aware of dreaming, but it is only since 1957 that we have been

able to identify periods of paradoxal sleep as neurophysiological correlates of dreams (12).

In fact, when subjects are awakened during a period of paradoxal sleep, they are able to describe in abundant detail oneiric visions in color, and, more rarely, auditory or gustatory memories, and sometimes the sensation of flying.

There is a significant relationship between the emotional intensity of the visions in the oneiric drama and alterations in heart and respiratory rates. Accordingly, nearly every time the subjects are awakened during paradoxal sleep, they have very precise recollections of dreams, whereas when they are awakened at increasing intervals after the spontaneous end of an episode of paradoxal sleep, their memories are increasingly hazy and appear in black and white. These memories are probably the source of some aspects of consciousness during slow-wave sleep (see above).

The States of Oneiric Consciousness

"A) I dreamed I was flying. *I was sure I was not dreaming; I was sure I was awake*, and I marveled at the fact that I had never before tried to fly — it was so easy....."

"B) I dreamed I was flying. At that moment, *I was sure I was dreaming*, but did not move. I witnessed in amazement my flight manoeuvres, without being able to foresee what would happen. It's an extraordinary sensation."

These are the two modalities of oneiric consciousness which may be obtained when subjects are awakened during dreams (dreaming one is flying is relatively frequent, and on account of its strangeness, it permits better analysis of consciousness).

Everyone — or at least those remembering their dreams — recalls a type-A dream, whose most celebrated archetype is Chuang-Tsu's dreaming he is a butterfly and the butterfly's dreaming it is Chuang-Tsu. The reality of oneiric consciousness is well summarized by this formula by Havelok Ellis:(13) "Dreams are real while they last. Can we say more of life?" Our oneiric consciousness reacts in this way, as if it were awake. We think we are not dreaming. It is, then, a matter of *reflective consciousness*, for we can ask ourselves if we are dreaming. Oneiric consciousness thus resembles that of the subject awakened in the grip of hallucinations. The realization of oneiric or hallucinatory images provoked by an endogenous system situated in the brain trunk is regarded as if it were a reality, even if fantastic. The reason for the reflective consciousness intervening during the waking state is, then, absent. The illusion of reality during dreams has been the object of numerous comments by philosophers(14). We shall attempt further on to circumscribe some of their psychophysiological aspects.

Type-B dreams are much rarer (1-2% of dream recollections). It has been decided to call them "lucid dreams."

We must note that the third dream of Descartes during the famous night of November 10, 1619 was a lucid dream. "What must be particularly observed is that, while doubting whether what he had just seen was a dream or a vision, *not only did he decide in sleep that it was a dream*, but he also interpreted it before waking..." (Descartes is speaking of himself in the third person.)(15) We know that this dream led Descartes to propose the dichotomy between *res immateria* and *res materia*, which he formulates as "I think; therefore, I am"; in France this formulation brought about a delay in studying the unconscious(16).

A lucid dream is actually a genuine dream: recordings have been made throughout the night by way of electrodes applied to the scalp, eye sockets, and muscles of people with lucid dreams. It is thus possible to find the unmistakable appearance of the cardinal signs of paradoxal sleep (which are impossible to simulate). Before the subject falls asleep, he is asked to indicate that he is dreaming by moving one finger, for example, in a codified way (three times, twice, once, etc.).

This signal may be recorded on the polygraph. As a result, thanks to the work of La Berge, we possess some recordings of periods of lucid dreaming during which the codified signal is registered (17).

I must admit that for a long time I did not believe in the existence of these lucid dreams. However, in the past three years, on four occasions, I have been able to observe the extraordinary subjective experience represented by the course of the formation of oneiric images — not influenceable — which one witnesses in a state of perfect awareness that it is a dream. A self conscious of being conscious (and awake — reflective consciousness) is thus "dreamed" by an unconscious which it cannot influence (but which it can interrupt at the slightest movement). We have not yet managed to provide an interpretation of these phenomena in neurobiological terms. However, over the last thirty years some mechanisms of the paradoxal dream in animals have been clarified. Can they help us understand dream mechanisms in man?

Is the neurobiology of paradoxal sleep a neurobiology of dreams in animals?

We can be sure that a human subject dreams during paradoxal sleep, inasmuch as he can describe his oneiric recollections, but can we interrogate a cat by waking it up

during this sleep state? The discovery and analysis of *oneiric behavior* (18) permit us to assume, however, that the cat dreams: it has, in fact, been possible to delimit the groups of neurons responsible for the muscular atony of paradoxal sleep. (Quite briefly, this group of cholinoceptive neurons is evenly and symmetrically situated in the reticular formation of the bridge, which sends information to the bulb. From the bulb there descends an inhibitory system — probably glycinergic — which blocks the excitation of the motoneurons at the post-synaptic endings of the bulb and medulla.)

The selective destruction of the systems responsible for muscular atony can thus enable us to lay bare the oneiric behavior expressing the activity of subcortical and cortical motor systems brought into play by a "generator" located in the brain trunk. Accordingly, the cat, whose wakefulness and sleep are normal, during paradoxal sleep presents characteristic behavior: orientation, alert, attack and pursuit of imaginary prey, fear, combat, and so forth.

During these episodes the animal does not react to the stimuli of the external environment. There is no doubt that it is precisely a question of paradoxal sleep with the persistence of muscle tone, as has been demonstrated by the numerous recordings of specific electrical signs of this state effected in different laboratories. Electrophysiology now grants us access to interesting precise information.

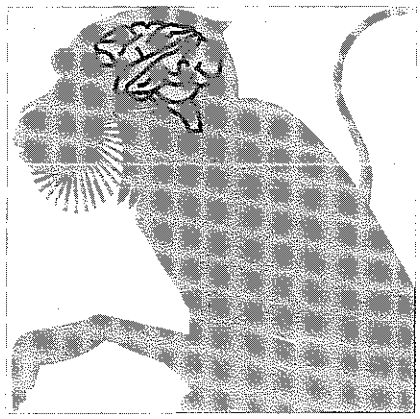
The cerebral cortex in fact presents rapid electrical activity similar to the state of wakefulness, whereas the visual cortex receives endogenous signals generated by the brain trunk which might be the correlates of the formation of visual images (the activity of the occipital geniculate bridge).

The study of latency between eye movements and the arrival of these signals at the visual cortex demonstrates, however, the existence of a paradox: in the awake and watchful animal the retinal signal of the target object of attention reaches the visual centers before the eye movement of pursuit is placed in action (the cause precedes the effect). In the sleeping animal, on the other hand, the start of eye movement *precedes or coincides with* the arrival of the endogenous, nonretinal signal (occipital-geniculate-pons activity) in the visual cortex. We would thus have to conceive of the effect's preceding the cause, which is obviously impossible. We must thus admit that a brain system programs (or selects) both the formation of oneiric images and the response of oculomotor orientation. Synaptic delays can, in fact, explain the latency between a pons-bulb generator and the arrival of information at the oculomotor nuclei and the visual cortex (see the discussion in 8).

These data, taken as a whole, enable us to formulate the following hypotheses:

— either oneiric behavior is nothing but the triggering of organized, complex automatic behavior without hallucinatory phenomena, such as those involving the formation of oneiric images (the cat would, then, act as an automaton, or like the animal-machine of Descartes);

— or, in the cat, there is simultaneously a stimulation of the sensorial sphere (especially the visual one) at the same time as behavior adapted to these hallucinations (attack, flight, pursuit) takes place. This hypothesis then forces us to admit the existence of a fundamental difference between sensorimotor organization of oneiric perception and that of visual attention during the waking state.



Accordingly, the hypothesis of action dreams characteristic of the feline species (alert, attack, rage, flight, fear, pursuit) taking place during paradoxal sleep is plausible, though hard to disprove. With all due reservation, some of the mechanisms studied in the cat during paradoxal sleep can thus be extrapolated for man, especially since the discovery of oneiric behavior in the human being.

Oneiric Behavior in Man

Oneiric behavior in male individuals affected by lesions of the brain trunk damaging the structures inhibiting muscle tone was recently described. This oneiric behavior often consists of violent attacks (involving arm fractures of those dreaming or the bruising of their wives!). In all cases polygraphic recordings of such episodes have shown that they occurred exclusively during paradoxal sleep with muscle tone and that they were accompanied by a dream (an attack by an animal, for instance) (19).

The following synchronic correlations between an objective neurobiological state (paradoxal sleep) and mental phenomena can finally be established as a result:

— in man: paradoxal sleep — dream — oneiric behavior

— in the cat: paradoxal sleep — oneiric behavior — dream.

These correlations authorize us to summarize in the table below the similarities (≡) and differences between some neurophysiological events observed during visual attention in the cat's sleep and "dreams."

Some global conditions are common to attention and dreams (and absent during sleep). It is, however, evident that brain functioning is different during waking consciousness and oneiric consciousness,

since numerous systems of the brain trunk are active during the waking state, whereas they remain inactive or inhibited during dreams (and vice versa).

The Periodicity of Dreams

The greatest problem to which neurophysiology seeks to provide an answer concerns the meaning of the periodicity of dreams. Why does the oneiric machine function periodically and not continuously?

The periodicity of dreams in sleep (which by convention we shall call "tau") is a characteristic of the species. It is closely correlated with the logarithm of body weight and, therefore, with metabolism. The tau of a rat's "dream" is 10 minutes; a cat's, 25 minutes; a man's, 90 minutes; an elephant's, 120 minutes. In addition, the average duration of dream episodes is equally correlated with the species: 2 minutes for the rat, 6 for the cat, and 20 for man (see references in no. (20).

Accordingly, the periodic generator of dreams during sleep obeys a relatively simple law. In most species dreams occupy about a quarter of sleep time (6/24 in the cat, 29/90 in man). Recent experiments carried out in our laboratory have demonstrated that it is possible to cause variations in both duration and tau in prepared animals whose brain energetics may be modified at will by acting on temperature (energy demand) and oxygenation (energy supply). The periodicity of dreams then appears to be controlled by central *economic* phenomena (relationship between energy supply and demand). We may explain this relation metaphorically in the following way: dreams seem to need a substantial expenditure of energy (an increase in glucose consumption probably accompanied by an increase in oxygen consumption), whereas attention requires an increase in glucose consumption *without* an increase in oxygen consumption.

One of the functions of sleep would be to prepare the energy conditions necessary for the emergence of dreams: a decrease in central temperature (i.e., decreased energy demand), a decrease in oxygen consumption, and the constitution of an energy reserve in the form of glycogen, which is stored in the "nutrition" cells of the neurons — i.e., the glial cells. *When, and only when* a sufficient level of energy reserves has been reached, can dreams take place and use these reserves according to the metabolic channels which are probably different from the state of wakefulness.

Oneiric consciousness thus seems to expend a greater amount of energy than the waking state does. This is the reason why every event which increases the demand for energy in the brain (hyperthermia, fever) or decreases supply (anoxia, ischaemia) blocks the appearance of dreams, but may increase wakefulness or sleep.

The need to renew energy reserves during slow-wave sleep explains — though probably not exclusively — the fact that the systems responsible for oneiric activity can function only periodically.

Phylogenetic and Ontogenetic Evolution of Paradoxal Sleep

Since we have accepted as a plausible hypothesis the cat's dreams, why not try to trace the evolution of paradoxal sleep during phylogenesis and ontogenesis, in search of the circumstances of its appearance?

The balance of phylogenesis may be summarized as follows: if in fish, amphibians, and reptiles there is an alternation between activity and repose (wakefulness/sleep), it has not yet been possible to discover, within behavioral dreams, the existence of a periodic phenomenon identical or similar to paradoxal sleep. This state is, however, easily recognizable in birds and mammals. It is, then, admitted that the appearance of paradoxal sleep in the course of evolution coincided

	Visual Attention (Waking State)	Slow-Wave Sleep	Paradoxal Sleep (Dreams)
Cortical electrical activity	rapid	slow	≡ rapid
Glucose consumption in visual cortex	increase	decrease	≡ increase
Oxygen consumption in visual cortex	no increase (uncoupling)	decrease	expected increase? (requiring verification)
Brain temperature	increase	decrease absent	= decrease followed by increase
Eye movements	follow the target-object, appear after the retinal signal arrives at visual cortex		= provoked by a PGO endogenous system, they precede or coincide with the arrival of PGO signal at visual cortex.
Postural tone	increase	decrease	# suppressed
Activity of the subcortical systems activating the cortex (catecholamine, indolamine, histamine)	increased	decreased	# suppressed
Activity of the pyramidal system	increased	decreased	≡ increased
Activiti of the bulbar-pons oneiric generator	suppressed	suppressed	# greatly increased

This is an enormously reduced summary of the main neurobiological variables during wakefulness, sleep, and dreaming in cats. The sign ≡ indicates a similarity between attention and dreaming. The sign # indicates a difference (see bibliographical note no. 20)

with the appearance of homeothermy (see bibliography in no. 21).

The passage from pecilothermy to homeothermy (from ectotherms to endotherms) was accompanied by changes in both the brain (the appearance of nearly cortical-archistriated structures in birds and of neocortex in mammals) and the organism (a considerable increase in energy processes — mitochondria — permitting the passage from bradimetabolism to tachimetabolism). On a cerebral level as well a basic phenomenon has taken place. Whereas neurogenesis continues throughout the lifetime of a pecilotherm, it disappears in homeotherms (see no. 22).

It can still continue in some birds (and could ensure the genetic transmission of song in nightingales (23). In mammals neurogenesis ceases at the end of cerebral maturation during the first weeks or months of life in the young mouse, cat, or human baby.

Study of the ontogenesis of paradoxal sleep has revealed the existence of a progressive transition, with undefined limits, between the latter days of neurogenesis and the appearance of paradoxal sleep. The early postnatal period of a young mouse or cat is occupied by alternation between two states: adapted waking behavior, during which the newborn animal, still a pecilotherm, instinctively searches for warmth (maternal fur) and food (breasts). This state is interrupted by another state, nearly continous and without evident periodicity, called "seismic sleep" (24). The animal is animated by eye, ear, paw, and tail movements. There thus exists a perpetual activation of motoneurons.

These movements do not seem to have central origin, inasmuch as movements of the hind limbs may continue after the division of the medulla. On the other hand, there is no specific electrophysiological sign of paradoxal sleep (occipital-geniculate-pons activity, for instance). In short, most pharmaceuticals or lesions capable of suppressing paradoxal sleep in adults have no effect on seismic sleep (25). It is, then, quite probable that seismic sleep is the expression of spontaneous movements accompanying neurogenesis at the end of embryonic life (cf. no. 26).

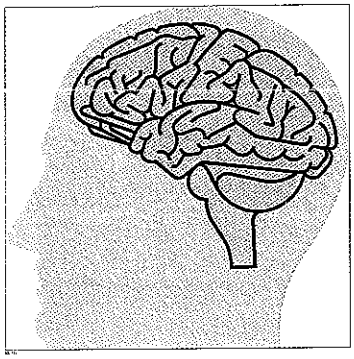
As the genetic organization of the nervous system reaches its conclusion, real paradoxal sleep is gradually manifested, replacing seismic sleep. It increasingly resembles adult sleep, and after the twentieth day the main signs are in place — perfect periodicity is established. Muscle movements disappear to leave room for rapid eye movements alone, then controlled by the generator in the brain trunk.

Cortical activation appears at the very moment in which endogenous signals (occipital-geniculate-pons activity) invade the visual cortex. Finally, and most especially, it is possible to increase or suppress paradoxal sleep with the same pharmaceuticals which do so in the adult individual.

In summary, there seems to exist an inverse relation between neurogenesis and paradoxal sleep during both phylogenesis and ontogenesis.

1) In poikilotherms paradoxal sleep does not appear. The neurogenesis of poikilotherms can ensure genetic programing of the brain throughout life, according to classical mechanisms deriving from DNA (division of neuroblasts).

2) The episodes of paradoxal sleep have a very brief duration (on the order of then seconds) in birds (in which neurogenesis can continue during adulthood).



3) Paradoxal sleep gradually takes the place of seismic sleep as neurogenesis disappears during the postnatal development of mammals.

The final question many be posed as follows: Can paradoxal sleep effect iterative genetic programing in the species in which neurogenesis ceases at the end of ontogenesis?

Does psychological heredity need genetic iterative programing?

The aspect of environment and heredity in personality structure is one of the areas of psychology which has given rise to the most lively debates. The results obtained by Bouchard (27) from thirty pairs of adult monozygotic twins *raised from birth on, or after a few days of life, in completely different environments* leave little room for doubt about the existence of psychological heredity (inasmuch as the heredity coefficient in the realm of personality ranges from 0.5 to 0.6).

It is evidently impossible to think that during ontogenesis the synaptic organization of the brains of these twins was identical, since this programing would have needed a number of genes far superior to that which exists in the genome. Even if this possibility were admitted, the plasticity of neurons — subjected to different environments and, therefore, to different apprenticeships — should have modified this organization and, with it, the subtlest behavioral reactions which are at the root of personality. If neurogenesis continued, we could assume that the division of neuroblasts in predetermined stages is responsible for behavioral similarities. But if there is a neurogenesis in mammals, it is exceptional. We can, then, enunciate the hypothesis that one of the functions of paradoxal sleep is the iterative programing of the brain.

This programing (which could be assimilated to genetic endogenous learning) would reinforce or annul the traces of epigenetic learning

taking place during wakefulness, which would bring into play a stochastic generator of the central phasic activity of paradoxal sleep in the brain trunk. The arrival of this information would stabilize some receptors — synthesized in a new way from mRNA — in the perceptive or motor cortical modules. This hypothesis is based on the study of the genetics of paradoxal sleep in consanguineous stocks of different mice. Each stock of mice presents patterns of rapid eye movement during paradoxal sleep which are characteristic of the stock itself. The crossing of the different lineages and hybrids gives rise to identical or intermediate patterns. Furthermore, there is a similarity in the organization of eye movement during dreams in monozygotic twins which is not found in dyzygotic twins (for a more detailed discussion of this theory, see Jouvet, nos. 3 and 28).

According to this hypothesis, periodic oneiric activity would represent the iterative programing of unconscious reactions which are responsible for personality and behavioral differences among individuals subjected to the same environmental conditions.

Conclusions

The mind (observed through the window of recollection at the moment a sleeping or dreaming subject is awakened) disguises itself under different aspects of consciousness. On the one hand, the absence of awareness or an unconscious without memory (somnambulism) during sleep; on the other, two aspects of reflective consciousness — habitual and lucid dreaming — whose permanence in memory is fleeting.

We have attempted to offer an explanation in neurobiological terms of the different aspects of the mind during sleep and dreaming and of the similarities and differences as regards waking awareness. If we can globally outline the beginnings of psychoneural parallelism, the sphere of the unknown nevertheless far surpasses that of the known.

However, one of the routes leading to an explanation of the functioning of the mind seems to be found in the study of dreams, inasmuch as a close correlation exists between periodic energy fluctuations in the brain and the appearance of dreams.

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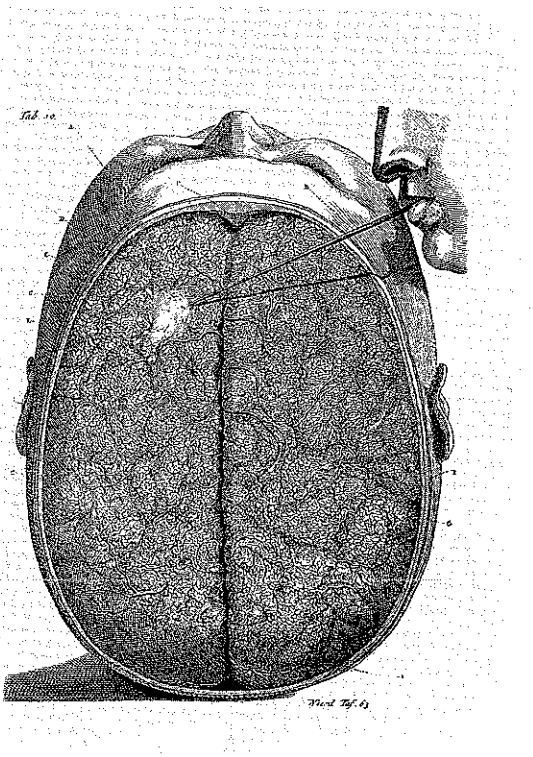

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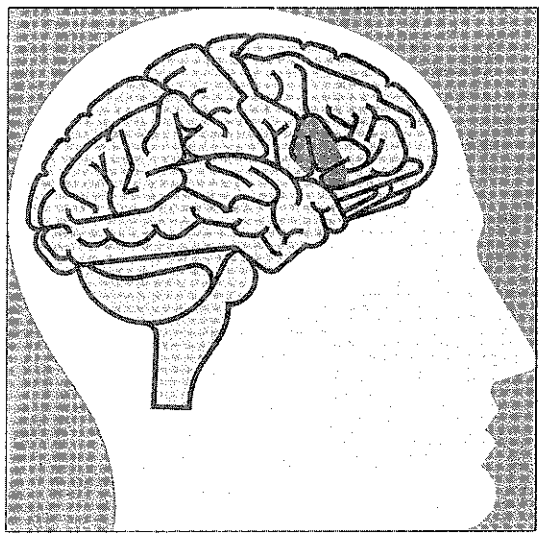
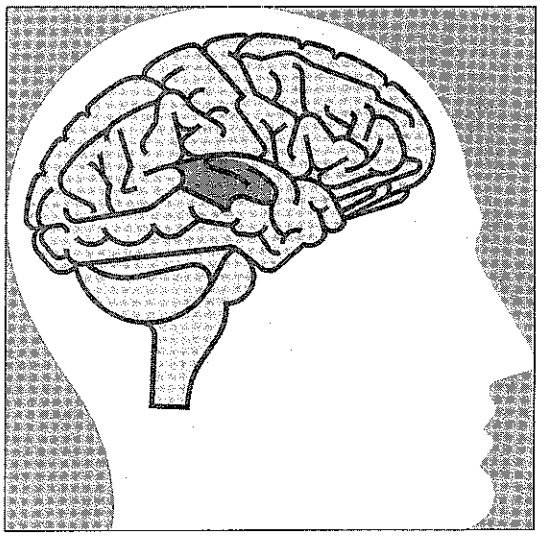




FEDERICO MAYOR ZARAGOZA

The Critical Reality of Mental Retardation

Mr. Chairman, Ladies and Gentlemen:

It is a great satisfaction for me to be able to deal with a topic today to which I have devoted most of my life. I am *serving* at present as Director General of UNESCO, but I *am* a professor of Biochemistry who has devoted himself to the biochemistry of the brain and, specifically, of the brain at the moment of birth

For this reason I have oriented my talk towards the critical reality of mental retardation. In 1963 at the University of Granada I initiated the National Plan for the Prevention of Mental Subnormality. At that time there were many subnormal people from a psychic standpoint in Spain who could have been treated in time to avoid the mental retardation affecting them.

The first point of my talk refers to what has constituted the guiding principle of the Spanish National Plan, which has been successfully put into practice and has resulted in a substantial reduction of the number of psychically handicapped people in my country, mentally retarded *human* beings and not just retarded beings. With this I mean to state that I fully subscribe to the main conclusion of the Resolution of the United Nations General Assembly of December 7, 1981, which I myself was greatly honored to present on behalf of all the participants in the activities of that major event represented by 1981 as the International Year of the Handicapped.

Very rapidly, what are *the causes of mental retardation?* Some of my colleagues will deal with this topic in greater detail, but I would like to recall the main causes, for the purpose of focusing my talk thereafter on the critical reality of the mentally retarded.

The main causes are: 1) *congenital and acquired biological causes*. Among them I want to mention *trisomies*; the most frequent one is that which affects pair 21 and is called Down's syndrome and also, more popularly, mongolism. With Professor Lejeune here, I don't dare continue to speak about trisomies, but I would like to tell you that one of their variants, trisomy 21, through nondysjunction especially appears in older mothers. It is produced when the mother's chromosome pair does not separate, and instead of there being one chromosome left, a single chromosome thread to unite with that of the father, there remain two, which, along with the paternal one, make three: it is therefore called a trisomy.

There are other less frequent trisomies: that of pair 7 and pair 14, for example. This incidence might lead us to believe that these are the worst chromosomopathies — i.e., illnesses resulting from chromosome alteration. Such is not the case: it is precisely because they are the most benign ones which are compatible with life. The other atypical combinations are lethal and, consequently, do not allow researchers to view the result of this pathology on a chromosome scale.

The risk of nondysjunction presenting itself in mothers over age thirty-eight increases exponentially and can be avoided, as you will understand, by avoiding maternity at an advanced age.

Another major chapter in congenital diseases is represented by the so-called *enzymopathies*; in this instance, there is a lack of the activity of certain enzymes or biocatalysts, which are proteins, the reason for which many authors prefer to term them as a group proteinopathies — i.e., diseases reflecting a genetic alteration expressed in a modification of enzyme proteins responsible for a given activity. The first proteinopathy to be studied in great detail concerns the protein of hemoglobin in blood: it is a pathology particularly frequent in Africa, in the black race, which is called "sickle-cell anaemia" because the red globules characteristically take on the shape of a sickle and which results in serious respiratory insufficiences, since oxygen is transported badly by this deformed protein.

After the hemoglobinopathies — for there are many alterations of hemoglobin which are known today — other enzymes were studied, other proteins with enzymatic activity. The first, discovered at the beginning of the century, corresponded to a syndrome called alkaptonuria, since urine immediately takes on a dark, blackish coloring. This is what enabled Garrod, the pioneering researcher in this field, to identify the first enzymatic alteration. Today several hundred enzymopathies are known. Some of them produce an alteration in mental capacity during the intrauterine period; others, instead, are manifested only postnatally, which means that the mother protects, makes up for, and complements the fetus' deficit during the gestation period. Since it is manifested postnatally, if detected early, the alteration can be known, and its consequences, avoided.

Among the most significant enzymopathies, I would like to men-

tion phenylketonuria, which appears in approximately one out of every 10,000 newborns; in Spain, this fact enables us to avoid between 50 and 60 cases each year of severe subnormality with dietetic treatment regulating the amount of phenylalanine.

Another alteration related to enzymopathies is hypothyroidism. Hypothyroidism, which can also be treated quite easily, appears in Spain with a frequency of one newborn per 2,000, which enables us to avoid from two to three hundred cases a year. As you know, hypothyroidism accompanies very considerable mental retardation, serious idiocy which may be avoided by administering thyroxin or trizodothyronin.

I do not wish to weary you with examples of this type of alteration, but do want to mention galactosemia, Lesh-Nyhan's disease or self-mutilation, and cystic fibrosis. All of these involve enzyme alternations, and some can already be avoided in our day.

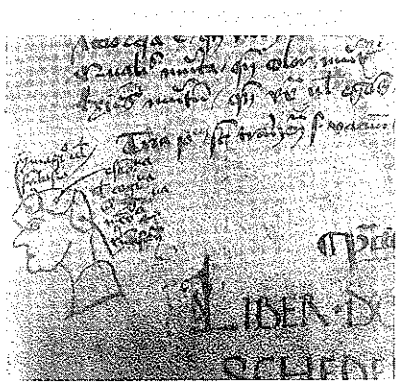
Another kind of proteinopathy concerns the alteration of certain proteins called receptors which are found in the cell membrane, including neurons. These receptors sometimes have canals or ducts and regulate the entry — and eventually the exit — of substances. They are seen to be composed of several proteins, which implies that there are several genes " responsible. " These proteins are also called " intermembrane " because they cross the cell membrane. Their alterations, in my view, constitute one of the most important pathologies at this time, the study of which will allow us to discover, diagnose early, and treat illnesses accompanying mental retardation.

A very well known illness normally presenting itself in older people is Parkinson's disease, which is due to the decay or decline of dopamine receptors (dopaminergic receptors). Schizophrenia might, on the other hand, be due to the exacerbation of the activity of such receptors in young people.

Another characteristic example I wish to mention to you is so-called *myastenia gravis*, a progressive disease appearing with muscular atony and due to an autoimmune reaction to one of the protein components of the cholinergic receptor.

1) To sum up, McKusic has already identified over 4,000 diseases due to genetic alterations reflected in the language of proteins, which is the language of the activities of biological functions. Before passing on to another kind of cause of illness appearing with mental retardation, I want to mention that quite recently genetic therapy was authorized to treat " bubble children " lacking desaminose adenosine. This news entails new chances for curing (or attenuating) the ailment. But it also involves risks, since it may be used for other ends less worthy of praise than is the supplementary treatment of a genetic deficiency.

2) Another major type of alteration accompanying mental retardation is the result of *physical and physiological traumas at the moment of birth*. It is to these physiological dysfunctions that I have devoted many years of research, particularly in examining the relation existing between hypoxic episodes (a lack of oxygen at the moment of birth) and subsequent mental retardation. We have come to know the inner mechanism producing serious mental retardation in many cases — motor and neuromotor paralyses and deficient intellectual development — as a result of several minutes (sometimes very few) without oxygen during birth.



These alterations, which are by far the most frequent, can be avoided by close attention at birth through adequate monitoring of oxygen access by way of the fetus' and the mother's pulse.

3) *Other causes of mental retardation* are fetal-maternal relations in the case of infections, immunotolerance, alcoholemia, drug addiction, etc. The greatest risk is in the early months of gestation, when the fetus is less protected by the placenta. During this period, called " embryogenic, " there is increased access to the fetus for toxic substances such as alcohol, drugs, viruses, or microörganisms.

In this chapter iatrogenic diseases are included wherein medicines may unleash alterations facilitating mental retardation.

4) Finally, I would like to mention *undernourishment* and *malnutrition* and do so with special emphasis, for in this case we do not need great discoveries, explorations, sophisticated scientific equipment — it is enough for us to manage to give food to all creatures.

Undernourishment and malnutrition continue to be two of the major social factors, proper to poverty and indigence, which originate mental retardation. Mental retardation is avoidable in some cases (like those I have just mentioned) through measures and treatments adopted during pregnancy, at the moment of birth, or in the postnatal period. In other instances, it is necessary to take appropriate steps before fertilization by way of genetic counseling. We cannot and must not invoke economic reasons — there is no better investment than to present mental retardation. We sometimes squander funds on prolonging life for a few days or months while not attending to the crucial moment of birth, postnatal analyses for the early identification of these alterations, and the care of the newborn and children as we should.

Once we are unable to avoid the appearance of a mentally retarded person — his or her first right is not to have been one — what position

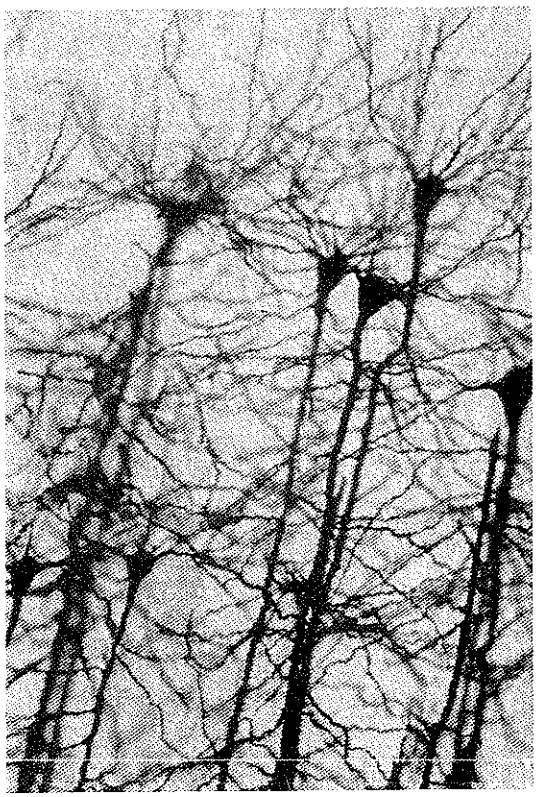
are we to adopt regarding the reality of the mentally retarded?

In the first place, we have special education, which may include integration. I have described integration "as a solution — and as a fraud," for integration is often a trap, an excuse for public authorities not to provide the personalized attention, both medical and educational, which the mentally retarded deserve. Professional training and apprenticeship, the development of manual skills and abilities form part of this chapter, which ought to occupy the important place it warrants in national budgets. And, finally, *protection*: protection when parents are not present, thanks to institutions seeking to offer the mentally retarded a favorable environment, both intellectually and professionally, for the whole of their lives. *The mentally retarded become adults*, and we must see to all the measures to be adopted to deal with their family, social, and hospital needs, along with the unique problems of sexual relations and possible descendants.

On speaking of the mentally retarded who become adults, it is proper to conclude with some words for adults who become mentally retarded. Alzheimer's disease stands out, for, as average life expectancy increases, it is becoming one of the leading geriatric illnesses. Many laboratories for neuroscience research, including my own, are attempting to advance in the knowledge of its causes.

The general conclusion is that we must prevent as far as possible and have at our disposal whatever school, hospital, assistance, residential, or other systems are needed so that the mentally retarded can truly be — as I stated at the outset — retarded human beings and not just retarded beings.

FEDERICO MAYOR GARCIA
Director General of UNESCO
Paris



JEROME LEJEUNE

Human Genetics and the Gifts of the Spirit

The recent development of the biological sciences obliges us to consider the foreseeable effects of their applications: the development of technology is and will be fulminant, but will man be fulminated?

When previously dealing with this fearful question,[1] I spoke of the seven capital sins which the manipulators would be capable of committing, and Your Excellency replied to me, saying, " There are also seven gifts of the Holy Spirit, Professor. "

This paper thus owes its title and form to your Excellency, for the wisdom of your reply led me to consider the jumble of knowledge, hypotheses, and opinions in which we struggle every day in the light of the Spirit.

For it is the Spirit who gives us life.

There is no living matter; matter cannot live or reproduce itself. There does, however, exist animated matter.

The object of genetics is precisely to catch what animates raw matter " live, " to describe the information producing and controlling myriads of molecules capable of channeling the swarm of energies for the purpose of adapting the randomness of particles to our needs.

In life there is a message; and if this message is human, that life is a man's life. The matter animated by human nature then edifies *a body in which a spirit becomes incarnate*.

As we know, there are seven gifts of the Spirit. But we must know whether enumerating them enables us to choose all the knowledge to be reflected upon.

1) *Wisdom*: First of all, we should specify to what use our means are to be put. A historical example will allow us to grasp this point.

About half a century ago, an American abortionist got the idea of applying the toxic effect of aminopterin — which inhibits the metabolism of folic acid — in his activity. This vitamin is in fact indispensable for the synthesis of the bases constituting DNA, leading to the blockage of cell division. This property is, furthermore, extensively used in chemotherapy.

Since the embryo's — and later the fetus' — cells actively divide, Thiersch thought of killing the child in the mother's womb, which he in fact did. But some of those children belatedly died, with serious anomalies of the nervous system: forked spine, meningocele, anencephalia.

Thirty years later Smithells, and later Laurence, discovered that folic acid given to mothers at the beginning of pregnancy, or even slightly before, protects children against such malformations of the central nervous system.

If the objective posed by Thiersch had been the fight against an illness and not the death of children, prophylaxis for forked spine or hydrocephalia would have been found thirty years later — hundreds of thousands of children would have been protected in all that time!

Pasteur said that fortune favors only prepared spirits. But what prepares the spirit better than the will to reach an objective? The facts may be evident, but we can see only what we are looking for. No wisdom, no intelligence — this is precisely the second gift of the spirit.

2) *Intelligence*. To defend every patient, to lavish care on every man, without asking for his name, his race, or his religion, presupposes that each of us is regarded as unique and, therefore, irreplaceable. To be certain of this, we ought to have an " intelligence of being " just like that which genetics provides for us.

The number of possible combinations among the different chromosomes, of which the father and the mother transmit half each, surpasses the number of men who are living or who have lived to such a degree that everyone is endowed with an original composition which has never before been produced and never again will be produced.

This statistical certainty is now before our eyes, thanks to the method of Jeffreys.

It would take too long to describe his technique, but his principle is as follows. After having chemically extracted the DNA of a tissue fragment, one treats it with enzymes which divide it into fragments that must be separated according to their size and passed into an electric field on a suitable base. After the action of the Jeffreys probe, the result has a familiar appearance, similar in all respects to the bar code used in supermarkets.

Parallel lines of varying thickness, spaced unequally, describe a message which an optical detector transmits to a computer. The name, amount, and value of the product are immediately set.

In the bar code of each one of us, a genetic identity card which is not at all falsifiable and which we always carry with us, half proceeds from our mothers. The originality of every man and his real filiation

are thus simultaneously manifested before our eyes.

These bar codes will also be read by a computer, as at the supermarket. The only thing that the machine will never be able to set is the price of human life.

To sum up in a few words what prudence and intelligence disclose to us concerning our human nature, we might simply state, *Neither a thing nor an animal, the human body cannot be disposed of.* In the sight of the law, every human being is a person, from conception to death — this is what would be prudent counsel.

3) *Prudence* indeed imposes itself when a biological action is applied to man — certainly if directly, but also if indirectly. Four hundred years before Christ, the sage of Kos had his disciples swear, "I will spend my life and exercise my art in innocence and purity; I will never give poison, even if asked to, and will not suggest such a practice" (and this applies to euthanasia), "nor will I give abortifacient tampons to a woman" (and this is valid for abortion).

Wisdom and intelligence had dictated prudence to the man who founded our art. And for more than two thousand years all the masters of medicine have constantly maintained this Hippocratic Oath.

Moreover, they have been followed by all moral and political authorities in civil society until recent times. Vatican II did nothing but repeat a completely general and constant teaching when recalling that *abortion and infanticide are abominable crimes.*

It should, however, be noted that today a certain number of more or less unfavorable conditions come to light in the uterus, and the elimination of the fetus is allowed by the Veil Law *at any point in pregnancy.*

Since diagnostic means are being perfected increasingly, one day it will be possible to discover the slightest imperfections or even a predisposition towards disturbance showing up quite late, such as Huntington's disease, appearing around the age of forty, or Alzheimer's disease, leading to madness between the ages of fifty and sixty.

Does prudence demand that we eliminate the individuals recognized to be the bearers of hereditary defects? We can say it does not.

It is true that diseases cost dearly, in both sufferings for the patient and family and social costs for the community, which must replace its members if the weight proves unbearable.

The price is well known in both money and dedication — precisely the price a society must pay to continue to be fully human.

Without calling to mind the deportations by Nazi selectors, *Gnadentodt* for the *unlebensverten Leben* (the pardon by way of death for lives unworthy of being lived), I shall cite a much more ancient example. Not then familiar with prenatal diagnosis, the Spartans awaited birth to expose the newborn whose constitution seemed incompatible with bearing arms or begetting future soldiers on the heights of Mount Taygetus. It was the only people in Greece which practiced this relentless eugenics systematically.

Of all the Greek cities the chief one in Lacedemonia is also the only one which has not left to humanity a sage, an artist, or even a ruin.

Why this exception among the Greeks, the most gifted men on earth? Is it because in getting rid of their deformed or excessively fragile children the Spartans unwittingly killed their poets, musicians, and engineers? Or because in practicing a reverse selection they progressively became brutish? We glimpse such a mechanism, but cannot assert it. Or were their science and intelligence already so inferior that they committed the imprudent act of killing their children? Genetics cannot conclude that the two hypotheses are simultaneously true.

If prudence disapproves of the doltish cult of force, this does not at all exclude forcefully keeping to truth if we wish to preserve reason.

4) The *strength* of the spirit is in fact resistance to the simultaneous stonewalling of the three aforementioned gifts, upon which war is waged in three phases: diversion, inversion, perversion. First, diversion: you do not look at the being who is to disappear, but rather consider the difficulties occasioned for his parents and society.

This is readily followed by inversion: a great deal of good could be done with this treasure of money and dedication squandered in vain. It would suffice to suppress the patient....

And perversion thus installs itself definitively: not only are those who are bothersome eliminated (by means of abortion or euthanasia), but it is decreed that it is ethically acceptable to use beings not yet strong enough to express themselves for so-called scientific purposes.

It is true that all the achievements of modern genetics have been carried out without a single man's life being placed in danger; but those claiming such results insist and proposed laws accumulate, taking the lives of very young human beings — why this hunger for fresh flesh?

For a very strong reason which we do not dare to formulate, so great is its sordid realism. A chimpanzee embryo is quite expensive, for breeding must be paid for. But human life does not involve a price. It has also lost its value, since some nations which for a long time were civilized have by a vote disavowed what for more than two thousand years all the masters of medicine had constantly sworn.

This spiritual strength was recently absent in the British Parliament, in both the House of Lords and the House of Commons. Since April 23, 1990 it has been possible to regard Her Gracious Majesty's smallest subjects — provided they have not completed fourteen full days of existence — as material for experimentation. This vivisection of the youngest English citizens, this suppression of *habeas corpus* at the beginning of life, does not even seem to have deserved the attention of the mass media.

It is a pity that other heads of state have not followed the admirable example of Baldwin of Belgium, who refused to sign the death sentence of his smallest subjects. *Est regis tueri cives*: it is the king's duty to protect citizens.

What prudence forcefully repeats to us should, in short, be written into laws: like every other human being, *the embryo cannot be disposed of.*

5) Embryological science teaches us much on this point. Allow me to introduce here my personal recol-

lection of testimony in Tennessee before the Court of Maryville in divorce proceedings.

The mother, named Mary, was asking for custody of the seven frozen embryos she had conceived by her husband; she wanted to defreeze them and bring them to life.

It is noteworthy that we use the same term to designate duration as calculated by a clock and heat as measured by a thermometer. We say " time " and " temperature. " Now then, the agitation of molecules is precisely the flow of reality which passes, in such a way that, with a decrease in temperature and blockage of movment, time as well is frozen. Life is not an impulse, as Bergson thought, for once blocked it could not get running again. However, if the precious edifice containing the information to animate matter has not been destroyed by freezing, life manifests itself anew, immediately recovering warmth and hence time.

Piled up by the thousand in a refrigerated bottle with liquid nitrogen, deprived of all freedom in that enclosure in which time itself stops, the little human beings are, so to speak, interned in a " closed concentration, " a concentration can. The Maryville judge had understood clearly; in France, however, the term was translated as " concentration camp ", a doubly false rendering. First of all, there was reference to a " can, " not a " camp "; secondly, " camp " represents a means to acclerate death terribly, whereas " concentration can " represents a means to make life terribly slow.

It is true that in both cases the system of concentration closes over the innocent.

In entrusting those seven little ones to the mother's care, the Maryville judge pronounced Solomon's judgment for the second time, after a lapse of 3,000 years: the one to whom the child should be entrusted is the woman who wants the baby to live and prefers having him given to another to seeing him condemned forever.

This love for one's descendant, this maternal mercy, finds its natural reciprocity in the child's love for his parents.

6) The sixth gift of the Spirit, *filial piety*, involves a surprising modernism for the genetic physician.

All previously believed that the patrimony transmitted by the sperm and that transmitted by the ovule were strictly homologus (together with the sexual chromosomes).

Today, thanks to Surani, Swain, and Holliday, we know that each sex marks the DNA it transmits with its imprint. Just as the student underlines the passage to be recited immediately and leaves aside what will be of use to him further on, DNA methylation marks the salient points.

Man underlines what will allow him to construct the membranes and placenta; woman underlines the instructions to diversify the tissues needed for the embryo.

Experiments with mice have explained a strange pathology, already well known in our species.

A fertilized egg containing only the masculine message, even when in duplicate, with the required number of chromosomes, is not a human being; it forms only little vesicae, pseudo-amniotic sacs — i.e., what is called a *hyadatiform mass*, which may degenerate into a tumor, the *choriocarcinoma*. On the other hand, a fertilized egg containing only the feminine message,

though complete, and even possessed of two sets of chromosomes, is not a human being either: it will produce nothing but separate " pieces " — hair, teeth, skin, etc. — but in disorder, without formal ordering. Such is the *kyste dermoïd*. The male and female imprints are simultaneously needed for the conception of the human being.

In the fertilized ovule, a minuscule sphere with a diameter of one-and-a-half millimeters, the division of labor we are familiar with is already to be found, miniaturized to the utmost — the male is responsible for building a shelter and seeking food; the female, for the formation of the child.

These facts allow us to affirm that there is a need for a man *and* a woman to generate a new spirit.

The first cell which did not have *one father and one* mother could not survive for long: the being would not even be conceived.

— The " gay " nightmare of purely male conception by introducing two spermatozoa into an ovule previously deprived of its legitimate nucleus and then introduced into just any rented uterus is thus over with.

— The speculation of the millionaire hoping to reproduce a " clonus " in his image and likeness to transmit his hereditary capital and financial interests at the same time is also left without value.

— The pretence of procreating " among women alone " by fertilizing an ovule with the nucleus of another ovule taken from a " friend " has come to an end as well.

For the scientist specializing in genetics, " Honor your father and mother and you will thus have a long life " is undoubtedly a divine commandment — nature obeys it.

Examine, observe our strength, then, and afterwards measure the dangers.

We shall begin by spelling out the immense genetic message letter by letter. It will fill the equivalent of six complete collections of the Universal Encyclopedia.

No man can read it all or understand it either; but the information will be placed in the machine. The apparatus, at our request, will give

us back the passage we are interested in. A sophisticated robot, employing the P.C.R., in response to our request will also produce for us the portion of the molecule by means of which it will continue the experiment, either to eliminate an undesirable gene or repair a defective paragraph.

This medical use is highly desirable and does not prompt any new moral problem *as long as one acts prudently and in the subject's personal interest*.

But our generation is not the owner of the patrimony of our species.

The human DNA of which we are only depositories is not material we can shamelessly patent or sell or manipulate.

It would be necessary for the laws to state that *the human genome cannot be disposed of*.

" Would you dare to impose your morality on others? " they will ask us. " Of course we would. In a pluralistic State which makes no reference to any morality whatsoever, to attempt (legally, of course) to introduce one's morality into the laws of one's country is much more than a right — it is the duty of every citizen.

In concluding, we may say that the fear stimulating the spirit is not at all fear of novelty or terror at technology — these factors, if subjected to proper management, are the keys to efficiency.

This movement of the heart which elevates the spirit is the fear of abandoning the reverence due the Creator and then the respect due his creature.

Timete Dominum et nihil aliud — this is fredom of the spirit: fear God and no one else. This freedom of the spirit is terribly necessary for us. For there is an affirmation, one alone, which may be proposed without any risk: Science with conscience will be needed to avoid man's ruin.

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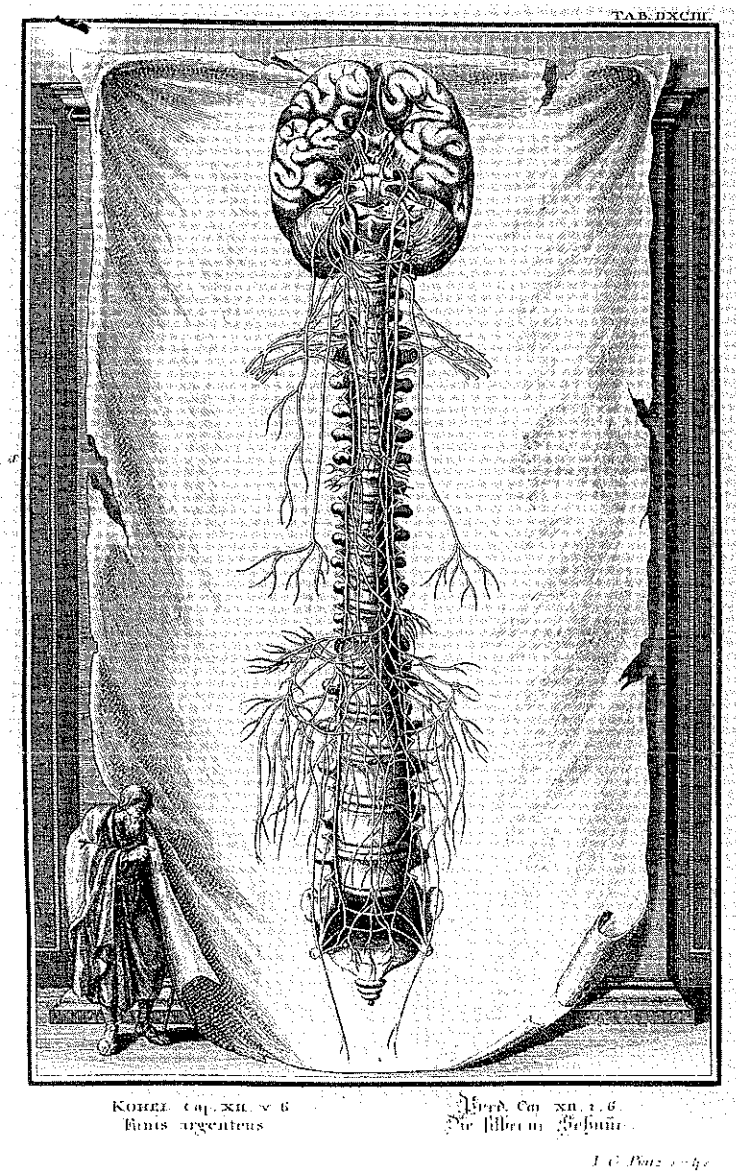
[1] Jerome Lejeune, " Seven Reflections on Deontology, " in *Dolentium Hominum*, No. 14 (1990), pp. 45-48



PIETRO PRINI

Artificial Intelligence and Contemplative Intelligence

1. In recent developments in cognitive research everything has occurred as if those working on it had proposed to respond to the question the Baron of Holbach, in his *Système de la Nature* (1770), ideally posed for Descartes, criticizing the dualism of the *res cogitans* and the *res extensa*. Since man is matter and has the faculty of thought, " Would it not have been more natural to conclude that matter can think? " (I, 2, 7) As a whole the cognitive approach to the problem of the mind/brain relationship has been applied in the same measure in which neomaterialistic philosophies occupy a vast area of contemporary thought. The line of demarcation between these new forms of materialism and the traditional ones lies, on the one hand, in the general semiotic-linguistic formulation of " mental " or intelligence-related problems in a broad sense and, on the other, in the reform of the grossly reductive mechanicism of the " man/machine " of physiological anthropology in the nineteenth-century tradition in favor of a more complex electrochemical representation of the brain and the neurocerebral system.

In the generally-accepted perspective of the semiotic-linguistic nature of the mental, ethnology has certainly cut short the distance between *human language* and so-called *animal language*, bringing out their common physiological and sensorial basis. Animals, through an overall need for survival, particularly within the domain of their own species, exchange information by way of signals, in a complexity of variations which are not always easy to specify, extending from modifications of physiognomy to changes in body position and movements, from olfactory and gustatory signals to sounds or utterances, from tactile signals to luminous messages, and so on. What we have gradually been discovering is that they are not merely expressive or pathognomic phenomena, but involve repertoires of authentic signal structures of a kind which is indeed cortical — at least in species with a high degree of social organizaiton — in such a way that the constancy of their codes may be detected with sufficient precision, particularly as regards optic or sound signals, through the most modern recording techniques.

If language, in its general definition, should be understood to be the transmission of information through behavior and not only genetically, its emergence in the animal world corresponds to the formation and superiority of the brain over the genome, as a structure for processing information itself and as the possibility for storing it in the form of memory. From this superiority there certainly derives in the animal world that series of phenomena which in the human world we term intelligent, such as the possibility of purposeful integration into social groups, the ability to learn and to teach, and, finally — at least in the most evolved animals — the possibility of inventing responses which are more flexible than those proposed by the environment in which they live. In fact, they are genuine mental phenomena, and it would be ridiculous to put their origin and bodily nature into question, though it is impossible not to recognize the abyss separating the animal's signal codifications from man's linguistic symbolism. The difference between language and those codifications lies precisely in the former's *connotative* rather than merely *denotative* function. In a restricted acceptation of the term " symbol " — to distinguish it from the kind of sign which is only a vehicle to designate (or a " signal " of) an object or an action to be performed or not performed — Langer is right in observing that " symbols are not intermediaries for their objects, but *vehicles for the conception of objects*: to conceive of a thing or a situation is not the same as to " react to it " in manifest fashion or take note of its presence; when speaking of things, we have conceptions of them, not the things themselves; and *it is conceptions, not things, which symbols " signify " directly*. Behavior towards conceptions is what words normally evoke — i.e., the typical process of thought " (Susanne Langer, *Philosophy in a New Key*, New York, 1962, p. 61). Undoubtedly, then, there is a common, sensorial, behavior, and neurocerebral basis for human and animal language, but also a *rupture* or *evolutionary leap* separating the former from the latter. What this discontinuity originates from and its nature are such as to go beyond not only the semiological sphere of animal behavior, but also the potentialities for working out and constructing responses to the environment by that " electrochemical machine " which is our brain. It is the main problem of contemporary anthropology. Between the designatory language of the animal and the conceptual linguistic symbolism of historical man, how does the original event in human thought take shape?

The hermeneutic review of a bril-

liant discovery by Giambattista Vico — the discovery of the "universal of fancy" or of the "poetic character," as he termed it — is opening up new paths to myth theory and, in general, to the semiology of human intelligence. This discovery has been — and still is — ignored by the twofold attempt by behavioral psychology and structuralist ethnology to eliminate all essential discontinuity between animal and human language and to place both *pensée sauvage* and civilized thought on the same level of classificatory language. The language of fantasy is, on the other hand, the authentic birthplace of thought (and not just the "material" of the concept, as Benedetto Croce held, following after Hegel), though constituted, as Vico states in *Scienza Nuova* (par. 401), by "acts of signification connected with the silent acts of bodily gesticulation." Animals *communicate* and *calculate*, but do not *think*, for they are incapable of instituting metaphors — i.e., to catch *images conveying a universal meaning* in the flow of perception, such as Jove, Hercules, or any other mythical figure. These "fantastic universals" of poetic thought do not signify common properties equivalent to the content of classificatory language for genera and species, but are real totalities of meaning. "Poetic truth," says Vico, "is a metaphysical truth within which physical truth not conforming to it must be held to be false" (par. 205).

A paradigmatic scheme for this *transfer* of the meaning of the data of perception through analogical substitution is the most famous of metaphors, the one transfiguring the emotion of fear over the thundering sky into the myth of Jove. It is not a fear to which man can react by defending himself or taking flight or, in any event, trying to save himself, as if faced with an attacker's weapon, the threatening appearance of an animal, or the disorder provoked by a flood. It is Fear with a capital "F," the panic the Greeks term *Phobos*, which is not centered on any object of reference and against which there is nothing to be done. Man's response, on his horizon of meaning, is not to *re-act*, but the emotion of the word resounding in the silent stupor of all his embodied being, and the primordial distinction between heaven and earth takes on a shape in the raging of thunder: Jove, the power of the sky revealing to us our belonging to the earth.

The primary event in human intelligence as such — wherein the human species or *forma humanitatis* manifests itself — is, then, the *metaphor*, the *image of a totality of meaning* disclosing itself in the silence imposed on every other word by an all-encompassing threat. It is the event of an opening meaning, like the appearance of a beach on the ocean. In this sense, the "universal of fantasy" is corporeal thought having its *seat* or *reception* in man's body rather than its *source*.

2. We know that by the "electronic revolution," as it has been termed, two main lines of research have been opened up: *robotics* and *artificial intelligence*, for the purpose of raising the electronic machine to a level of performance equal or superior to that of man and at the same time discovering the extent to which there are "mechanical" elements, in a literal sense, in some higher human activities, such as analysis of information, mathematical calculation, and the capacity for control and decision. Until today it has been the leading attempt to interpret the mind materially and reproduce it technologically.

Starting from the assumption that there is a substantial analogy between the mechanisms regulating electronic machines and those of mental apparatuses and that at the root of these mechanisms are reception, analysis, and transmission of messages, robotics is the study and realization of calculators with a high level of automatism, sufficient to replace man in his function as controller and pilot of machines and systems; artificial intelligence, in turn, in this special acceptation of the term, is the search for the ways in which some activities of natural intelligence may be emulated through the programing of electronic processors capable of carrying out real inferences of a logical — heuristic type — and not only logical — deductive — upon representations. At this last level of development of information science, artificial intelligence is not limited to programing into machines the logical system for information recognition and processing into executive decisions, but designs processors able, on the one hand, to represent the informative message as *knowledge* — i.e., in mental terms, to "understand it" — and, on the other, to *infer from it inductively* (and not just by deductive implication) the planning of actions depending on current projects, such as translation from one language to another, recognition of the speaker's voice, the best handling of a game of chess, so-called "expert systems," etc. As immediately appears, the novelty of this extraordinary ambition lies in designing processors capable of "learning by themselves" — the quotation marks are obligatory, for a reason I shall state shortly: "learning by oneself" is the innovative development of what has been "already learned," to the point of emulating *inventiveness*, which is the greatest title to nobility of natural intelligence.

It is a working hypothesis, and there are not yet sufficiently notable realizations, at least as regards a part of these and other similar projects. Even though the electric signals of a calculator's hardware can travel thousands of times faster than sensorial messages through the neurons of our neurocerebral system, the difference in performance between the former and the latter is still immense. But we must immediately note that artificial intelligence arose not from the intention of constructing a double for man, but rather, first of all, so as to study man's mental behavior, in order to modify it as well, following the model of machines that were nearly perfect, logically, with a kind of overturning of machine logic upon the very minds of those benefiting from its services. In this sense, artificial intelligence is until now the final chapter of that radical transformation of man's mental performance in the modern world of work which has been effected by the industrial revolution. It is "the thing itself," *das Ding*, as Theodor Litt said, the "machine" which lays down the law in the world of work, in this technical civilization of ours succeeding those which are rural and artisan; for its functioning and use it demands a broad multiplicity

of specialized services coordinated according to a precise organizational plan. If the industrial revolution has transformed man's conduct at work, changing his physical performance, the information revolution is transforming his mental conduct, "industrializing it," so to speak — that is, making his work an exercise of analysis and planning. For this reason those comparing the importance of the information revolution to that of the invention of the alphabet in oral and ideographical cultures are perhaps right.

But *the collapse of a false problem* which has rather often impeded and still impedes clear analysis of the relationship between the neuronic brain and the electronic calculator hence appears justified. It is not a matter of asking whether the information processor, programed by vanguard electronics, is, as the so-called advocates of "intensive artificial intelligence" feel, "really a mind," to which authentic "cognitive states" may be attributed (cf. criticism of this thesis in John Searle, "Mind, Brains, and Programs," in *The Behavioral and Brain Sciences*, No. 3, p. 417). It is a meaningless problem if we take into account the fact that both realizations — that of the computerized language of the calculator and that of the natural language of our brain — *are a linguistic practice by man*, of real, living, and thinking man, without whom there would not be calculators or programs or discussions about them. If a calculator were built — like the ones assumed by the so-called "fifth generation" — at the maximum possible level of independence from man, i.e., such as to be able to write its own programs on the basis of some elements given it and progressively using higher degrees of formalization — it would, in any event, be subject to the algorithm of its own construction and thus could not inform us on the option which decided to construct it according to that rule and not others. With a play on words, we might say *it is programed to be a programer*. Its language constitutes the exact model of language as a mechanism of self-regulation, but the one speaking this language is in the end the mind of man which has built it. No one, then, should be so uncouth as to apply the phrase "thinking machine" literally to the calculator. It is a machine by means of which, as by means of one's own brain, the whole man, with the inventive energy of his living corporeality, thinks, speaks, and produces. The codification under the form of electronic signals of all the sources of information — human voice, texts, data, graphic patterns, figures, sounds, and images — furnishes a language model which is rooted in another language preceding and conditioning it. Indeed, this model, with its semantic applicability and syntactic consistency, experimentally demonstrates to us the "mechanicalness" — i.e., the materiality — of our own mind. In short, we may state that the mind, and the mind alone, is truly a "thinking machine" which has its phylogenetic "hardware" in that extraordinary "automaton" represented by our neurocerebral system.

But the project of a "totally artificial" intelligence, coming to be clarified as the hypothesis of a symbolic world suspended in the impossibility of *globally* attributing to itself a meaning or a nonmeaning, is also an *experimentum metaphysicum par excellence*. Indeed, even

our natural language, inasmuch as it is constructed in the phylogenetic, ethological, and cultural hardware of that neurocerebral system which conditions the exercise of mental life in every man, is subject to that underlying condition of the electronic brain: the *inexpressibleness of the sense of one's origin* — i.e., *the absence of a global sense*.

This impossibility for us of an *absolute language* — that is, one capable of containing the sense of oneself — is expressed by what we might call *the paradox of metalanguage*. According to the formula proposed by Alfred Tarsky, "a metalanguage contains methodologically correct and materially adequate definitions of semantic concepts (of a language) if and only if that metalanguage is endowed with variables of a logical type superior to all the variables of the language under consideration" ("Grundlegung der Wissenschaftliche Semantik," *Actes du Congrès International de Philosophie Scientifique*, vol. 3, Paris 1936, p. 8). From this standpoint, the relationship between the language of the computer and natural language appears rather clear. The computer, on a cognitive level, is a perfect specimen of the *tabula rasa*, of the mind free from every input, on which the empiristic concept of the theory of knowledge claimed to base itself: before being programed the computer knows nothing at all. Its language is, then, such as to be adequately judged by natural language — i.e., by that of its programer, who constitutes its original paradigm and appropriate metalanguage. But the comprehension of artificial language in the terms and rules of natural language cannot, in turn, comprehend itself; it cannot be situated in a metalanguage which would not be true if it were absolute and would not be absolute if it were true. The paradox of metalanguage is that it *comprehends without being able, in turn, to comprehend itself*.

The mind of man — quite unlike that "ghost in the machine" about which the denigrators of the "internal spectacle" have spun yarn — is a "symbol machine" with the unprecedented capacity to collect its thoughts in silence before what is beyond all calculation and all measure. We encountered this silence at

the birth of the myth in the emotion of the unfaceable cosmic Phobos: it is instituted in the sphere of all our linguistic practices, when we realize that the most important thing in the world is that which cannot be said, for it involves the sense of our origin. This is the basic difference between man's mind and artificial intelligence, and, indeed, merely animal intelligence. The animal howls or flees as if mad when it cannot react, and the computer remains *silent* in its inevitable " nil " when it cannot respond. Man's mind, on the other hand, can overturn its own speech in the *silence questioning itself* on its impossibility of constructing the total meaning of itself and the world. This *reditio in se ipsum* in the silence preparing to listen is the event in which man comes into the world as man, becoming unmistakably marked as *contemplative intelligence*. Silence is the *empty dwelling* which can host the disclosure of being. In Angelo Silesio's *Cherubic Pilgrim* these essential words may be read: " Be silent, dearly beloved, be silent; if you could remain utterly silent, God would show Himself to you much more clearly than you wish. " For the mystic the word of God — which is thus his " pure absolute silence " as well — fills man's holy silence with meaning. The experience of the Sacred, music and poetry, the enlightenment of moral ideals and philosophy as a question, indication, and cipher with respect to transcendence are the essential expressions of contemplative intelligence, where all men may meet on a deep level, as radii of a circle meet at its center.

PIETRO PRINI
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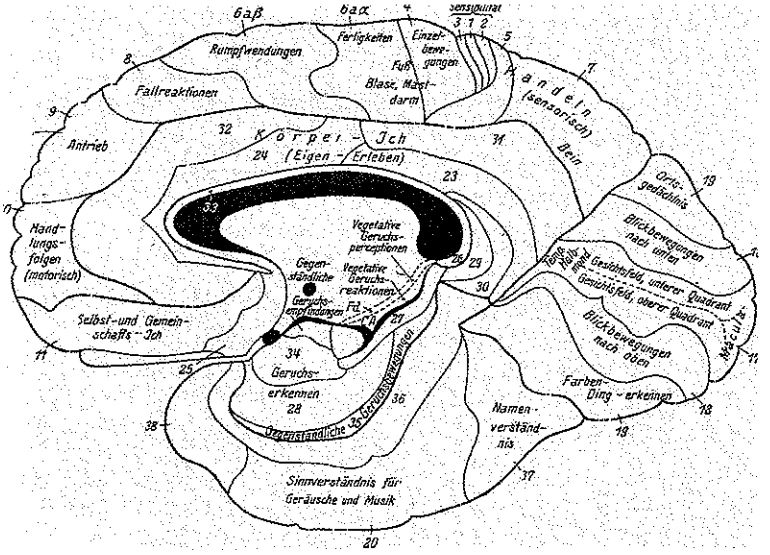

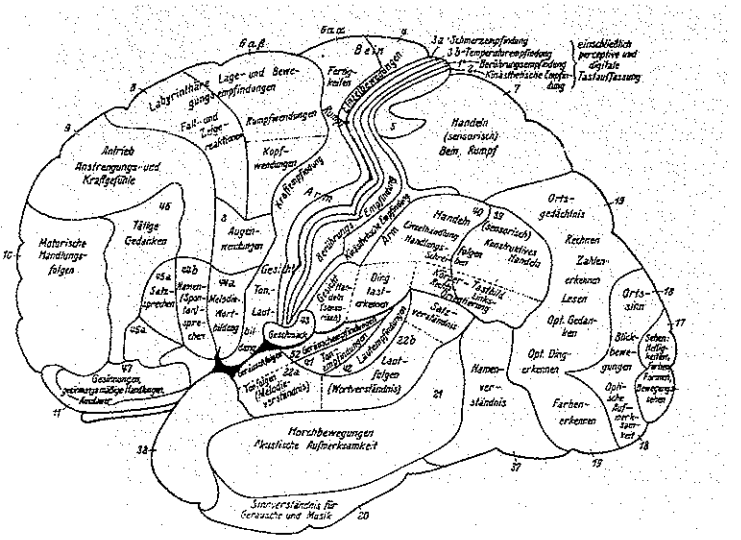

ADRIANO OSSICINI

The Mental Development of a New Human Being

In the last ten years there has been a profound transformation in the various ways of looking at the question of the mental development of a new human being, both with regard to physical and psychic elements and in relation to environmental and genetic factors.

It is difficult to cover such a vast field in such a confined space, because a serious contribution should not fail to involve a serious theoretical overview and should also make reference to precise facts derived from clinical experiments carried out in this area. In order to discuss the subject which has been given to me I will, on the one hand, take advantage of the long experience I have gained over a number of decades as a teacher of psychology at various Italian universities — with special reference to matters relating to psychic development and evolutive age — and, on the other, utilise the clinical experience I have obtained from working with a team of collaborators in a psychic-pedagogic medical center for some forty years.

I think that I will thus be able to provide certain orientations for a theoretical overview of this subject and, in addition, offer certain specific contributions of clinical relevance — especially with regard to experiments I have conducted on the early stages of psychic development in children, beginning with an area which is rather unexplored: the psychic life of the child when it is still in the womb.

With regard to a theoretical overview, it should be said that questions regarding the mental development of new human beings have undergone a profound transformation in terms of opportunities for investigation and classification. The term " mental development " is used nowadays more with reference to the totality of psychic development in all its physical-psychic ramifications. A mind on its own is neither definable nor assessable, but mental development is assessable within a framework of a complex evolutive process.

Secondly, the profound influence of instinctual dynamics and affectivity on mental development has also been very much emphasised. This has happened to such an extent that a picture of mental development — especially with regard to the early stages of life — and of the ways in which a new human being comes to be different, is certainly not possible without an assessment of the interrelationship among these realities.

For this reason, our clinical experience now leads us to consider mental development as a complex evolutive process taking place within a general context of psychophysical evolution and the dynamic between unconscious and conscious realities, and at the level of socialisation — within which rational aspects are prevalent and often decisive.

By now the old individual psychology which started with the subject and went on to his relationships has been substituted by a relational psychology which sees the subject as — first and foremost — a product of a series of interpersonal relationships. This modern psychology then goes on to an analysis and an identification of the subject's *individual* reality. In the same way the analysis of the psychic processes is obtained by entering the profound dialectic between the unconscious and the conscious parts of the mind.

All of this is of particular importance especially in the first phase of human life when the relationships that the child has with parental figures are of an importance very different from that previously attributed to such relationships. In the past it was thought that the parent was indispensable in helping the child to grow, in helping the mental development of a new human being. But it was considered as something that acted from the outside, as external help which supported, protected, and directed.

All modern research in clinical and dynamic psychology contradicts this conception of the way things are. Given the small space available I will offer some examples. Those fundamental realities which we call the mechanisms of defence of the ego, or rather identification, projection, repression, displacement, and sublimation, show that parental roles are so decisive precisely because they go beyond the apparent confines which exist between subject and object. This is because the parents become an integral part — from within — of the psychic evolution of the subjects. They become real and authentic psychic organisers within the child. All this happens through the formation of the defence mechanisms of the ego. But there is something else to be observed. A striking contribution to new ideas and concepts about the psychic development of children has been made by new research conducted into the mother-child relationship, especially with regard to the period of life within the womb.

For a long time discussion took

place amongst psychologists as to when one can assert that the psychic life of the child begins. The above-mentioned new ideas — which have gone beyond the old cognitivistic conceptions about very early psychic development and have stressed affective and even more instinctual elements — have demonstrated that it is possible to affirm that the beginning of psychic life coincides with the beginning of physical life and that the psychic life of the child must be analysed going as far back as possible, because psychophysical development begins at the very moment that the spermatozoa fertilises the ovule.

Over many years, I personally, and my collaborators, have conducted research into the mother-child relationship as regards the psychic development of the child itself during the period of life within the womb. This research (and not only ours, given that such research has been carried out in all the most important scientific institutes in the world) has produced striking results. Not only does a psychic life exist in the child when he is in his mother's womb, but this life is *linked* to the *determining* relationship that he has with his mother herself, who functions, indeed, as a psychic organiser and plays a decisive role in the psychic development of the child while he is in her womb.

It is obviously not possible for me to describe this research in detail here. But it is enough to observe, for example, the profound changes that a child undergoes in psychic terms when he is in his mother's womb as regards his acceptance or nonacceptance by the mother. In the same way, it is enough to think of the great importance this research has had in clarifying how much of a contribution was made, and is made, at a psychic level, by hereditary, congenital, or acquired factors. At a hereditary level it has been made increasingly clear that hereditary factors must be considered of importance in the psychic development of a newly born child as well. But what is of greatest importance is that a large chapter has been opened on congenital factors, or rather everything which is acquired at a psychic level during pregnancy, during the intrauterine period. All this research has allowed us to distinguish this kind of psychic acquisition from those acquisitions connected with the post-natal period.

It is as if psychology had, in the last decades, retraced its own footsteps. Indeed, from the old psychology, which placed emphasis on the importance of the puberal and post-puberal period to the psychology which came afterwards, which stressed the importance of the early school period, we came to modern psychology which explained how important the first period of life and the early years of life were, both for mental development and psychic life. Contemporary psychology, however, explains that the most important period of all is the beginning of human life, or rather the period within the womb and the first two years outside it. As a result, not only have old ideas and conceptions been overturned and analyses have had to investigate the question of affective and institutive mechanisms ever more deeply, but questions relating to the mother-child relationship and to relationships between the parents as a single unit and the child itself have become decisive and determining.

In returning to the mother-child relationship, and to the experience I have had over many years in observing the intrauterine and post-natal period, I would like to say that my experiments confirm this recent research. They enable us to affirm that a mother-child relationship exists which has the characteristic of being a building block. Upon it is built, in determining fashion, *not only the initial* but the *entire* mental development of the new human being. Furthermore, the future psychic well-being of the child is pre-eminently bound up with this relationship and to its inclusion in a balanced interrelational dynamic, in the first years of life, between the child and the parental figure.

Over many years of studying the *mother-child* relationship during the period of pregnancy, of intetrauterine life, I have been able to demonstrate how determining this relationship is in the future psychic development and stability of the new human being. In this area my research has been strengthened by years of study of the psychic pathology of children, especially of that special reality of children which we place in the vast field of infantile autism, whose pathogenesis is linked to those stages that we have included as being *primary*!

This is the most dramatic and earliest picture of infantile psychic disturbances. Its seriousness and precocity enables us — when we employ the new techniques that we use for these purposes — to make, indeed, a clinical analysis and orientation regarding the procedures of mental development in new human beings.

For this reason, there is a revolutionary qualitative and quantitative leap from the old mentalistic conceptions to these new ways of understanding things. But this has not been followed, in the least, by suitable changes at a sociological and pedagogic level or in terms of the norms of the law. And this — even if this is not a matter for me to discuss in this paper — has a dramatic influence on the slight importance that is given to the questions that I am dealing with here. And this is in a modern reality in which proposals are advanced in the field of bioethics relating to the topics of this conference which are not only disturbing at a moral level, but also disturbing, and even more so, at a scientific level.

But to turn to matters relating to psychic development, given the premisses that I have made it is possible to understand how even the concepts of development and evolution have been profoundly transformed.

The process of mental development not only is no longer considered to be a linear process, and even less uniform, but is seen as a complex process of a relational kind which has periods of special importance and periods of lesser importance, with accelerations, pauses, and regressions, all taking place with a relational dialectic in which the component individual can be isolated only by following the context and the relationships in which he develops. For this reason, we can also indicate some first stages in the early mental development of the new human being: the period of intrauterine development, birth, the first year of life, the second year of life, and then the change that takes place with the solidification of relational abilities and transference.

But this schema of orientation should be extensively elaborated.

Indeed, contrary to what was thought only a short time ago, the fundamental phases of mental development in the new human being are the initial stages — those that go from intrauterine life to the third year of life!

Therefore, to have a clear picture of mental development in the new human being it is necessary — according to recent directions in scientific psychology — to investigate the problems of relational psychology, within the group dynamic.

It is certainly true that every new human being has his individual originality at a genetic, congenital, and acquired behaviour level. But all this can only be analysed through psychological relationships and interpersonal psycho-physical relationships.

Just as at a physical level a child carries within it — concretely and in both a negative and positive sense — a part of the patrimony of those that have created it, so also at a psychic level (apart, of course, from undoubted hereditary influences) his daily development can be understood with reference to, and indeed is linked to, the relationships which, especially at the beginning, and *in building block terms*, he manages to establish. And all this has become increasingly important and interesting with the study of deep mechanisms, whose analysis was often neglected by orientations which were based upon a prevalently descriptive observation.

In particular, certain experiments carried out by my research group in the light of the great discoveries made by perhaps the world's greatest living psychologist — Professor Ignatio Matte-Blanco — have allowed a systematic study of these problems at the level of language. This is because, although it is true that after the discoveries of depth psychology nearly all scientists were convinced that the study of the development of human beings required more than the analysis of conscious behaviour and that it was necessary to consider also unconscious behaviour, it is nevertheless also true that this analysis was too often carried out at an empirical level and without valid models of comparison or organisation.

Now, as is well-known, this great

Chilean scholar of Catholic inspiration and with long years of psychoanalytical and clinical experience behind him, was able, through a great scientific leap forward, to achieve something of very great value — the ability to render *the language of the unconscious* accessible in systematic fashion by means of a specific grammar and a specific syntax of the language itself.

In my clinical trials carried out on normal subjects, but especially on subjects affected by infantile autism, I have been able to confirm that through a study of the bi-logic of the differences between conscious language, which has the principle of noncontradiction at its base, and un conscious language, *which does not follow such a principle*, one can finally also make an analysis of mental development which is not only descriptive but motivational, and thus one can probe the stages of this development.

This is done not with the aim of interfering with the various phases of mental development so as to act upon them according to that project which is connected with a certain type of society — as is often done in the delirium of the omnipotence of modern science — and so provide the most refined "products" possible at an intellectual and human level. But, on the contrary, so that one can work to facilitate a harmonic mental development according to the tendencies, aspirations, and attitudes of the case, upon the basis of achieving a solid psychic balance which enables human relationships to thrive and take place within a precise framework of ethical values. This is something which we can do when confronted by the dramatic maladjustments of childhood and youth which we are often forced to passively observe.

Whereas for our fathers or grandfathers psychology was a question of effectiveness or of quantity, now mental development has become, instead, a qualitative fact which is not something isolated and apart but something which can be tackled within the framework of the complex development of the personality as a whole.

But this specific application of modern science to relational problems not only emphasises the prob-

lem of the determining influence — especially in the first years of life of the mother-child relationship — of the father-child relationship and the dynamic of the family group, but the analysis and the study, concurrently with the development of the child, of changes *in the development* of those people who have a determining relationship with him.

This is because the term " development " has undergone profound transformations. Development is not only what the child experiences in order to become an adult. Development, for modern psychology, is any psychic evolution that takes place within the human being from his birth to his death; it is any modification which occurs in the relational sphere at a conscious or unconscious level. All of us develop in our relationships with other people, and we do this day by day and in our adaptations to new situations. Involution is not, as was once thought, a special period, perhaps terminal in relation to human existence. Involution in psychic terms is every form of pathology at any age.

It is certainly true that man changes with the passage of time, that he is transformed, but he is always asked to perform different tasks at a psychic level as well. And, in contrast to the physical level, his abilities of psychic adaptation — if specific pathologies do not intervene — are complex and often very much greater than one might think.

For this reason, for these problems of mental development in the new human being, we now need to have a new pedagogy and a new sociology. In an atomising and dispersive society which directs people towards individualistic positions in a radical and destructuring fashion, these would lead us, instead, to forms of relationships in which an affective — rather than merely intellective — interpersonal relationship is emphasised and appreciated; and in which mechanisms of reassurance, protection, imitative models, and the development of mechanisms of defence of the ego, can be carried out in a harmonic fashion and without destabilising traumas. It is as if science had rightly showed us at an opportune moment — when a sizeable part of society seeks to stress the individual as opposed to the group, and to emphasise production and success — the importance, in contrary fashion, of *balance*, *affection*, and *values*.

In making an assessment of many years of experience in this field, it seems to me that I can state that harmonic mental development of the new human being cannot be defended outside solid interpersonal relationships which take place within a specific and valid dynamic of the family group.

For this reason mental development is a dialectical reality in which the internal impulses must find, in the external sphere, a reality which leads to their harmonic development, in a context which by now, in scientific terms, is well identified and located.

Prof. ADRIANO OSSICINI
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WANDA POLTAWSKA

The Role of the Family in the Development of Personality

According to a common opinion, the development of personality takes place during infancy and youth. But, from the point of view of Christian anthropology, for which the summit of human maturity consists in sanctity, we must assume that a human person spiritually develops all his life long. The role of the family in the development of the personality of all human beings seems self-evident; the family milieu may either foster or hamper this development. The influence of the family lasts for the whole life and even — according to the dogma of the communion of saints — beyond death; experience however indicates that many families are not able to foster the personality of their members. This phenomenon is at the root of the fact of an increasing number of pesons with psychological and/or nervous instability. A lack of proper and effective preparation of young people for marriage and responsible parnethood is generally observed. Moreover, the parents themselves are more and more often the cause of the child's psychological disturbance.

However, it is not only the child who may develop in the family; the parents also undergo a development under the influence of the child. The more mature a person is, the more consciously he strives for sanctity; and a certain feedback takes place: each member of the family influences the other numbers. The role of the family is irreplaceable in the development of personality, but changes with the growth of the child.

1. The family and the conception of the child

The self-evident truth that a child is born in a family and has a mother and father is today no more so simple. There exist persons who not only do not know who their is father, or even their mother, but who grow without the feeling of belonging to anybody (FIV). This is a direct menace to the sense of security, indispensable for a child. The child should appear in this world as the desired fruit of the love of two responsible persons. However, the separation of sexual activity from procreation has caused a negative attitude towards parenthood, and the development of contraception, an attempt to dominate fertility. As a matter of fact, nobody can truly dominate fertility, since it is a biological mechanism, working without human will. The fertility of the individual is only potential; actual fertility is the effect of the union of a couple. A human person cannot direct fertility, but of course may destroy it. The couple may and should direct their sexual activity, which always depends on human will, since *homo sapiens* never acts spontanously in sexual matters, but always in a conscious and planned way. Every human couple is *able to choose* the best moment for the conception of their child, but to do this they must know the mechanism of their fertility. In order for a married couple to become a mother and father in a fully conscious way, they should not only acquire suitable biological knowledge, but should also direct their own sexual behaviour; and this demands self-control and a certain discipline.

A child thus conceived is accepted and loved from the beginning. Its further development depends on the state and behaviour of the pregnant mother. She should be peaceful, avoid all stress, both physical and psychological, and rejoice in her child. Such conditions are made possible only by the protective and affective presence of the child's father. If this is lacking, the child becomes neurotic and lacks psychic balance. The mother's behavior influences the child's development. When pregnant, she must adapt her life to the demands of hygiene. A mature, responsible woman changes her behaviour for the child's sake. The pregnant mother should never take stimulants (alcohol, drugs, cigarettes). At this time she should develop direct contact with her unborn child, which is possibile, as the newest discoveries of prenatal psychology demonstrate.

The optimal conditions for birth are those in which the woman is not only cared for by a doctor, but is helped by the presence of the child's father.

2. The family and a small child

The newborn child is very sensitive not only to physical factors, but to a lack of tenderness. Of all reactions that of fear is imprinted most strongly, already before its birth.

The first five years of life are very important from the point of view of life attitudes. The parents must accept both the sex and the individuality of the child. Sometimes there appears the problem of an overprotective mother, whose attitude blocks the development of the child (this is often a post-abortion syndrome).

In this period the child observes and imitates its parents, which demands constant self-control in their behaviour and speech. In this way the child educates its father and mother. For the child's sake they must often keep down their emotive responses and conflicts. A conflict between the parents causes neurotic, fear reactions in the child.

A numerous family creates the best conditions for the child's psychological and social development, but the child should be prepared to accept the newcomer and the parents should take care not to cause jealous reactions. The number of children should be the result of the mutual decision of the couple, and they alone have the right to decide. All exterior intervention and pressure in this matter is a violation of the rights of parents. On the other hand, the parents should have as many children as they can educate. Every subsequent child must be planned to be accepted by both parents. This is possible only while respecting the biological rhythm of feminine fertility. Responsibility for life demands sometimes renouncing or abstaining from sexual activity. Unfortunately, such abstention is treated at present as a threat to personal liberty.

The parents' proper attitude towards the child demands from them the acceptance of every child. Spouses who really and wisely love each other do not use such drastic methods of limiting procreation as abortion or contraception. Couples adopting the contraceptive attitude always fall into conflict. The conflicts are caused by the characteristic changes undergone by women after abortion (it is statistically proved that abortions are 7 times more frequent with couples who use contraception and that they divorce more often than other couples).[1] Moreover, spouses who use contraception often become neurotic, and this influences the children.[2]

3. The family and the children's puberty period

The further periods of pre-puberty and puberty create new problems. There often arises a conflict between generations, especially between mother and daughter, father and son. If the parents are not able to resolve these problems successfully, interpersonal relations are broken. On the other hand, there is a tendency to exaggerate these conflicts, which seem to be much greater in the same generation (the growing amount of divorces).

Puberty may be called a physical period of psychological instability. The child needs parental love and acceptance especially now: parents must direct it tactfully, not infringing upon his independence. The child should now pass from education to self-education. The complex personality of the child demands integration. Parents would profit by the concept of "integration through act"[3] This is the time of acquiring a right *Weltanshauung*. Parents can transmit their own, if they have not lost their authority. Unfortunately, the authority not only of parents, but of all adults may be destroyed because of their behaviour. The family should counteract external amorality, which may be very difficult where the educational system contradicts the parents' morality. This contradiction is particularly sharp where sexual activity is concerned. This domain demands special prudence and delicate treatment, Sexual education is the parents' task. If they have not accomplished it in the right way, the child may fall a prey to neurotic or even psychopathological reactions.

Because of all this, the family needs help in the education of its children: the help of its grandparents and other members of the family if they all believe in the same system of values.

4. The development of personality and the hierarchy of values

An enormous help in the development of every person is his or her religion. The parents should transmit faith by means of their life model. A child who believes with the help of grace develops more and more. A human being conscious of the sense of life and its ultimate aim is psychologically balanced. Young people without an understanding of the meaning of life reveal deep instability in their personality.

The correct development of the child depends on the climate of the whole family. Such conditions are fulfilled by a family which consciously tends to sanctity. The Evangelical commandment of love is the best prescription for neurosis. This is valid not only for believing Christians, but for everybody. The need for love and tenderness is a universal need of mankind

5. The family's relation to suffering and death

A proper development of personality is realized when the human person has his place in the world. When accepted and loved by the whole family, its member must also understand the meaning of his existence. The lack of understanding of the sense of life causes many incorrect reactions and depression. Man finds the deepest sense of his life in God. The loss of faith may shake one's psychical balance (V. Frankl). A young person's crisis of faith is often caused by the observation of suffering, in particular of the suffering of the innocent. John Paul II says that the suffering of the innocent is the greatest mystery of God which cannot be understood but has to be accepted.

While aging, people lose their health and there occurs the problem of illness and death. A child should learn that death is but a state, a transition to another world for which man has been created; that, as John Paul II says, life on this earth is only a way — a way and nothing more — a way to heaven.

A proper, real vision of life and death not only calms us, but also mobilizes us to live in a proper way, to take advantage of the time that is given to us on earth. The consciousness of imminent death should mobilise us to activity. The death of old grandparents in a loving family should cause its members to think about the necessity of striving for sanctity. A serene, fully human, conscious death does not bring fear but makes the life of those who witness it more serious and incites them to deeper reflection. Human maturity demands reflection on the goal and meaning of existence; without such reflection, man remains infantile and irresponsible.

6. The family of families

The practice of life shows that

many persons are unable to found a family in a proper way; and, also, that many families do not keep the oath of love and fidelity. There are crippled families, and their number in the world grows. The Catholic Church meets the needs of those families by organizing different activities and creating different institutions, the goal of which is to help them. Those are initiatives of the local Churches and of the Holy See (e.g., The Pontifical Council for the Family). The most effective help seems to be that which comes from other families, when, as Pope Paul VI said in the Encyclical *Humanae Vitae*, "equals serve equals." The opening up of the family towards other people who need help is the best test of the maturity of its members. A fully developed person is not only able to realize his own plans in accordance with the will of God, but also radiates them to the external world — according to the words of the above — quoted Encyclical. The task of the Christian family is to radiate sweetness and holiness.

PROFESSOR WANDA POLTAWSKA
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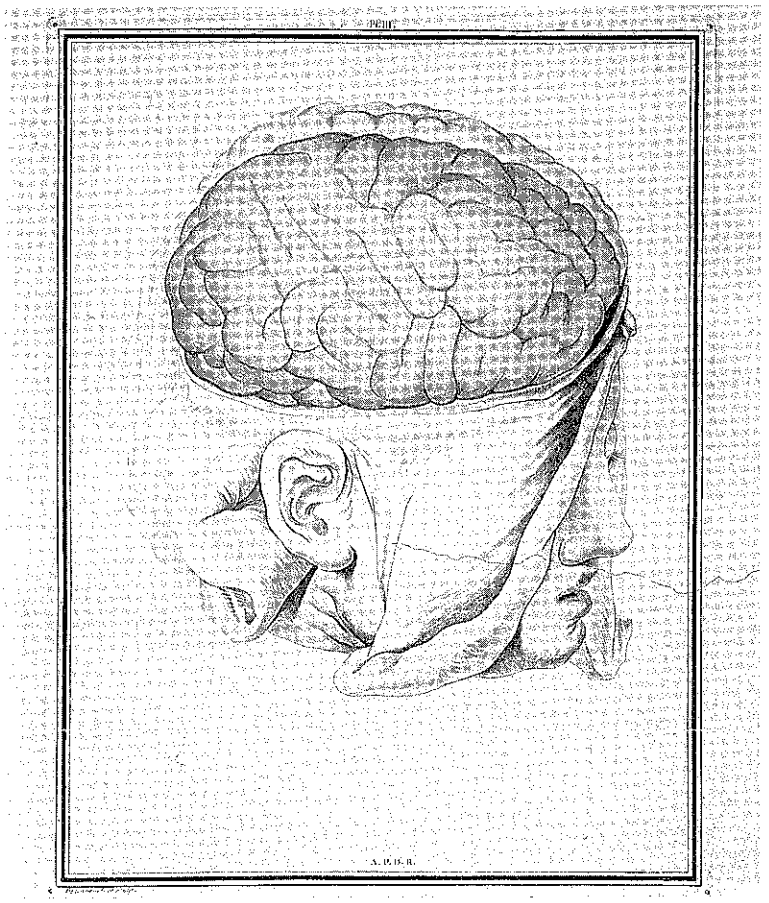
[1] Cf. WANDA POLTAWSKA: "Wpływ przerywania ciąży na psychikę kobiety", In: *Specjalistyczne aspekty problemu przerywania ciąży*, Krakow 1977, 54-87

[2] Cf. WANDA POLTAWSKA: "The Effect of a Contraceptive Attitude on Marriage," in *Natural Family Planning*, IV: 1980, 3, 187-206

[3] Cf. K. WOJTYŁA: *The Acting Person*, Dordrecht 1979 (it is better to consult editions in other languages, as the English text has been partly distorted by the editor)



MARAT VARTANIAN

The Brain: Behavior and Aging*

The speaker pointed out the complexity of the brain structures and the difficulties deriving from it for researchers engaged in the field, especially for those who are attempting to specify the cause of the aging process in the brain.

The brain contains 100 billion neurons and 114 degrees of synapses. Every neuron has about 1500 synapses, and every synapse has about one million receptor molecules. Every neuron presents about 10,000 synaptic inputs, and long-range memory consists of about 10 trillion bytes of information and information frequency, 10 or 18 operational degrees per second, and this represents more than 600 times the capacity of the new supercomputers being projected for the next decade. From all of this there clearly emerge the difficulties which researchers in the field of neurosciences must face.

The anatomical characteristics of the central nervous system stricken by Alzheimer's disease are next illustrated — the most fearful disease which can strike the brain at an advanced age. In addition to the brain atrophy which is well known in this type of affection, the alterations involving the vascular choroid plexus and the consequences for the brain mass of profound alteration in the metabolism of cephalo-spinal liquid were dealt with.

In the normal subject, at the age of 35 or 40, we can assume a daily loss of nerve cells of 100 and as a result we can hypothesize that at the age of 80 about 70% of the nerve cell patrimony will have been lost. Such a neuron loss would not be undifferentiated for all kinds of nerve cells, but would be prevalent in some brain areas more than others, and this fact is emphasized through visualization of reduction of neuron density in the different brain areas. The differences among some specific brain areas in subjects stricken by Alzheimer's disease as opposed to those not affected were pointed out. In his research he uses the technique of coloring by phosphocreatinekinase (P). Since P is the enzyme expressing the accumulation of cell energy, a reduction of this enzyme would indicate a reduction in cell energy capacity. Naturally, the histochemistry picture differs according to the type of brain structure considered — whether normal, linked to normal aging, or typical of Alzheimer's disease.

We can then ask whether all the morphological and functional cell changes result in a change in the brain's functional activity. As a research method for the brain's functional capacity electroencephalography may be regarded as the most common evaluation. In the young normal subject the spectrum of frequencies is obviously within normal limits; in the normal elderly it is hard to find marked electroencephalographic alterations, and the graph may almost be superimposed upon that of the young. In the elderly subject with Alzheimer's disease, however, it is very common to find a reduction in electric activity and a reduction of the frequency spectra which most likely reflect atrophic variations present in different parts of the brain. The greatest differences may be found in the frontal and temporal areas, which prove to be those hardest hit by this illness.

The psychophysical correlates of organic alterations can also be illustrated; first among them is the reduction of short-term memory which is typical of the disease.

After stressing the importance of socialization for the elderly person's psychic well-being, he commented on the research programs at his institution and closed by pointing to the increase in elderly population, which should grow by 224% between 1975 and 2025 and stressing that a global commitment to facing the problems linked to the aging of society seemed more necessary than ever.

Professor MARAT VARTANIAN
Member of the USSR Academy of Medical Sciences and Director of the Mental Health Research Center

* In the absence of a prepared text, a synopsis of the speaker's oral presentation is published.

JEAN-DIDIER VINCENT

The Body and the Spirit: Considerations on the Newborn and the Ill

" Non est census supra censum salutis corporis " (Si 30:16).

When insisting on the primacy of the body, we go against those philosophies of the intelligence which claim ignorance of our organic statute or do not attribute more than a mechanical role to it, though this machine is close to perfection. We recognize, instead, with Schopenhauer, that the "absolute miracle for man lies in the experience of his body " and that intelligence proceeds from the body.

The Body and Language

The newborn babe smiles: his awareness of the features represented on his own face has as its corollary a feeling of well-being proceeding from within his body. This science of his body translates an innate knowledge.

The child looks at his mother. His visual acuity — as opposed to what tradition affirms — is not negligible: it reaches at least 20/150. The child is capable of recognizing the structure of a face. If presented with a schematic face with two eyes, eyebrows, nose, and mouth, he turns his head. His rotational movements are proportional to the model's degree of resemblance to a face. They decrease when the eyes are in the area of the mouth and cease when characteristic features disappear.

Equally innate behavior by the mother responds to the child's innate recognition of his mother's face It is not excessive to affirm that the child and the mother are genetically prepared to exchange smiles. According to Henry, the smiling gaze is the cement with which mother and child seal a " social unity. " The mother smiles at the son, and the latter recognizes the meaning of the maternal gestures because he has already read it before in his body

From the first weeks following birth on, the child expresses a whole repertoire of gestures and mimicry bringing his members, head, and, above all, face — eyes, lips, and tongue — into play; a real protolanguage which the mother is already prepared to grasp and to which she responds, adapting better and better as her son educates her in her role as an educator. The exchanges are so rich and complex that it is extremely difficult to separate what is acquired from what is genetically represented in the two. The dominant role in this double relation seems, however, to belong first and foremost to the son, who has at his disposal the baggage of preformed representations enabling him to initiate communication with the other protagonist, his mother or a substitute for her.

The extraordinary wealth of this intersubjective communication is a fact for the human species thanks to the development of means of expression proceeding at the same rate as that of the means whereby information reaches the brain. But this also exists in the animal.

In the mouse the face is not, as in the child, what first presents itself, but, rather, the whole surface of the animal is a meeting-place with the world in this creature's incessant dialogue with the inside of its body.

Mice, if deprived of maternal contact at birth, lose weight: an enzyme, *decarboxylase ornithine*, is absent, and protein synthesis is thus destroyed. This loss can be impeded by injecting endomorphines, but either motherly or artificial licking of the little ones'skin is equally effective. An exchange between the mother's and the offspring's skin permits the approach: the mother licks the newborn and then, when she cleans herself, impregnates her mammae with the familiar smell taken from them. It is this smell spread over the mother's breast which attracts the young towards the mammae. If citrole is injected into the uterus during pregnancy the newborn will concentrate preferably on the mammae scented with citrole. Later the female smelling of citrole will be the preferred object of desire for the young male in heat. Hormones within the body follow the movements of desire expressed on the animal's surface; the animal thus comes to confuse the surface with the interior, and each term of the opposition confers its authenticity on the other.

In man, intersubjectivity, in its prodigious development, is submitted to the test of the body, and *representations drown in corporeality*, according to an expression by Dagognet. Trevarthen demonstrated that expressions of sadness and discouragement or of happiness and joy depended directly on successful attempts at communication with the mother and were manifested according to objective criteria and motives, measurable in the body. Through knowledge of his subjectivity, the child learns feeling from his mother. Thanks to these emotional representations, which to some extent constitute the road map for his impassioned body, the child understands the touched face of his mother. The intimate knowl-

edge the subject acquires of his body thus asserts itself in the bond linking him to his mother, which in his further transformations, in what happens to the body, will always remain omnipresent. All that has been said concerning the mysterious work of the soul upon the body perhaps tends towards this representation, which is done and undone, mobile like a reflection on water, in a being in a state of becoming, according to Dagognet's beautiful formula: " The figured representation uncovers and spatializes the soul. "

Trevarthen, one of the finest experts on the child's psychomotor development, is right in affirming that " the basic processes of perception and knowledge, along with the deepest processes whereby individual voluntary action takes place, interact competitively with the mysterious, very powerful mechanisms ensuring interpersonal and social cooperation in human intelligence. " Functionalistic theories of language recognize that we cannot understand how it works unless we are able to perceive more than objective things expressed by words.

Finally, we can consider that intersubjectivity, or the exchange of emotions with another, allows the individual to confirm the validity of his feelings with respect to the reality of his innate representations. The mother thus offers the newborn child the first and most eminent of representations, on which the individual's brain builds the world wherein *he exists*

The Body and the World

Every existence is individual; but the individual does not exist except in the world: a world in itself which we shall call " extracorporeal space, " in opposition to the corporeal space which is one's body. The latter is the space in which the three communications systems unfold: nervous, hormonal, and immunological. Extracorporeal space is at the same time a product of the body, its creator, and its orderer, thanks to epigenesis and its action on systems. Extracorporeal space is unique; it belongs, properly speaking, to the individual: a world in itself whose size depends only on his knowledge. For an astronomer, extracorporeal space goes as far as the Alpha star of the Centaur, but for a stray cat, it does not go beyond the streetcorner. The world does not exist in the body if not because the body produces the world; in other words, the body constructs its own knowledge. The brain is the privileged space which summarizes the body; an " active metaphor, " in it representation is inseparable from action; it might also be said that the body is the theater of the world. When we speak of representations, it not a question of living pictures, figured representations of an absent external reality, but of the play of the actors involved in the unfolding of actions they themselves interpret to communicate their meaning to spectators. As participants in a shared subjectivity, the latter also play an active role in the development of the self. The whole representation thus acts as a link between action and knowledge, between what is known and the knower: a precomprehension grounding intentionality without referring to a superorganic intervention or to an awareness endowed with corporeal extraterritoriality.

The spirit is not superorganic, but belongs to the organism: not to recognize the creature's property of thought is to disdain him. Among all the activities of the organism thought is probably the most sensitive to all the hazards of the physicochemical reactions produced therein. A slight pause in the influx of oxygen into the brain suffices for all mental activity to cease. A human being unable to oxygenate phenylalanine is a complete idiot; insufficiency in secreting the thyroid hormone produces cretins; a little iodine in the water of the fish might have enabled him to be a genius. When we consider, moreover, that our thought is affected by taking a drug or medicine or that madness obscures the brightest intelligences on account of a handful of neurons destroyed, where does all this occur if not in the brain, the single and multiple organ of thought — the brain in the body and the body in its extracorporeal space forming what we have termed a " floating central state, " which defines the psychosomatic unity of being? In short, if we accept what no biologist denies today — that we are a product of the evolution of the species — how could the selective pressure of the environment be exercised in any other place except an organism? Is a teleological explanation of causality equally debatable? Can an end be a cause? It is not an abstraction of the future which directs life, but only its representation within the communications systems materialized in the brain which directs action. Indeed, to replace the effect with its representation does nothing but shunt the problem. It would be preferable to say that the effect constitutes itself with the unfolding of the action; anticipation is not a motionless representation, but a partaker of the continuous flux of becoming: the intention no longer appears as a starting point, but as inseparable from a continuum, and indistinguishable from antecedents. It is then appropriate to complete our definition of the " floating central state " by introducing a third dimension: time.

In summary, every individual constitutes a psychosomatic unity or " central state " which develops according to three dimensions: corporeal, extracorporeal, and temporal. This central state is *fluctuating*; it changes with passing time and with its surrounding world, of which it is at once the creator and the representation.

The Body and Time

Intentionality is the order on which thought is organized. Merleau Ponty, to put an end to the separation of body and spirit, proposes an " intentional arc " establishing " the unity of the senses, that of the senses and intelligence, that of sensibility and mobility. "

Intentionality introduces awareness of time: it is time that constitutes me. Corporeality and temporality become confused. " My body takes possession of time; it makes a past exist and a future for a present; it is not a thing; it makes time instead of undergoing it. " We observe that in the body there exists a materiality which supports intentionality and the time of becoming. It is the genome. Indeed, it prolongs duration in the past and embodies a time whose source is in the origins of the species.

Time introduces us into the very heart of subjectivity. The biologist observing the animal poses the problem of subjectivity and of the apprehension of time in the animal.

The Body Subject

I am an animal (a fluctuating central state) that thinks, eats, digests, walks, writes. We must not confuse the function with the organ. Digestion is not the enteron, though one does not appear without the other; and the fact that I find myself ruminating certain thoughts does not liken my brain to the belly of a herbivore. We cannot refuse the animal status as a subject, if only in terms of relative subjectivity, since man has the privilege of a subjectivity which is at once experienced and shared, which places his sociability far above what occurs in the other species.

Observing the subjectivity of an animal teaches us to know the mechanisms of our own subjectivity. The animal, with degrees of complexity which are more or less elevated according to the species, is capable of hesitating, effecting choices, making decisions, going beyond future situations, and testing the results of its perceptions in action. The passage from animal to man cannot be carried out through simple observation of analogies, but requires assurance of the identity of the mechanisms. Sometimes this is possible in the measure in which man offers himself to the scientist's observation, thanks to the technical feats of the instruments of physics and chemistry or to the learned rhetoric of cognitive tests. First of all, there remains the problem of *experienced subjectivity*, which, by virtue of the interlacement of individuals' sensitive channels in the social context, is also *shared subjectivity*: with the other who makes me a self.

In the measure in which my body and I form a single One, how can my body be ill without my subjectivity's being affected by it, or vice versa? In the last part of our paper, we shall consider illness as a test of this subjectivity.

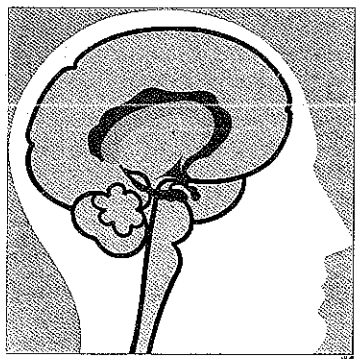
The Sick Body

Illness affects not only a part of the body, but, beyond the body, the subject in his relationship to the world, in a kind of test involving a direct questioning of death. Illness is the patrimony of the living being: " The stone cannot be ill because it vanishes in the negation of itself...; it is not being which, in negating itself, triumphs over the opposition, as happens precisely in illness and in the sense of oneself, " says Hegel.

When I attribute illness to a subject, I implicitly admit an intentionality. Illness certainly belongs to the history of the body, but it is placed in a temporality which structures the fluctuating central state of which it is a manifestation.

Since subjectivity is involved in the process of illness, different questions are posed. How is the decision made to deploy an affection? Is it the transient foreign agent which introduces the malady into the fluctuating central state, or, on the contrary, is it the latter which takes the initiative in recluting pathogenic agents: Why is one organ or another chosen as a theater of operations:

The first question leads us to that very old one concerning the terrain: " The microbe is nothing; the terrain is everything, " says Pasteur. The notion of terrain has been used to excess: a generic concept explaining everything not based on any experimental datum. The terrain and the immune system can, however, be associated without any exaggeration. The latter, together with hormones and the nervous system, represents the third set of communications within the fluctuating central state. Like the other two, it constitutes a system integrating action and representation The implementation of the means of immune defense is indeed nothing but one of the manifestations of action and of the immunological recognition apparatus enabling the body to know itself by way of a real self-representation of its flesh: a self thanks to which a living organism distinguishes what is its own from what is alien to it for the purpose of protecting itself and getting free from the latter.



The immune system intervenes within the fluctuating central state in its temporal dimension: it is the product of the genome, but at the same time also a product of selection linked to the subject's history; it is memory, a mixture of immutable knowledge of its identity grounded on the greater *histocompatibility complex* and its recollections fluctuating in time.

All the events traversing extracorporeal space and the subject's body influence the immune system in the same way as the nervous and hormonal systems. The arrival of a strange being in the fluctuating central state resembles a clash and depends on both partners: either nothing happens and they ignore one another, or the fusion of the two fluctuating central states takes place, familiar germs, domestic animals that are in themselves and in me; or, finally, conflict and illness occur. The manifestations of illness, which strike us as inauspicious, are often nothing but the expression of negotiations, defenses, attacks, and evasions in which an organism and an unacceptable stranger clash. Fever, for instance, apart from its calamitous appearances, is a beneficent means of struggle against the pathogenic agent, which fears the heat; fever allows the mobilization of the organism's resources and centers its attention on the fight begun by block-

ing behavior that wastes energy, like eating or drinking. Thanks to fever, the body focuses its attention entirely on the illness. A substance secreted by the immune system, interleukin 1, is responsible for fever, whose generating mechanisms are located in the brain.

Illness, then, does not depend on abnormality, on deadly phenomena enjoying a kind of extraterritoriality in the body, but only on the exceptional use of ordinary means — the physiology of the sick man, said Victor Pachon, in connection with pathology. Illness does not interrupt the ordinary course of time: the subject's history conditions the organism's reception towards the transient pathogenic agent. The two-way exchanges involving corporeal and extracorporeal space are determining factors on account of the hereditary or acquired fragility of the body and the maladies occupying extracorporeal space.

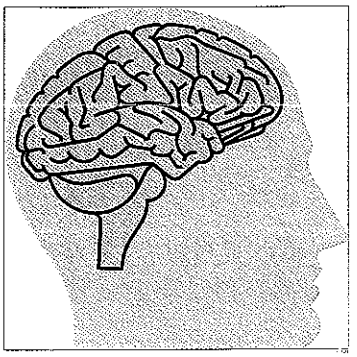
In the latter, other companions in misfortune should be taken into account — one example is the epidemic.

In illness the body is not the only thing affected. Extracorporeal space frequently adapts to the sick body at the price of a constriction or fixation of the environment. We then grasp better that illness engages the subject's subjectivity and not any objectivity, which would manage to dissociate the three components of the central state and interrupt the continuity between action and representation. But illness is always a crisis of subjectivity. It expresses a fluctuating central state in instability, sometimes inaugurated by a catastrophic reaction; this unstable state finally contributes to producing a new unstable balance called care.

To produce an illness, a central state has not necessarily had recourse to a foreign agent and may find in itself the elements for a crisis. As a last resort the organism is capable of constructing its foreign agents: in autoimmune affections cellular components are no longer recognized by the body as something belonging to it, and it reacts against them as it would against foreign agents. "Illness then becomes an attack against oneself by oneself."

Finally, the terrain: a pathological expression of the fluctuating central state, it appears as the sum of representations/actions, whether these are nervous, hormonal, or immune. To use a commonplace term, illness is a manifestation of being in the world in its "globalness." To arrive at it it is necessary for the three modalities to be assembled. The brain offers the privileged location for such a synthesis.

Alongside the sensations with an external origin which verify an image of the world, information proceeding from within contributes to forming what Paul Schilder was the first to call a "body image." This physician with a psychoanalytical background has the merit, above all, of proposing the question of the choice of a particular organ as the location of an illness. To speak of organ neurosis or of the symbolic meaning of an organ provides artificial explanations which cannot satisfy a biologist. On the contrary, one can accept the fact that transactions of an associative kind among the different representations decide to bring action to bear on such and such a part or function of the body, according to the subject's history and the local sensitizations resulting from it. "Each one of us," Schilder says, "continues throughout life with experimentation on himself or herself, with the help of key representations. In this way the person comes to act directly upon the internal parts of the body." It matters little whether the representations reach consciousness or not, inasmuch as they lead to the formation "of terrain prepared for this experimentation."



The representations of internal sensations seem to obey the same rules as those for representations of external sensations. There is interaction — indeed, competition — between these two perceptional worlds to arrive at representations which also integrate the sum of past experiences. An effort of the same intensity made on a conveyor belt during a medical test and during a walk in the mountains will be felt to be much more difficult in the first case. The external world transforms those of the internal one, and vice versa. The hypothesis has been proposed that certain subjects place stress on internal representations (somatization) to attenuate the representations of an unacceptable external world.

Today we know that the immune system contributes to the Jupiter complex of representations within the brain. Briefly, hormones act on cells of the immune system, which are also able to secrete certain hormones. The chemical messengers (cytokines), released by the immune cells, influence the functioning of glands such as the hypophysis or adrenocortical. Even more significantly in this regard, the brain acts on the immune system by means of secretions and the vegetative nervous system; the immune messengers, on the other hand, act upon the central nervous system. Within the latter, the cytokines are present, jointly localized in neurons with the neurotransmitters. These immunological messengers particularly occupy strategic regions of the encephalon involved in one and the same functional module. With repect to representations, it is interesting to note that cytokine receptors are mostly found in the cerebral cortex. The brain hemispheres — which are known to intervene in different ways in the management of emotions, with a cortex on the right side specializing in the comprehension of nonverbal communication and emotional expression

and a left side responsible for language and the capacity for abstraction — are also thought to have different immunological functions. We observe that this involves, first of all, a balance between the two hemispheres and rigorous specialization: as regards emotions, the right cortex is thus felt to intervene largely on the negative, adverse side of emotion (sorrow, fear, sadness), and the left one, on the positive, comforting dimension (joy, pleasure). But it is, above all, the frontal zone of the cortex which appears to be especially involved, the one which in man has acquired considerable importance.

In parallel fashion, on the basis of experiments with animals and clinical observations, we may infer that the left cortex exerts positive control over immune defenses; the right cortex, on the other hand, seems to be largely immunodepressive. The left-handed people having their right hemisphere speak are unfortunate: they are exposed to all transient microbes. The same occurs to the right-side hemiplegics, who not only have lost the use of language and of the member on the right, but fall prey to infections. The left brain hemisphere thus presents itself at the same time as the seat of the figurative representations of the right half of the body, which mainly serves to act, and as the location of the organic defenses against destructive germs threatening it. And although the observation is forced, we cannot fail to be surprised by the coincidence of localizations which permits transitions among representations/actions in their different domains and the genesis of illness, with no need to appeal to an autonomous activity of the spirit.

This latter attitude seems, unfortunately, to have been adopted by many who promote so-called *psychosomatic* medicine, for whom certain bodily affections and the lesions of certain organs are the product of the harmful effect of disturbed mental activity. The concept of " operative thought, " or that of *alexithymia*, renders a poor " mental " case responsible, without dreams or phantasms, unable to express his malaise in words, caught between the present and reality; the patient then turns to his body, filling it with mysteries. Illness is nothing but the punishment for a " bad mentality. " Psychosomatic medicine, then, only refers the sick body to guilt and sin.

Conclusion

By way of the growing newborn and the sick — representing two extreme situations of a body exposed to the world — I have sought to show the psychosomatic unity of " being. " It is not a matter of abasing the latter, but of measuring organic humors, the only ones accessible to the biologist's eye. *Homo factus est ad imaginem Dei... quod per imaginem significatur intellectuale, et arbitrio liberum et per se protestativum* — God, who has become man in the body of Christ.

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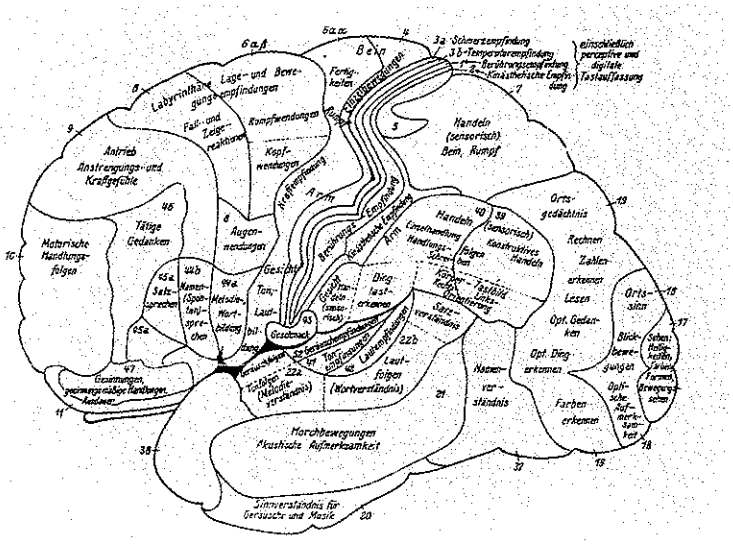

FERRUCCIO ANTONELLI, MASSIMO BIONDI

Psychosomatic Medicine 2000: Present State and Prospects

The current of thought that subtends the term " psychosomatic medicine " has roots which go far back in time: Hippocrates (" if the soul falls ill, it consumes the body "), Plato (" here is the error of the doctors: they separate the body from the soul "), Virgil (" spiritus intus alit...mens agitat molem et magno se corpore miscet "), Juvenal (" orandum est ut sit mens sana in corpore sano ").(1)

The traditional family doctor has always been an excellent psychosomatologist. He knows about the soul as well as the body, he is ready to listen, he is understanding in his " counselling, " and practical in offering medicines and words in the best and most effective way.(2)

This age-old tradition was brusquely and unexpectedly interrupted in the last century. Scientific progress increasingly came to define medicine in terms which were decisively mechanistic and instrumental. The psyche is not to be seen in laboratory tests, by means of X-rays, or through the microscope. Therefore it does not exist, or if it does exist, it provokes little or no interest.

Scientific psychomatics appeared on the medical cultural scene in the thirties, especially in America. The starting points were Freud, with his allusions to the so-called " leap from the psychic to the somatic, "(3) and Cannon, whose mice died of a heart attack if they were exposed to the sight alone of an enraged cat outside a transparent protective shield.(4)

Psychosomatics wanted to fill a blank, or at least correct an error. It wanted to rediscover the man behind the patient, with his personality, his painful experiences, his existential dramas:(5) an emotional burden which was potentially capable of destabilising his health and creating even fatal pathologies(6) — such as, for example, heart attacks — before something became evident in using even the most sophisticated instruments of control.

Today one can say that this primary objective of psychosomatics has been reached to a sufficient extent (7, 8) On the whole, doctors are willing to engage in a doctor-patient relationship, sensitive to the at least partially psychogenic element of many organic diseases, and a little more respectful of the personality of the sick person, and they are even able to tolerate the presence of psychologists in hospitals.(9)

But psychosomatics is very far from being able to say that it has performed its task. On the contrary, it considers itself to be, with reference to the medicine of the second millenium, the key to the understanding (and treatment) of most human pathologies.

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One of the many ways to explain what psychosomatics is with a single image or a few words is to compare the human body to the plan of a flat, where the psyche is the corridor, the various rooms are the various mechanisms, and the psychosomatic area is the boundary which joins (and separates) the corridor from the various rooms.

This psychosomatic area varies in size according to the differing vulnerability of the organs to the influence of emotional factors.(10)

* * *

A disturbance can be defined as psychosomatic only if:

1) it has psychic, and thus emotional, origins,

2) it involves the neurophysiological structures, or

3) if it alters the function (and at times the morphology) of the so-called " target-organ. "

Emotive stimuli, stress, frustrations, etc. are not *tout court* pathogenic factors. Otherwise, we would all be ill and one would need to revise the traditional definition of what a healthy state is.(11, 12)

Emotive stimuli are not pathogenic, not even in proportion to their objective entity: a person can faint at the mere sight of a frog.(13)

This fact is of considerable practical importance because it emphasises the value of psychotherapy in the treatment of psychosomatic disturbance. Psychotherapy is a process of growth which reinforces the personality: obviously, it does not eliminate stress but it helps to control it.

Emotive stimuli become pathogenic when:

1) There are too many of them or they are overly concentrated in a short period of time. Various scales exist by which the emotional weight of events can be measured. The most original is the scale invented by Holmes. It gives points to forty-three situations which can be ascertained with relative ease.(14) For example, marriage costs an adaptive effort of fifty points, separation sixty-three, reconciliation (like retiring) forty-five; the death of a friend thirty-seven points, of a

close relative sixty-three, of a spouse one hundred, a fine eleven points, and so forth. If a man reaches three hundred points in a year his psychosomatic balance and well-being are very seriously threatened.(15)

2) The personality is incapable of managing these emotional stimuli for one of the following reasons:

a) congenital fragility, as in the case of so-called "egoweak" personalities;

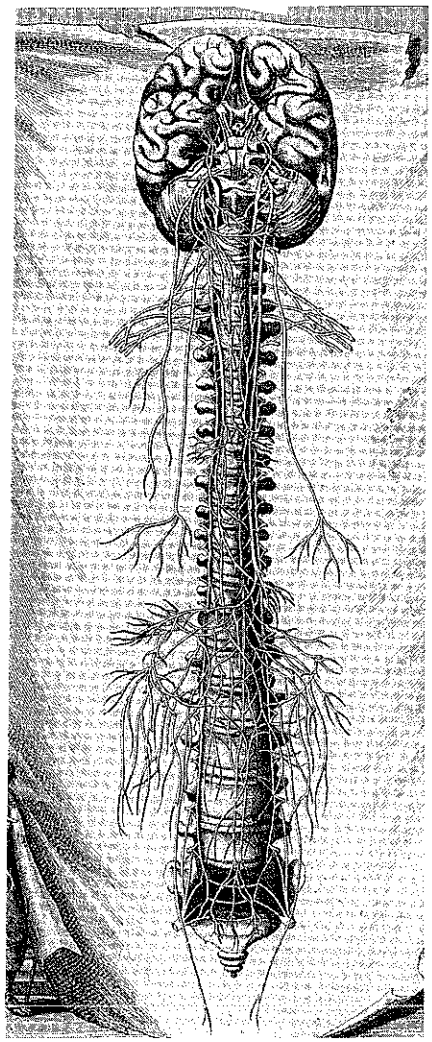
b) greater vulnerability because of previous experiences: for example, job dismissal is more pathogenic in subjects who have undergone real or hypothetical (that is to say, imagined) experiences of being abandoned in their childhood;

c) lack of "coping" resources, that is to say, the ability to tackle a stressing situation with success, and to keep it under control.(13) It is said that there are people who are able to move if the world falls down around them. The theoreticians of Karate praise the rush which is able to survive being submerged by snow because it knows how to bend, and speak ill of the oak which resists and ends up by being broken. Such is the force of adaptability.

Neurophysiological reaction is so important that it has given life to a new discipline in the world of neuroscience — psychoneuroendocrinology. This discipline has greatly extended the structures — SNV and reticular substance — which only a few decades ago seemed to be solely responsible for the process of somatisation.

Such structures are (other than SNV) the following. (The subdivision is only academic because, in effect, they interact with one another as elements in a single system):(10)

1) the hypothalamic-hypophyseal functional axes.(16) Various hypothalamic-hypophyseal functional axes exist. Each one has the specific task of regulating the same number of hormones or peripheral glands. Together with the limbic system the hypothalamus and the hypophysis are to a certain extent the *heart* of the psychosomatic system. One need only bring to mind the hypothalamus-hypophysis-adrenocortex,



which was studied many years ago by Saye as a factor in the resistance of the organism to stress, and which today is still at the centre of both medical and psychiatric attention. It is represented by the CRF-ACTH-cortisol sequence, a sequence which is extraordinarily sensitive to emotional stimuli and which is the concern of both medicine and psychiatry (one need only think of alterations in depression). The *hypothalamus-hypophysis-GH* axis, which is decisive with regard to growth and sensitive to emotional stimuli (one need only think of psychosocial dwarfism caused by a lack of affection). The *hypothalamus-hypophysis-gonad* axis (LH, FSH, testerone and female sex hormones) which is at the centre of numerous organic and psychosomatic (psychogenic amenias, impotence, etc.) disturbances. There are also the *hypothalamus-hypophysis-prolactin* and *hypothalamus-hypophysis-thyroid* axes. There are yet others which influence the various metabolisms, and all are sensitive to affective inputs and emotional stress.

2) The immunity system: in *acute* stress various alterations in the capacity of the immunity system to function take place, but they are *transitory* and it seems that they are a part of the organism's attempt to adapt, to neutralise the agent of stress, and to survive. The opposite is the case with *chronic* stress.

The ability of the immune system to function is reduced or removed. (17) Studies on the possible psychosomatic origins of cancer derive from the supposition that a collapse in immune powers, which is typical in the case of cancer, is provoked by chronic stress.(18, 19)

3) the neuromodulators: these are substances which have been discovered in recent years (the neuropeptides, such as endorphines, the encephalines, etc.) and which influence the previously known neurotransmitters (noradrenalin, aceticolin, etc.) through very small dosages by an input that can be understood only by using the metaphor of a computer: the *shift* is a key which, when pressed at the same time as another key, for example the C, gives it a temporary new function (for example, return to the

beginning of the line); that is to say, it " modulates " the keyboard and increases its functions. The neuromodulators influence the psychic state (especially mood: one needs only think of the endorphines), but they are, in turn, influenced by emotional situations: the endorphines themselves are " liberated " in situations of both stress and relaxation, as well as by acupuncture. (20, 21)

It is not yet clear how the choice of the " target-organ " comes about (if indeed there is a " choice ") The old theories of Alexander (specificity of conflict)(22) and of Dumbar (specificity of personality)(23) have been superseded both by the positive appreciation of the pathogenic weight of events (social factor) and by the fact that the great psychosomatic " illnesses " (heart attacks, colitis, ulcers, etc) have been almost submerged in modern society by an enormous number of psychosomatic " disturbances " of lesser clinical seriousness but of greater social weight.

However, such disturbances, in general, always retain a certain predilection for a specific organ or apparatus in specific individuals. In theoretical terms, we can speak of a symbolic language of the symptom or of miopragia of the organ or an apparatus. In effect, there is always an apparatus which is more involved and affected. This is a question which is still open: we will see how it ends, if, indeed, it ever ends at all.

But nonetheless let us address ourselves to another: the interesting news of the most recent parts of the increasingly fascinating dialogue regarding psychosomatics. Many people take part in this dialogue, and psychosomatics constitutes perhaps the most revolutionary (in a positive sense) insight of the neurosciences.

Psychosomatics has always been understood as a science which studies the pathogenic effects of the psyche — that is to say, of the brain — on the various organs of the human body (such as the stomach, the heart, etc) which have thereby been defined as " target-organs. "

But nobody has as yet placed the brain in this category of targets.

Why should the brain be excluded from falling victim to emotional problems which it itself is entrusted with managing, even though only in a part (the limbic system) of its own structures?(24, 25)

If there is a psychosomatic dimension to the mystery of cancer, cancer of the brain should not be excluded.

Psychosomatic " reasons " have been hypothesised for sclerosis en plaque, and multiplex is an illness of the nervous system.

The whole of psychosomatics finds its convincing " hows " and " whys " in utilising a neurovegetative and neuroendocrinal system that is present in every remote part of each periphery, including the brain: one need only think of the sleep-vigil rhythms.

There are no reasonably valid reasons for excluding *a priori* that the brain also could be a target-organ in the psychosomatological dynamic.

But this would mean that the whole of psychiatric pathology could be interpreted in psychosomatic terms (24, 25) This would not be something new. When the psychotherapy of schizophrenia was proposed and accepted — by Jung (26) and by Pao(27) — there was a tacit backing of psychic genesis by what seemed to be the organicistic stronghold of biological psychiatry.

Psychosomatics, ever since it was born half a century ago, has been often and willingly understood to be a prototype of an immaterial, imaginary illness: a pseudopathology. When evidence has demonstrated the psychosomatic character of certain ulcers, certain heart attacks, and of certain cancers, psychosomatics has met with greater credibility. We now ask ourselves why, today, one cannot consider as plausible the psychosomatic character of schizophrenia. (25)

Psychosomatologists most emphatically do not wish to revenge themselves for the error committed in the nineteenth century when the microscope sanctioned the exile of psychiatrists from the realm of medicine and thereby decreed the triumph of visible organicity.

In the impending twenty-first century the psychosomatologists do not throw down challenges. But they do present hypotheses about a part of psychiatry which could be interpreted and therapeutically handled in psychosomatological terms.

It is not a question of asking that the whole of Medicine, including psychiatry itself, become " psychosomatic. "

The day on which this psychosomatic hypothesis should be " valid " even in psychiatry, psychosomatic medicine will not cradle any ambitions to leadership. On the contrary, it will move humbly backwards, satisfied by the fact that it has done what it had to do. On that day psychosomatics will no longer have any reason to exist. It was born for one purpose only: to re-evaluate the human being conceaaled behind the aridity of a clinical chart made up of figures and reports. The goal will have been reached. Like a rocket launched to disperse shadows which extinguishes itself and dies when it falls to the ground. Mission accomplished.

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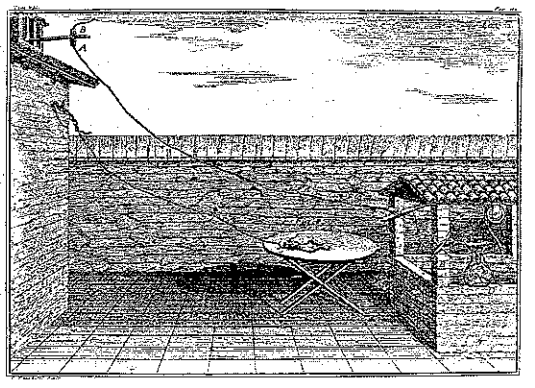
Editor of "Medicina Psicosomatica"



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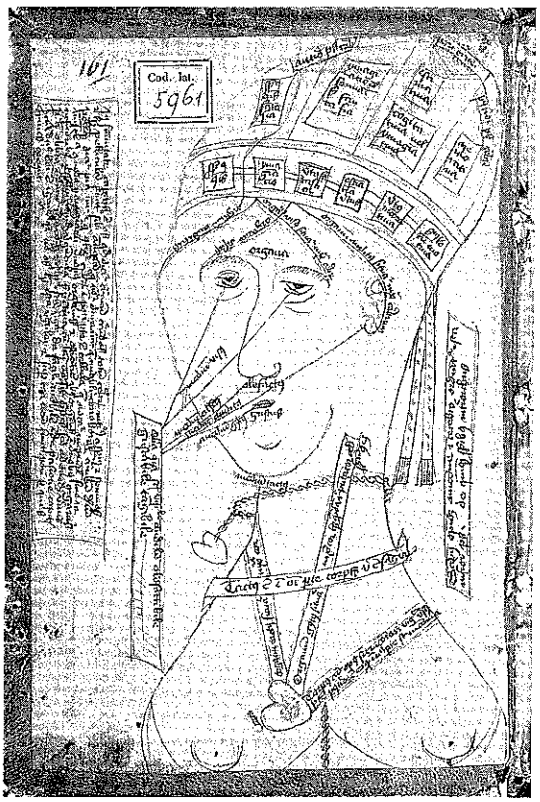
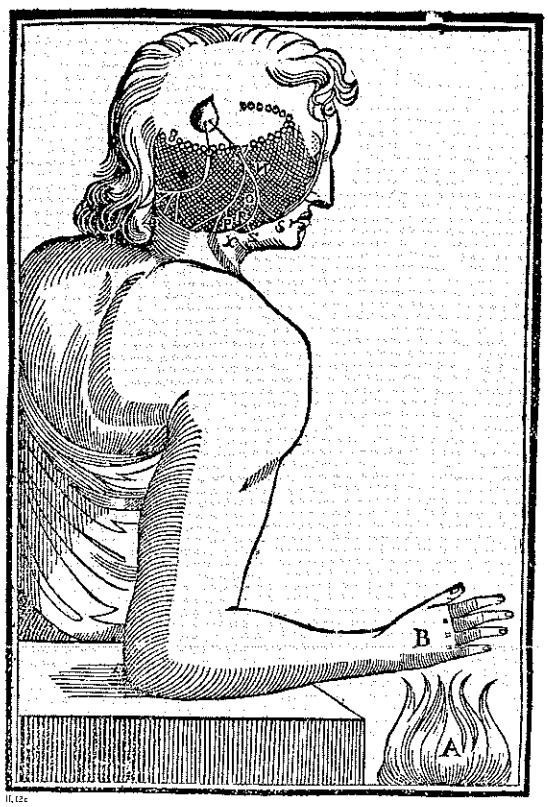




K V. SUDAKOV

Brain Mechanisms of Emotional Stress

Avicenna was probably the first to investigate the inducing of emotional stress: he used two lambs, one of which was placed in a cage next to a wolf and the other was left free. The animal which found it impossible to avoid the danger deriving from the immediate vicinity of the wolf died. The purpose of Avicenna's experiment was to prove that emotions, arising, for instance, from impossibility of helping oneself out of a conflict situation, are biologically relevant, and lead to depression, fear, cardiovascular and respiratory disorders, and ultimately death (N.M. Madifdov, V.D. Gordieva, 1980).

I. P. Pavlov (1927) observed the disorders in higher nervous activity caused by conflict situations (Petrograd innundation in 1924) in dogs which previously had been subjected to classical conditioning experiments. D. I. Miminoshvili and G. O. Makagyan (1956), working in Sukhumi (USSR), provided even more decisive evidence that behavioral conflict situations have a role to play in the genesis of cardiovascular disorders in baboons. The authors broke the natural hierarchy in a baboon colony by encaging its dominant male next to the colony. The animal could only observe the life of the colony, without any way to influence the behavior of its exsubordinates. Instead, it roared and desperately attempted to bend the iron bars of the cage. Within a few months this conflict situation resulted in severe arterial hypertension and myocardial infarction with lethal outcome.

In these instances, the physiological functions deteriorated without any direct physical damage to the animal, on the sole basis of behavioral conflict situations. Primarily strained were the mechanisms of emotions which help the animals to perform the subjective evaluation of their internal state and the impact of environmental factors.

Psychoemotional stress is an increasingly important factor in human life. Technological progress is gaining in strength as a source of social conflict situations. People more often than not have to work in extremal industrial, climatic, and geographical conditions or even in space; that is also conducive to psychoemotional stress.

Accelerating life events, informational loading, urbanization, monotony, and adynamia are greatly expanding the periods of human psychoemotional loads. The same factors reduce the share of positive emotional states related to enjoying nature, culture, human relations. This increases the incidence of psychosomatic diseases: neuroses, cardiovascular and endocrine disorders, gastrointestinal ulceration, etc. (Fig 1). Thus emotional stress appears closely related to the survival of mankind.

Animal modelling of diverse conflict situations has permitted a better understanding of the mechanisms of physiological dysfunctions under emotional stress (D.I. Miminoshvili, G.O. Makagyan, 1956; D.V. Holst, 1969; J.P. Henry, P.M. Stephans, 1977, K.V. Sudakov, 1981, F.P. Vedyaev, T.M. Vorobieva, 1983; and others).

Immobilization is most widely used as a model of psychoemotional stress in animal experimentation. Fig. 2 presents a rat immobilized in a tight plastic box. Our investigation has shown that here the main stress-inducing factor is the forced confinement of an animal in the restraining compartment. Interestingly, in the cases when animals entered these boxes of their own volition, escaping more important zoosocial conflicts, they could stay there for a long time without even minor signs of emotional stress and impairment of physiological functions.

Our experiments showed that within a population of Vistar rats exposed to a standardized conflict situation (30 h forced immobilization) individual animals differed in the stability of their physiological functions (E.A. Yumatov, 1980). By post-factum analysis, the whole population could be divided into 6 groups (Fig. 3). There were virtually no changes in blood pressure (BP) and heart rate (HR) throughout 30 h of immobilization in animals of the first group — therefore, labeled " resistant. " Mean BP increase by 20 to 40 mm Hg with a subsequent decrease to and stabilization at the initial level during the first 5 to 6 h of immobilization was observed in animals of the second group. Their HR was relatively stable. Animals of this group died after different terms of immobiliization while their HR slowed progressively. In the fifth group the immobilization caused both HR and BP to fall with fatal outcome within 13 to 17 hours. The sixth group manifested a sharp rise in BP (by 45-60 mm Hg) and HR (up to 600 bpm) after which both BP and HR fell abruptly and the animals died. Groups 3 to 6 were termed nonresistant or predisposed to stress.

Similar types of reactions could be observed under more severe stress induced in immobilized rats by alternating electrical stimulation

of ventromedial hypothalamus (HVM) defense centers and electric skin stimulation (D.F. Vedyanev, S.K. Sudakov, 1983). These responses were observed in other species, e.g. in rabbits, as well (S.K. Sudakov, 1980).

Lesions were detected (T.I. Belova, J.J. Jonson, 1982) in the blood vessel walls of the brainstem reticular formation in rats susceptible to cardiovascular disorders after a 6.5 hour long immobilization with the technique developed by R. Kvetnanski and L. Mikolai (1970) (Fig. 4).

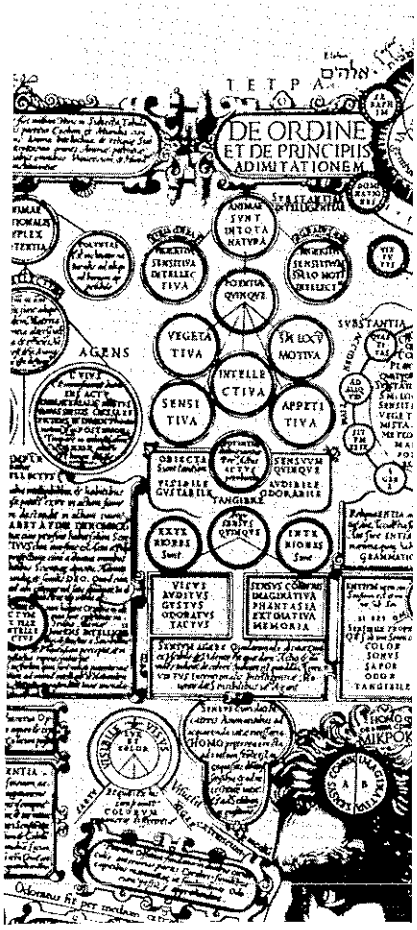
As our experiments have shown, the degree of resistance to emotional stress differed in rats of distinct strains. Thus, Vistar rats appeared more resistant than August rats (K.V. Sudakov, 1983).

Individual resistance to stress could be determined in rats using tail-flick test, measuring the general moto activity (e.g. in Varimex device), analyzing the ECG, impedance rheogram, BP, and respiration in response to an orthostatic challenge (K.V. Sudakov et al., 1990).

Stress-resistant and predisposed rats showed different catecholamine contents in brain structures (T.I. Belova, R. Kvetnanski, 1984). Catecholamine levels were measured using radioenzyme tests in different brain nuclei in Vistar and August rats (Fig. 5). As compared to Vistar strain, August rats had higher levels of dopamine (DA) especially in DA-producing brain nuclei, and higher levels of norepinephrine (NE).

When exposed to immobilization stress, the rats differing in their BP response, also had a different time course of catecholamine contents in the brain nuclei. For instance, in *n. arcuatus hypothalami* (group A_{12}) the NE content did not differ from the control values in rats with stable BP, and was significantly decreased in rats predisposed to BP changes (Fig. 6).

Our special experiments have shown that the animal's resistance to emotional stress is determined by the content of protein-like endogenous substances content in the brain. The content of oligopeptides in the hypothalamus of animals differing in their resistance to stress was analyzed by immunoenzyme technique (R.M. Salieva et al., 1988). Hypothalamic levels of immunoreactive ß- endorphin-like substance were higher in stress-resistant Vistar rats as compared to predisposed animals. This level increased throughout 3 h of acute emotional stress induced by immobilization combined with aperiodic electrical HVM stimulation alternating with electrocutaneous stimulation (Fig. 7).



The content of immunoreactive delta-sleep inducing peptide (DSIP) was also measured in the hypothalamus of animals with different resistance to emotional stress. Stress-resistant Vistar rats had higher levels of the peptide in hypothalamus than their stress-prone counterparts. By the 3rd h of stress stimulation the hypothalamic DSIP content continued to increase (Fig. 8).

We have also investigated the contents of substance P (SP) in the hypothalamus of rats with different resistance to emotional stress using radioimmunoassay (E.A. Yumatov et al. 1987). Stress-resistant rats had significantly higher levels of SP in the hypothalamus than predisposed animals.

Thus, the experiments have proved that animal resistance to emotional stress depends considerably on the content of peptides such as ß-endorphin, DSIP, and SP, in the hypothalamus. These levels were higher in stress-resistant than in predisposed animals.

The special experiment (K.V. Sudakov, 1984) was aimed at determining the changes of single brain neurons sensitivity to neurotransmitters and neuropeptides microintrophoretically applied through the chronically implanted micropipettes under acute emotional stress. Neurotransmitters: acetylcholine, norepinephrine, serotonin, and oligopeptides; angiotensin II, bradykinin, and SP were applied to single neurons of HVM, midbrain reticular formation and sensorimotor cortex of immobilized rats before and after the electrical stimulation of HVM with implanted electrodes. These experiments (E.A. Yumatov, E.A. Bykova, 1987) showed that changes in the neurons' sensitivity to the neurotransmitters and neuropeptides were characteristic of the after-effect of HVM stimulation. The individual neurons could acquire or lose their sensitivity to applied drugs (Fig. 10). Changes in the sen-

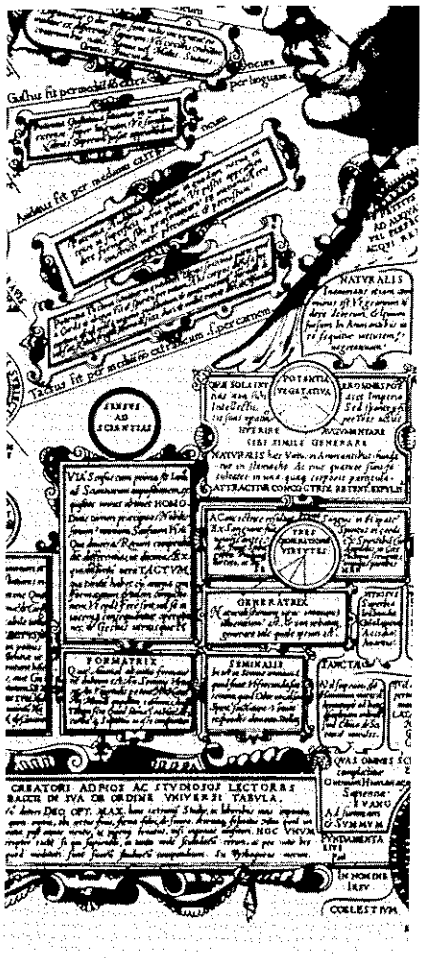
sitivity of sensorimotor cortical neurons to neurotransmitters in the course of acute emotional stress were described also by E.A. Yumatov and E.A. Kiyatkin (1983).

Thus, the levels of biologically active substances, oligopeptides and neurotransmitters were different in the brains of animals resistant or susceptible to the changes of cardiovascular changes under emotional stress. Acute emotional stress induced the changes of single brain neurons' sensitivity to these substances. These findings disclosed the nature of the "vicious circle" creating steady impairments of physiological functions under emotional stress. It became clear that these dysfunctions are based upon the primary changes in the brain neurochemical processes.

Here the question arises of whether it is possible to correct the distorted neurochemical integration in stress-prone animals in order to enhance their abilities to cope with stress.

Oligopeptides appeared to have such brain function-normalizing properties (P. Oeme et al., 1980, K.V. Sudakov et al., 1990). With this in mind, in a series of experiments the Vistar rats subjected to immobilization received i.a. injections of DSIP (K.V. Sudakov et al., 1983a). Animals tested under acute emotional stress could be divided into the following groups: a) resistant; b) adapted with increasing or decreasing mean BP; c) predisposed which died at different times in the acute conflict situation.

DSIP increased the percentage of animals surviving the 3 h conflict situation. Under the effect of the peptide the percentage of stress-prone animals reduced from 65% to 25% and that of resistant rats increased from 14% to 60%. The same model of acute emotional stress was used to study the effect of DSIP on the intracellular messengers of the sympathetic and parasympathetic nervous system: cAMP and cGMP. Their contents were measured in medial hypothalamus and midbrain reticular formation. The study demonstrated phasic changes in these messengers' concentration in the brain under emotional stress. By the 30th min of emotional stress the brain cAMP levels increased by a factor of 8 to 10 and those of cGMP by a factor of 6 to 8. By 60 min the brain cAMP and cGMP levels decreased, though remaining 4 to 5 times as high as their baselines (E.V. Koplik, T.P. Khovanskaya, 1983). In DSIP preinjected rats as related to those vehicle-injected, the cAMP content in the medial hypothalamus was significantly reduced by the 30th min. In the midbrain reticular formation cGMP level rose by the 30th min of emotional stress.



The experiments performed by our colleagues have shown that DSIP injection into the brain lateral ventricles blocked behavioral and somatoautonomic manifestation of the avoidance response under direct electrical HVM stimulation (K.V. Sudakov et al., 1983b). DSIP was shown to block the ascending activating influences of the hypothalamic defense centers in the brain cortex, normalizing the cross-correlation between EEG rhythms in the right and left hemispheres (G. Sukhbat, 1986).

Our colleagues E.A. Yumatov et al. (1984) have demonstrated that SP injected i.p. in a dose of 125 μg/kg of the peptide prevented the hypothalamic norepinephrine levels from decreasing in immobilization stress. A highly significant increase in the hypothalamic norepinephrine content was observed in SP injected rats compared to controls matched in terms of immobilization (Fig. 11). This effect clearly persisted even 2 weeks after the injection.

Finally, the work performed at our laboratory (R.M. Salieva et al., in press) has demonstrated that DSIP administration leads to significant increases in hypothalamic SP levels (Fig. 12), which are possibly a cause of increasing resistance of the animals to emotional stress.

Conclusion

The experiments have shown that animals' resistance to emotional stress is largely determined by the contents of neurotransmitters and neuropeptides in brain structure. Stress-resistant rats, as compared to stress-prone ones, have higher hypothalamic levels of DSIP, SP, ß-endorphin; their domanine and norepinephrine levels in the midbrain reticular formation are lower. By raising the brain levels of DSIP and SP one can increase the resistance

to stress in stress-prone animals. Taken together, these data suggest that the stress-induced mental and autonomic disorders are based upon the primary changes in the brain molecular mechanisms.

All this opens new perspectives on using oligopeptides to enhance (in animals and, in future, possibly in humans) resistance to external stress-inducing factors.

The experimental studies raise our hopes that further investigation will soon discover the endogenous substances that will enable medicine to reliably protect the tense brain of modern man from adverse effects of inevitable psychoemotional stresses.

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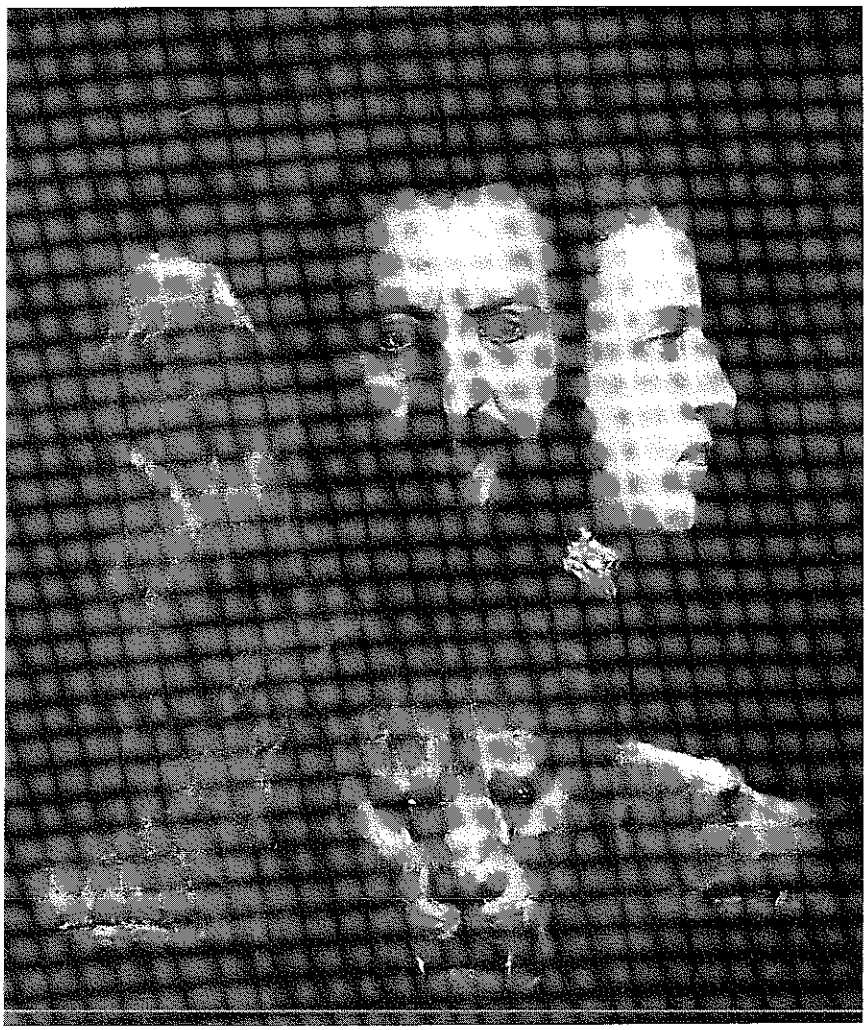


OLIVER SACKS

Awakenings Reconsidered

I want, first, to express my pleasure and excitement at being invited to this meeting, which, it seems to me, comes at a historical juncture: for, on the one hand, we are entering the " Decade of the Brain, " a period of unprecedented empirical and conceptual advances in neuroscience, in our understanding of the living nervous system, and most especially of its highest functions; and, on the other, religion has always been the home and harbour of our deepest subjectivity, our inwardness, of all that constitutes the human spirit or soul. Science and religion have often met stormily, dogmatically, without mutual understanding; but both are explorations, finally, of what it means to be human. Perhaps there can now be a friendly, and above all *deep* meeting of the two, in which each can accommodate, and illuminate, the path of the other.

The title of this talk needs some clarification. I will not be speaking of awakening from sleep; nor of that universal awakening which is mental birth — the birth of consciousness, of the individual, or mind, in us all; but of a singular and special awakening, one which would perhaps have fascinated John Donne, who spoke of " a preternatural birth in returning to life from this sickness. " The sickness I shall speak of is a viral sleeping sickness, the so-called *encephalitis lethargica*, which gripped the world in epidemic form soon after the first World War, and which left its survivors in a singular state, not of sleep, but of transfixion, a sort of stasis, for decades — until in 1969, it became possible to " awaken " them.....such patients as I describe in my book *Awakenings*.

These transfixed victims of the *encephalitis lethargica* were transfixed, not merely physically stuck, often for hours or days on end, in fixed postures or attitudes, unable to move, and without any will or impulse to do so — but mentally transfixed as well, their perceptions, thoughts, and streams of consciousness arrested; and not merely mentally, but existentially as well — their identities, orientations, relationship to the world, transfixed at the point where their illness had closed in on them. Thus many of them, when they were " awakened, " seemed much younger than their years, as if they " belonged " to an earlier age, as if there had been no mental activity, no emotional or mental development, for decades.

Let me illustrate the absoluteness of this transfixion: one such patient had been able to start a bath, but had then " frozen, " while the bathwater overflowed. Summoned to see her, I found her motionless in the rising flood, until I touched her, when she jumped: " My God, " she said, " what happened? "

" You tell me, " I answered.

" I had just started the bath, " she replied, " there was an inch of water in the tub...and then you touched me, and I saw there was this flood. "

This patient, Hester, had become mentally stuck, transfixed, with no sense of time, in a single perceptual instant. *She* had stopped — and the world had stopped for her. Her brain/mind was maintaining, perseverating, an obsolete image, which it could no longer revise or update, until I touched, and " awakened, " her. Similar trance-like states might contain or consist of an unvarying circular movement of the mind, such as an endless, inner reiteration of $2=2=2=2=2=$, a mental activity at once empty, compulsive, and absorbing, which cut the patient off from normal consciousness, from any living, participating experience of the world.

Another patient was able, much later, to describe how she had experienced her brother lighting his pipe: she had seen a series of " stills, " she said, at a rate of about five a second (one of which, confusingly, was out of place, so that the actual lighting of the pipe seemed to precede the arrival of the lit match). She had found this discontinuous, fractured perception bewildering — it gave her no sense of an action, of an intention, of a reality, of a whole.

What was going on (or failing to go on) in these patients? They were not demented, or dreaming, or confused; but they all had profound damage to the basal ganglia, those deep-lying parts of the brain which not only regulate movement, the flow of movement, but which are, in Gerald Edelman's term, " organs of succession. "

Unable to move, or to organize that continuous and smooth series of movements by which all of us, normally, explore and experience " reality, " these patients were bizarrely cut off from " reality, " were cut off from new experience, its updating, its integration — and thus marooned, or fossilized, in unchanging, obsolete worlds from the past.

This was to become tragically clear with my patient Rose R., who, when she was finally " awakened, " by the drug L-DOPA in 1969, spoke of figures from the past as if

they were still alive, of events from the past as if they were still current, and with the voice and vocabulary of a woman forty years younger. She had, we found, "registered" certain events — Kennedy's assassination, Pearl Harbor — without being able to relate these to "a world," or to herself. She said, "I *know* it's 1969, but I *feel* it's 1926; I *know* I'm 64, but I *feel* I'm 21.... I've been a spectator for 43 years."

Some patients could be briefly "awakened," or engaged, for seconds or minutes, by ongoing activities in which they could participate — music, in particular, could have an astonishing effect, not only enabling frozen patients to move, but allowing them, as they moved (which they might do dancingly, or singingly, or in some other way *with* music) a total intellectual and emotional animation, a total "awakening to life" which was, however, tantalizingly brief, and came to an end the moment the music ended. Music, one felt, could itself serve as "an organ of succession" for such patients, a sort of substitute for their own so-damaged organs of succession, thus allowing them, very briefly, a normal movement, a normal sense of time, and, with this, a reactivation of perception, of experience, of "life," albeit one limited in content as well as duration, for it remained tied to, even identified with, the music itself.

But no real, or sustained, or wholly autonomous "awakening" could occur without *physiologically* normalizing the basal ganglia — or, properly speaking, the entire nigrostriatal system, which disease had profoundly depleted of its neural transmitter, dopamine. Dopamine cannot be administered directly; it cannot pass through the blood-brain barrier — but it can be generated internally if one gives its biological precursor, L-dihydroxiphenylalanine, or, for short, L-DOPA. In the spring of 1969, then, I gave this to my patients.

"The wonder of awakening to life" was most dramatic, with these patients, in the summer of 1969, when virtually all of them showed an astonshing, sometimes explosive "awakening." This "awakening" felt, to each patient, like a rush of energy, of vividness, of feeling, of movement, a rush of life to a frozen and dead world. Everything became, suddenly, real and alive, charged with an intensity, an "it" ness, it had not had in decades. All sensations grew suddenly more vivid — colors, sounds, smells, everything; and sensations previously desiccated were now charged with feeling — "I am *enjoying* my food, I feel ravenous for food," one patient said. "Before I simply ate what was put in my mouth." Instincts, appetites, emotions, of every sort, dormant or asleep for years, were suddenly awakened. I would see patients take deep breaths of air with delight, touch themselves, move their limbs, in a sort of rapture. Sexual feelings came alive, were awakened, in patients, many of whom had been, through diencephalic damage, "centrally castrated" for years. Libido, coursing through almost forgotten channels, would light a flame of love in these patients who had felt dead, or automata, for so long — a love which might embrace another person, or which might spread out to become a love for life, for the world, for humanity. Some patients felt a sense of grandeur, of illumination or salvation: thus one patient, Leonard L., wrote in his diary, "I have risen, I am still rising. From the ashes of defeat to the glory of greatness..... *Now*," he added with an evangelical fervor, "*now* I must go out and speak to the world." Sometimes the sense of awakened love and power had a gentle, tender quality to it. "L-DOPA is a blessed drug," wrote Leonard L., in the first flush of his awakening. "It has given me back the possibility of life. It has opened me out where I was clammed tight-shut before..... If everyone felt as good as I do," he added, "nobody would think of quarrelling or wars. Nobody would think of domination or possession. They would simply enjoy themselves and each other. They would realize that Heaven was right here down on earth." A tender, blissful feeling which, all too often, with the continued stimulation of the drug, or the frustrations and limitations which these patients soon ran into, could turn into its thwarted and enraged opposite.

But the sense of gratitude, of delight, was paramount in that first summer, and echoed in the words of almost all the patients. Thus Frances D., who had been disabled for years, was able to go for a day-trip to the country, and on returning exclaimed, "What a perfect day — so peaceful — I shall never forget it! It's a joy to be alive on a day like this!" Rose R. called her "awakening" "fabulous, gorgeous!" Ida I. said "wonderful, wonderful"; Aaron E. spoke of "a wave of energy and strength," an "inner movement," transforming him. A sense of movement, indeed, was expressed, or implied, by them all — a sense of movement which had been absent in their fixed, frozen states.

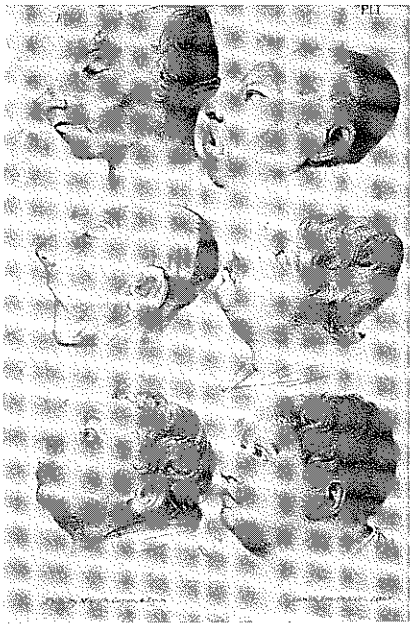
And these were not just individual reactions, for fifty patients were awakening to life at this time: all of them had been in the same tunnel or dungeon, all of them were now out in the bright light of day. They discovered, they delighted, in each other as *people*, where previously they had been contiguous statues on a ward. They delighted in each other's daily-increasing health and vitality, in the intense, shared sense of a new life. Thus there was not just an individual, there was a *communal awakening*, a communal sense and hope of "a new life." It

was a time of exuberance, of festivity, of resurrection, of rebirth, the dawn of a new life. This was the experience, the mood, of '69.

How, I wondered, were we to understand what was going on? How much was this a direct (and, so to speak) pharmacological effect of L-DOPA? How much the sheer joy of release, the sheer wonder of being alive once again, after decades of virtual entombment in their own bodies? How much the new sense of hope, after hope had been denied them, had been dead, for decades? I could not tell, nor could the patients either: "Is it the medicine I am taking," wrote Hester Y., "or just my new state of mind?"

Such elations, such a sudden sense of a new consciousness, a new life, occur, of course, in other situations. They could occur, I sometimes found, in the course of a migraine — especially that intense state of cerebal excitation, the aura, which might precede it. Dostoevsky recorded such exaltations — a so-called "intellectual aura" — at the start of his epilepsies: "There are moments, and it is only a matter of five or six seconds, when you feel the presence of the eternal harmony..... During these five seconds I live a whole human existence." And of course, apart from these obviously organic contexts, there are times when grand events in life transform and awaken one: one such, the one Donne speaks of, is recovery from an illness; another, well known to you, is falling in love — finding the whole world transformed by love. Another, well known to the scientists among you, is a sudden sense of discovery, a sudden "Eureka!", a sudden shift of mental paradigm, which causes one's whole intellectual world to be transformed. Another is the creative joy of making or experiencing art. And yet another is the sudden sense of revelation — an epiphany, a sense of a presence, and a power, and a love, that transforms life.

Physiologically, I have to say, we can explain nothing of these experiences, which Maslow has called "peak experiences," and which seem to represent the human mind, the human soul, at its most enlarged, at its maximum. It is clear, in general terms, that they represent supreme states of integration, states of extreme cerebral wellness or wholeness, which — alas! — in their full force cannot be maintained. This, indeed, is what our post-encephalitic patients found.



The summer which had started with such exuberance, such hope, was to become much grimmer, rather suddenly, for most of them in the fall. Some of the difficulties they ran into — sudden oscillations of effect, sudden switches from excitement to stupor, proliferating states of motor disorder (chorea, dyskinesias, tics of all kinds), and, increasingly, reversions to Parkinsonism and trance — were plainly physiological in origin, the result of continued stimulation of their so-devastated regulatory systems. A great height of stimulation cannot be maintained even in the normal brain — how much less was it possible in the grossly damaged brains of these patients. And where, for the rest of us, the special, rare excitement of creative activity, or discovery, or being in love, or epiphany — may wear off, leaving us, at least physiologically, where we were before (though, hopefully, different, and better integrated, for having been through the experience) — these patients did not have a "normality" to return to, and when the excitement ebbed, or could no longer be sustained, they fell into, or were thrown into, renewed depths of illness.

And yet, as clearly, the total reactions of these patients to L-DOPA could not be wholly understood in simple, pharmacological terms — but were profoundly dependent on the lives that they led, the lives that were open to them, or that they discovered, or made.

We may be temporarily transported by an excitement, a eureka, an epiphany, but we have our usual lives, our worlds, our identities to go back to. But what was the situation of patients such as these, who had lost ten or twenty or thirty years in a limbo, who had suffered a complete chasm, a discontinuity, in their beings, so that they "awakened" to a world which was no longer their own? Or, rather, to a world which no longer recognized them as "belonging," but saw them as anachronisms, fossils who had "come back," as anomalies bizarrely animated, from the past.

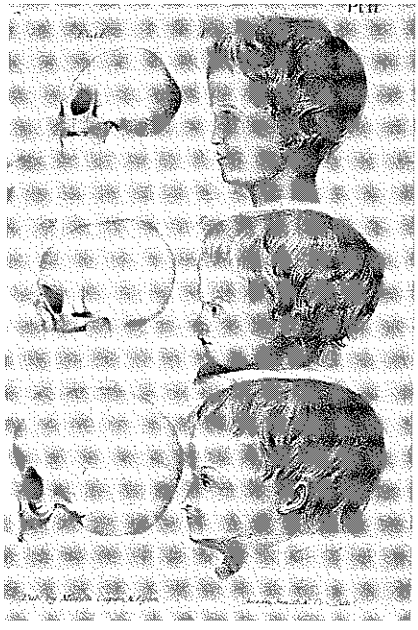
Such a situation has often been imagined in fable — in the legend

of Rip van Winkle, or the Sleeping Beauty — but here was the situation, a profound time-dislocation, in fact. What state of consciouness can one have, what sort of integration can one reach, if one has just " come to " after an interval of decades, if one's experience of life has been shattered, cut in two, if one has an irremediable chasm between " past " and " now, " instead of the continuum, the continuous transition, which the rest of us know?

It was this, it seemed to me, and not just limitations in the motor-regulatory capacities of the midbrain, which faced all our patients — it was this which they had to negotiate — or somehow come to grief. Some patients came to grief, could scarcely bear their " awakening, " from the start. One such was Rose R., who had been " a spectator " for 43 years, who felt herself 21, in 1926, even though it was 1969. " I can't bear your world, " she said, " all this television, trash, nonsense. It means nothing to me, I have no place in it, nothing makes sense. " And with this, after ten days of a strange animation, in which she seemed to have awoken indeed, but to a wholly obsolete, flapper-ish 1926-self, she suddenly ceased to react to L-DOPA, and went back into the trance that had held her for more than forty years — a Sleeping Beauty whose " awakening " was intolerable to her, and who could never be awoken again

How is one to reconcile a young self with an old self — if there has not been a transition, but a vacuum, between them? " Awakening, " for our patients, in the summer of 1969, was festive indeed *if it did not touch on these things*: they could enjoy eating, breathing, colors, smells, the sharpness of their own sensations and emotions; they could enjoy trees, music, dancing, sunsets — timeless things not tied to history; they could, perhaps, have a sense of " the eternal harmony, " of eternity — for this, at the grandest level, lies beyond time; they could enjoy, first and last, the sense of movement in their own bodies, *the sense of movement without which one is not conscious or alive* — for none of these things yet touched on the tragic time-chasm, the dislocation, in their own lives.

It was necessary, then, for these



patients — if it was possible for them — to withdraw their regard from the world of the past (a " past " which, through the absence of subsequent experience, still felt intensely " present " to them) and pay attention, instead, to the actual world of the present, not as spectators (who could observe it, detachedly, as a spectacle) but as participators, who could engage it, and be engaged by it, as active selves. One such engagement lay in human relations, not in the restoration of a " past " or now obsolete, relation, but in allowing a new relation to occur. Thus Ida T., when she " awakened, " talked a great deal to herself in Yiddish, chuckling and gurgling as she did so. Yet all her talk was of the village where she had grown up as a child. She had awakened indeed, but in a manner completely regressive and nostalgic — she had yet to allow a current relationship. But for Ida T., despite her 48 years " asleep, " despite the half-century vacuum in her life, this nevertheless proved to be possible. She met her daughter, whom she had never seen before — or not since, as a baby, her daughter had been taken from her — and was able to forge with her a new, strong relationship. And this, it seemed to me, was the path out of the abyss, the Ariadne's thread in the labyrinth of dislocation. Through this relation Ida T. became reconciled to the gap, managed to bring together, to integrate, her two identities — as a young mother and as an old woman — to create a new, richer being which incorporated them both, a being which gave her perspective, and depth.

For Leonard L., the most intellectual of them all, healing the time-wound, uniting the two consciousnesses, the old and the new, had to be accomplished, partly, by the intellectual act of narrative, by constructing a history, an autobiography, which could join and unite them, could make an explicit reconciliation and synthesis. " It'll bring me together, " he said, " It'll cast out the devils. It'll bring everything into the full light of day. " He typed almost ceaselessly — twelve or fifteen hours a day — and when he typed he indeed " came together " and achieved, or started to achieve, a synthesis in himself.

Synthesis, indeed, was the su-

preme goal and (sometimes) achievement for these patients, who, as they " awakened, " realized they were bisected, split clean in two, anomalized, by disease. Such a special, supreme act of synthesis, is not demanded, is not needed, in unshattered lives, which, so to speak, reconcile themselves, *are* synthesized, from beginning to end.

When Goethe celebrated his eightieth birthday, someone proposed a toast to " looking back, " to " memory, " but the old man became quite furious at this toast: " I do not recognize 'memory,' " he cried, " in the sense that you mean it.... It must, rather, from the beginning, be woven into the fabric of our inmost self, must become one with it, must create a new and better self within us.... There is no past that one is allowed to long for. "

This is easy for a healthy man to say — his perceptions, his registration of the world, have never come to a stop; he is in a position, constantly, to weave everything into his inmost self, and, with this, continually to be enlarged, and to grow.

And it is this process which Gerald Edelman has spoken of, when he speaks of the neurobiology of consciousness, of experience changing (like Heraclitus' stream) each moment, and of it being interwoven with the past, constantly, to create the depth of an integrated " remembered present. " Such a process depends on, first, a continuous physical-and-mental movement, an exploration, on the part of the perceiver-thinker; and, second, on the continuity of memory — the ceaseless integration of past and present. Both of these conditions were denied, most tragically, to our patients by virtue of their unique disease. Edelman has talked of " diseases of consciousness, " but none of these is profounder or stranger than that which so cruelly afflicts the post-encephalitic. The patient does not realize this, ironically, until he has " awakened " — and it is precisely this, and even exclusively this, which will dominate his mind.

This is the distinction, but given a special, unique physiological basis, between what William James called the " once-born " and the " twice-born. " The " once-born " (like Goethe), however great their powers, have the advantage (or disadvantage) of never knowing despair, of never having been disintegrated, of having always been whole. The " twice-born " — like sinners, and melancholics, and post-encephalitics — have a more complex character and task: they have (in James's words) " drunk too deeply of the cup of bitterness ever to forget its taste, and their redemption is into a universe two storeys deep. "

This, then, is the situation of the strongest of the patients who " awakened " in 1969: first they had a lyrical, innocent, and in some sense timeless " awakening, " then a period of tribulation, a dark night of body and soul, in which they struggled with a division in themselves, an almost unimaginable mental (and neurological) division. And yet, despite everything, and in a manner which is as heroic as it is remarkable, they may nonetheless manage to integrate their doubleselves and lives, to achieve a spiritual, and Edelmanian, synthesis of the deepest and stablest kind.

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Virus-Nerve Cell Interaction and Illness

The nervous system, with respect to viral infection, is unique since it is isolated from the immune system, and there are many types of "ultraspecialized cells" present. The system may be infected by both hematogenous and direct neural routes. Some viruses invade the CNS from the bloodstream by entering the stroma of choroid plexus through the fenestrated capillary endotelium and then either infecting or being passively transported across the choroid plexus epithelial cells into the cerebrospinal fluid (CSF). Once in the CSF, virus can infect the ependymal cells lining the walls of the ventricles and can, then, invade the underlying brain tissue. This pattern of infection has been shown for some viruses including mumps virus and arboviruses. In the moment in which virus is inside the organism a series of responses are mounted by the immune system able to defend it. What are the kinds of cells involved in this and how do they operate? The cells involved are T cells and antibodies produced by B cells. Antibodies can recognize either free virus or virally infected cells; they control virus infections by neutralizing free virus and by killing infected cells through complement-mediated cytotoxicity or antibody — dependent cell — mediated cytotoxicity (ADCC). In contrast to antibodies that recognize viral proteins by themselves, T cells only see viral antigen in association with cellular major histocompatibility complex (MHC) glycoproteins. Thus, T cells do not recognize free virus but are highly effective in eliminating virally infected cells and controlling virus growth by cytolysis and lymphokine release. The antigen-specific T-cell receptor recognizes short peptide fragments derived from viral proteins in association with either MHC class I or class II antigens. In general, CD8+ T-cells recognize viral peptides in association with MHC class I antigens, whereas CD4+ T cells recognize viral peptides plus MHC class II antigens. The peptide fragments can be derived from any viral protein, structural (either surface or internal) or nonstructural.

Thus, all viral proteins can be potential targets for T-cell recognition. In spite of these defensive barriers, virus can persist inside the organism, giving rise to chronic infections during which virus is produced continuously or to infections in which viral genomic material is integrated in host cell DNA activating during intermittent episodes; in this case we have a "viral latency" What are the strategies adopted by virus in order to persist? First of all, to regulate its lytic cycle, then to evade the immunologic surveillance.

The best example of the first strategies comes from restricted viral gene expression utilized by a lytic virus, i.e., latent infection of neurons by herpes simplex virus (HSV).

As regards the second strategies, viruses can utilize various means. Antigenic variation is the most effective means of escape from neutralizing antibody. The classic example of this is the antigenic "shift" and "drift" seen among the influenza viruses. Antigenic variations are responsible for HIV persistence in humans, too. Another potential means of escape from neutralizing antibody is the presence of an excess of nonneutraliz-

ing antibody that binds to virus and blocks the action of neutralizing antibody. Virally infected cells can escape antibody-complement mediated lysis or ADCC by reduced expression of viral glycoproteins on the cell surface as in neurons latently infected with HSV, rendering them inaccessible to any anti-HSV antibody that may be present in the cerebrospinal fluid (CSF). An interesting mechanism of evading immune surveillance has been described by Oldstone *et al*.

It consists in antibody-induced modulation of viral antigens on the infected cells. In vitro studies with measles virus have shown that addition of virus-specific antibody (in the absence of complement) to infected cells leads to a rearrangement and capping of viral glycoproteins toward one pole of the cell: these antigens are then shed from the cell surface as antigen-antibody complexes, resulting in infected cells without viral antigens on the surface. Clearly, if this phenomenon takes place also in vivo, it will presumably occur in body compartments that do not contain or have low levels of complement, such as the CNS and areas of lymphoid drainage. Reduction of MHC class I antigen expression on host cells as a consequence of viral infection has been reported for several viruses. This is an effective means of avoiding recognition by CD8 + T cells. Another mechanism is the decreased expression of cell-adhesion molecules (i.e. LFA-3 and CAM-1) that are required for efficient T cell-target interaction. In the interactions of immune system, the role of lymphokines that represent a complex network of regulatory mediators is noteworthy, and without doubt, among them, IFNs have a central function because they are important for the activation of macrophages and other accessory cells, and for T and B cell functions. Since virus infection and activation of the IFN system are intimately related, the possibility of an involvement of the IFN system in certain pathologic states is the object of serious consideration, especially in view of the immunomodulating effects of IFNs.

For example, the presence of IFN-gamma was correlated with the developing of several viral diseases, index of an activation of cell-mediated immunity. Otherwise, in many diseases of known viral origin, IFN, produced as a result of the infection, can paradoxically contribute to the disease. Thus, the exogenous IFN-gamma administered in patients affected by MS has led to the exacerbation of the disease. Our recent finding that there are natural anti-IFN gamma antibodies throws a light on the mystery concerning this molecule with multiple activities. Generally, human IFNs

Table 1. Effect of human natural anti-IFN-γ, antibodies on the antiviral activity of human IFN-γ or IFN-γ

IFN type	Antibodies (μg/ml)	IFN U
HulFN-γ	—	27
	0.60	27
	1.20	27
	2.40	27
	4.80	27
HulFN-γ	—	9
	0.60	9
	1.20	9
	2.40	9
	4.80	9

Table 2. Effect of natural human antibodies to IFN-γ, added at different concentrations on the expression of Fc receptor and HLA-DR antigens on U937 cells stimulated with rIFN-γ (a).

Addition to culture	% of Fc receptors-expressing U937 cells	Inhibition (%)	% of HLA-DR expressing U937 cells	Inhibition (%)
Antibodies to IFN- (μg/ml)				
0	83	—	74.1	—
0.6	84.2	0	71.4	3.7
1.2	60	27.8	47.4	36.1
2.4	30.4	63.4	13.6	81.7
4.8	8.4	89.9	1.2	98.4
Unrelated antibodies	(μg/ml)			
4.8	83.6	0	73.5	0.7

a U937 cell cultures were stimulated for 24 hr with 200 U of rIFN-γ and at the same time, they were treated or not with different concentrations of human anti-IFN-γ antibodies, or with purified human unrelated Ig

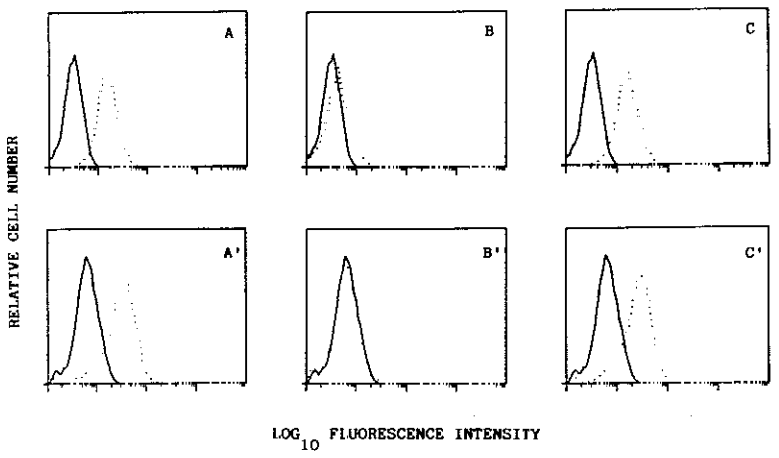

Fig. 1. Inhibition of the expression of Fc-receptor sites (upper line) and HLA-DR antigens (lower line) on U937 cells stimulated with rIFN-γ. U937 cell cultures were stimulated for 24 hr with 200U of rIFN-γ, and at the same time, they were treated or not with human anti-IFN-γ antibodies, or with purified human unrelated Ig, at a final concentration of 4.8 μg/ml. Expression of Fc receptor sites (A, B, C) and HLA-DR antigens (A', B', C') on U937 cells was evaluated by flow cytometric analysis. Continuous line: cultures set up in the absence of rIFN-γ. Dotted line: cultures set up in the presence of rIFN- (A, A'), in the presence of rIFN-γ and human anti-IFN-γ antibodies (B, B'), and in the presence of rIFN-γ and human unrelated Ig (C, C').

should not elicit antibodies in man, except in conjunction with autoimmune disorder[1] or in patients receiving large amounts of exogenous IFN, administered parenterally over a long period of time[2] However, there is no valid explanation for the recently observed presence of spontaneous anti-IFN-γ antibodies in a small number of patients with cancer[3], for the presence of IFN-γ antibodies in HIV-infected patients[4], individuals suffering from various viral diseases and even (at low titer) in healthy individuals[5], nor for the presence of antibodies of all three species of IFN in healthy donors[6,7]. The specific increase observed in the anti-IFN-γ antibody titer during viral infection and its decrease following resolution of the disease indicate that these antibodies are related to viral infection, possibly as a consequence of the production of IFN-γ after antigenic stimulation *in vivo*[5].

We have investigated the ability of affinity-purified natural human IFN-γ antibodies to affect the antiviral and immunomodulating activity of the human lymphokine *in vitro*. Our results show that affinity-purified human anti-IFN-γ antibodies do not impair the antiviral activity of IFN-γ, while they are capable of suppressing the IFN-γ induction of class II MHC antigens and of FC receptor sites for Ig. We also found that natural anti-IFN-γ antibodies can interfere, in a mixed lymphocyte culture (MLC), with the proliferation and cytotoxic generation of lymphocytes, probably by inhibiting endogenously produced IFN-γ. Human antibodies to IFN- were purified from the sera of healthy individuals with Protein-A-Sepharose columns and then were applied to a recombinant IFN-γ (rIFN-γ) coupled CNBr-activated Sepharose 4B column. The antibodies bound to rIFN-γ were eluted from the immunosorbent, using 0.1M of glycin-HCl buffer at pH 3, and then desalted with a column of Sephadex G-25. Antiviral activity was detected in a biological neutralization assay of the cytopathic effect of vesicular stomatitis virus on human WISH cells as described previously[8]. 9U of rIFN-γ, were incubated with various concentrations of human anti-IFN-γ antibodies, ranging from 0.6 to 4.8 μg/ml. After 2hr of incubation at room temperature, the mixtures were assayed for their antiviral activity.

The human anti-IFN-γ preparations did not impair the antiviral activity of human rIFN-γ and at any of the concentrations used to perform the experiment (ranging from 0.6 to 4.8 μg/ml) (Table 1). For the experiments on the induction of Fc receptors and HLA-DR antigens a human monocytics cell line U937 was used: 2×10^5 cells were stimulated for 24-48 hours with different concentrations of rIFN-γ. At the same time, affinity-purified human anti-IFN-γ antibodies or unrelated human immunoglobulin (Ig), at a final concentration of 0.6, 1.2, 2.4 and 4.8 μg/ml, were added to each cell culture. Inducer and antibodies were both present in the cell culture. To detect Fc receptors and HLA-DR antigens an immunofluorescence technique was applied and the cells analyzed by cytofluorimeter. It was shown that they inhibited the expected increase in Fc receptor and HLA-DR antigens (Fig. 1). The inhibition was found to be dose-dependent,

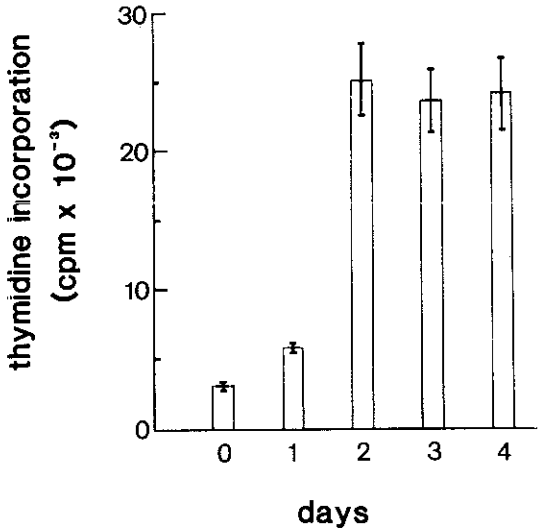

Fig. 2. Effect of human anti-IFN-γ antibodies, added at different times, on mixed lymphocyte culture proliferation. Lymphocytes were activated *in vitro* with irradiated allogenic PBL. Purified human antibodies to IFN- were added at the concentration of 4.8 μg/well at the initiation of MLC or on day 1, 2, 3, 4. [^{3}H] thymidine pulse for 18 hr on day 6.

maximally effective with human anti-IFN-γ antibodies at a concentration of 4.8 μg/ml (Table 2). The effect of anti-IFN-γ human antibodies on proliferation and cytotoxicity in MLC was observed by utilizing peripheral blood lymphocytes (PBL) obtained from blood of normal donors.

The PBL were then dispensed into 96-well round-bottomed plates (1×10^5 cells/well) in complete medium and admixed with irradiated allogenic PBL at a responder/stimulator ratio of 1:1. For blocking experiments, affinity-purified human anti-IFN-γ antibodies, or unrelated purified human Ig, were added at the onset of culture or on day 1, 2, 3, 4, in doses ranging from 0.6 to 4.8 μg/well. To assess proliferative response, the cell mixtures were incubated at 37° C for 6 days and pulsed for the last 18 hr of culture with 1 μCi/well [^{3}H]-thymidine. The cells were then harvested onto fiber discs with a Scatron multiple culture harvester, and radioactivity was measured in a beta-counter with a toluene-based scintillant. The addition of human anti-IFN-antibodies at the beginning of the culture resulted in a markedly reduced uptake of [^{3}H]thymidine as compared to control cultures, as measured on day 7 (Table 3). The inhibiting ability of human anti-IFN-γ antibodies was gradually lost with decreasing concentrations of antibodies. To investigate at which stage of a MLC IFN-γ is required, human anti-IFN-γ antibodies were added at different times of culture. As shown in Fig. 2, lymphocyte proliferation was inhibited when human antibodies specific to IFN-γ were added on days 0 and 1. When the same antibodies were added later (days 2, 3 and 4), no inhibition in proliferative response was observed.

The cytotoxicity of allogenic stimulated PBL *in vitro* was assessed after 7 days of incubation against various target cells (see below) in a 4 hr^{51} Cr-release assay. Varying numbers of effector lymphocytes were admixed in microtiter plates with 3×10^3 target cells labelled with 200 μCi of $Na_2{}^{51}CrO_4$ in 0.2 ml final volume of complete medium. After incubation, the plates were centrifuged, and 0.1 ml of the supernatant was collected and counted. Data were calculated as the percentage of specific ^{51}Cr-release. Spontaneous release was determined by incubating target cells in complete medium. PBL, stimulated for 2 days with phytohemagglutinin and subsequently grown in complete medium containing interleukin-2 and K562, the NK-sensitive human myeloid leukemia line, were used as target cells. Fig. 3 shows a representative experiment on the cytotoxic response of mixed lymphocyte cultures, evaluated on PHA-stimulated PBL or on K562. The cytotoxicity of effector cells, recovered from cultures set up in the presence of human anti-IFN-γ antibodies, was strongly reduced against PHA-stimulated PBL. On the other hand, the human anti-IFN-γ antibodies had less influence on the development of cytotoxic lymphocytes to K562 cells.

Our data, therefore, show that such antibodies inhibit not only the increase of the expression of Fc receptor sites and HLA-DR antigens induced on U937 cells by the addition of rIFN-γ, but also inhibit the proliferation and development of cytolytic activity, probably by neutralizing endogenous IFN-γ. These results agree with many studies showing that endogenously produced IFN-γ is essential to the proliferation and cytotoxicity of MLC[9]. In fact, our experiments show that this lymphokine is clearly required at an early stage of response. This is consistent with a role for IFN-γ during the initial process of activation rather then as a cause of differentiation in the cytolytic function.

Human anti-IFN-γ antibodies showed only a moderate inhibitory effect on the cytolytic activity against K562 cells. Moreover, the ability of human anti-IFN-γ antibodies to suppress the activity of cytotoxic lymphocytes against K562 cells was observed to be variable. This may be due to the presence of different effector cells in PBL cultures, since endogenous IFN-γ has

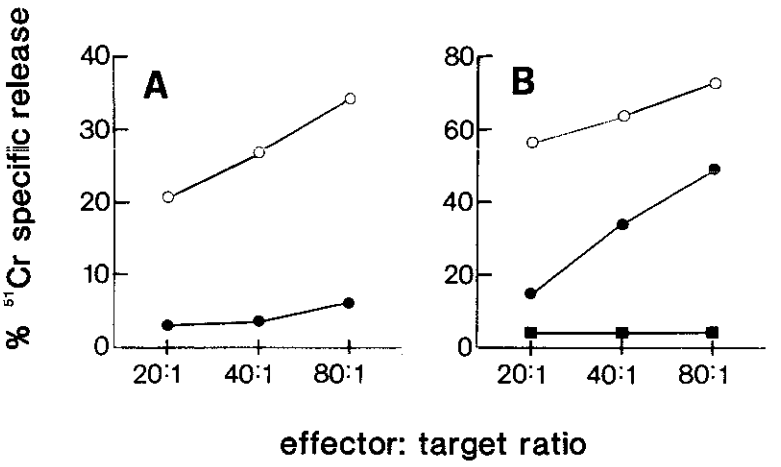

Fig. 3. Effect of human anti-IFN-γ antibodies on the development of cytotoxicity in MLC. PBL were activated in vitro with irradiated allogenic PBL. Purified human antibodies to IFN-γ (O) or unrelated purified human Ig (O) vere added, at the concentration of 4.8 μg/well, at the initiation of MLC. ( ) PBL kept with medium only. Target cells were PHA stimulated lymphocytes (A) and K562 (B).

been shown to play an important role in the activation of LAK cell precursors but not in the boosting of NK lytic activity[10].

At present it is difficult to explain why human anti-IFN-γ antibodies have no inhibitory effect on the antiviral activity of rIFN-γ. It is possible that the antiviral assay employed is insensitive or that different regions of human IFN-γ may be involved in immunomodulation and antiviral activity.

What role could these antibodies have? Probably, a positive role as a part of a regulatory idiotypic network serving to limit the intensity and duration of immune response. Other data showed that anti-IFN-γ antibodies appear to protect NZB mice against spontaneous development of autoimmune diseases. Thus, human anti-IFN-γ antibodies may be candidates for trials in connective-tissue diseases, such as systemic lupus erythematosus and rheumatoid arthritis, or chronic inflammatory diseases of the CNS, such as MS; and possibly all those diseases where activated cell-mediated immunity needs to be depressed.

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Table 3. Effect of human anti-IFN-γ antibodies added at different concentrations on allogenic induced lymphocytic proliferation (a).

Addition to culture	[^{3}H] thymidine incorporation (cpm + SD)	Inhibition (%)
Exp n 1		
Antibodies to IFN-γ (μg/ml)		
0	7202 + 422	—
4 80	216 + 64	97
2 40	4837 + 312	32.9
1 20	7485 + 453	0
0 60	7334 + 375	0
Unrelated antibodies	(μg/ml)	
4 80	7180 + 483	0 3
Exp. n 2		
Antibodies to IFN-γ	(μg/ml)	
0	6182 + 283	—
4 80	374 + 77	94
2 40	5196 + 188	16
1 20	6327 + 312	0
0 60	5986 + 507	3 2
Unrelated antibodies (μg/ml)		
4 80	6303 + 358	0

a Lymphocytes admixed with irradiated allogenic PBL, at a responder: stimulator ratio of 1:1, were incubated with medium alone or with medium containing different ratios of human antibodies to IFN-γ, or of unrelated human antibodies Proliferative response was measured on day 7 after 18 hr pulse with [^{3}H] thymidine.

FREDERICK K. GOODWIN

The Illness of the Soul: Mood Disorders and Their Biological Aspects

First of all I would like to illustrate how the study of clinical depression particularly illuminates the complexity of the mind-brain interface, and also to highlight some remarkable advances in modern medical science.

It is now clear that clinical depression or major depressive illness does reflect a disturbance in brain function, a disturbance which can seriously compromise what is most central to our *humanness* and indeed to our spirituality, which is our free will and our capacity for moral choices. This particular kind of brain dysfunction is a particularly rich way to understand the complexity of the relationship between brain as an organ, as a biological reality, and human mind as a *construct* of our entire being. Depression is a spectrum concept ranging all the way from normal depression or normal sadness through grief reactions, through what is called neurotic or reactive depressions or what we call *dysphoria* now, all the way over to severe clinical depression.

Now, the point of this is to illustrate that there isn't generally a sharp dividing line between the states of normal depression and the states of severe clinical depression. It is rather a continuum, and as you go from one end of the continuum to the other, you pick up increasing degrees of functional impairment, that is, the capacity to function in a normal way is increasingly interfered with, and the symptoms of mood and cognition become increasingly mixed with physiological disruption, that is to say, disruption in sleep, in appetite, in physical feelings, in bodily functions. Clinical depression is a disorder of the entire body, even though it is often focused on as only a mental disorder.

The mood state of disforia or dpression is the most important defining characteristic, as a diagnostic intern but in addition to the mood state, one must have a variety of physiological disruptions, such as appetite, sleep, loss of energy, psychomotor or even movement changes, loss of interest, slowed thinking; indeed the severely depressed patient can appear to be like an Alzheimer's dementia but it is a reversible kind of dementia.

In addition to the above-mentioned cluster of symptoms, one has to have a persistence of the symptoms for at least two weeks, and it must involve impaired functioning. This is a complex syndrome which would be difficult to locate in any single area of the central nervous system. It is not likely to reflect a specific lesion except perhaps if the lesion exists in areas which are specifically programmed to regulate and modulate large areas of the brain, because indeed, if you consider all the symptoms and think about brain disfunction, you have to think about virtually the entire central nervous system, so one is looking at some sites for *disregulation*.

We know that major depressive disorders are fundamentally recurrent, that is to say, if you have had one major episode, as I described, the chances of having more than one in your life are about 80 percent. The pattern of recurrance is either unipolar, which means the person has depressive episodes alternating with normal periods, and indeed, the natural history of a depression is to last anywhere from nine to twelve months, and then to spontaneously recover, except for the 15 percent of depressed people who will kill themselves by suicide while they are depressed, but the capacity for spontaneous recovery is one of the most interesting aspects of depression.

The other pattern of depressive illness is called bipolar, in which the recurrence represents an alternation between manic states, which are in many ways the opposite of depression, that is, a hyperactive, racing, euphoric, irritable state which alternates with depressive moods. This is the classic manic-depressive situation.

All major depressions can be divided into unipolar or bipolar. Bipolar is about one-third of all of them; unipolar is about two-thirds.

In our studies of the incidence of major depression, affective disorders affect about six percent of the population at any given time — this is data from the United States — but *cross-national* data indicates that that percentage is roughly the same across many nations and many different cultures. In the United States, only one out of three people who have a depressive disorder seek and get treatment. This is a form of self-stigmatization which brings us back to the question of the distinction between the impairment of a depression, a clinical depression versus the ordinary state of normal depressed mood.

The reason why only one out of three people seek treatment is most people still assume that depressive symptoms are something that they

* This lecture was transcribed from a tape recording without having been reviewed by the author.

should correct themselves or that the depressive symptoms are simply a result of their poor choices or their life circumstances, and that it is up to them to change them. This is a kind of harsh moral judgment that people make of themselves when indeed they are impaired by a brain disorder that has enough similarities to the normal free will state of *voluntariness* that people make the assumption that they should fix it themselves and not seek treatment.

I wanted to point out that we have indications now that the early onset of depression or anxiety disorders in adolescence doubles the likelihood of developing substance abuse disorder later on, so that the depressive disorders, their ability to be detected and to be treated is important for another major area of public health concern, particularly drug abuse.

If we are going to deal with this issue of major depression and its biological roots, there are a number of ways to understand the biological factors involved in these disorders, and as I said, this does not *make* these illnesses entirely biological but rather a biological vulnerability.

The first line of evidence that there is a biological vulnerability relates to genetics. It has long been noticed that depressive disorders and manic depressive illness *run in* families. The question is: is that tendency due to a genetic factor or an environmental factor? To separate thise factors one does studies of children who have been *adopted away* from their natural parents at birth and reared by a separate set of parents. One studies the difference between monozygotic and dyzogotic twins, monozygotic sharing all of their genes, dyzogotics only sharing all of their genes, dyzogotics only sharing as much as siblings, and then one does pedigree studies of large families all three of these methods, can confirm that there are powerful genetic factors operating in depression and manic-depressive illness.

The second reason we have to say that there are biological factors involved in major depression relates to the psychopharmacology revolution of the early sixties, a revolution which brought for us successful treatments for major depression, and it was the first time we were forced to acknowledge that there must be a brain disorder, because indeed, the clinical recovery that was produced by antidepressive drugs was so dramatic that it had to be assumed to be based on correcting of some brain disorder.

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The biological predisposition and the environmental factors that can trigger it are a complex interaction, and indeed, the issue of drug treatment of depression and psychotherapy of depression is a very complex interaction. What we can say is that the medications and the psychotherapy work synergistically, and their effectiveness is better when the approaches are combined. Two major classes of drugs, the *tricyclic* antidepressives and the *monominoxidase* inhibitors, were discovered in the sixties and their mechanism of action was determined to be interactive with the amino transmitters at the synapse, ultimately resulting in an increased amount of functionally effective transmitter at particularly important receptor-sites.

These two major classes of drugs have now given way to a whole variety of new antidepressant agents which are now under development, reflecting more selective attempts to interact with these important receptor systems, particularly in areas of the brain that are known to regulate mood and to regulate the integration of mood and thinking; particularly involved, of course, the norepinepbrine system, the serotoninergic systems and the dopaminergic system, but also the Gaba system and its relationship to the parts of depression which involve anxiety, so there is a variety of new agents *under development*.

The basic point is that it is now possible to successfully treat up to 85 or 90 percent of patients with major depression by using the appropriate sequence of selective medications.

Let us go back to the fundamental reality of the recurrence of this illness, because there have been many developments, of course, in the treatment of depression to produce acute recovery, but the real question is can you prevent recurrence for those patients who have the especially recurrent forms of the illness? and that is particularly important for the bipolar or manic

depressive patient. Lithium therapy represented a big breakthrough for manic depressive patients. The great majority of patients had no further episodes after the initiation of lithium therapy. There were some who did not respond very well, they had rapid cycles, but by and large, about 75 to 80 percent of these patients responded very well to this important pharmacological agent developed, like all of the others, from animal studies.

Another important question is the interaction between biological vulnerability and environment.

This reminds us that the relationship between environmental stresses or psychological stress and the onset of illness is complicated. It is not an all or nothing consideration. Emile Kraplin many years ago described that environmental stresses were more important in the beginning of the illness and became less and less important as the illness developed, and this is an illustration of that principle which has now been confirmed by controlled studies. Often environmental stresses, psychological stresses can precipitate initial mild episodes and gradually as time goes on the episodes may get more serious and closer together, and finally a point arrives where the illness seems to become autonomous and requires no further precipitation to produce episodes. An entirely autonomous or endogenous process thus appears. Now, how can that happen? What mechanisms are there for that?

Robert Post at the National Institute of Mental Healt reasoned that perhaps it had to do with the central nervous system process called kindling. In kindling, if you give a stimulus to the limbic part of the brain (the part of the brain that controls so much of our emotional life), and if you repeat that stimulus over time, you will gradually get a more exaggerated response with each repetition, even though the intensity of the stimulus does not increase, and eventually you can reach a point where the brain will go into a spontaneous seizure even in the absence of any stimulation at all.

Now, this is not an epileptic seizure that you would see as if the activity were in the motor cortex, but it is indeed a seizure, a limbic seizure, which effects itself in a kind of behavioral convulsion. Dr. Post reasoned that perhaps this kindling process was analogous to what happened in some forms of manic depressive illness where repeated stresses are required gradually produce a more severe reaction, until finally no more stresses are needed, and the illness goes on autonomously.

He also showed that the anticonvulsant drug, carabamazepine, could prevent kindling. He then reasoned that perhaps this anticonvulsant drug might be useful in those patients who had this rapid cycling form of manic depressive illness.

And indeed, carbamazepine in controlled trials has been shown to be very helpful in about 65 percent of rapid cycling manic depressive patients who do not do well on lithium, because lithium does not prevent this particular mechanism that we call kindling.

One way we might use that knowledge of kindling tied in with current work on genetics is that if you could identify a genetic marker for those people who were going to become manic depressive, you might try to introduce medications earlier in their adolescence to prevent the ability of stresses to activate the illness. We know from animal studies that the kindling — mechanism is highly effective in young animals,, and as they get older they become less vulnerable to being affected by kindling; therefore, we might protect the young persons who are going to develop manic depressive illness by putting them on medication even before their first symptom of course, this would not be ethical to do unless we are fairly certain that a person is going to develop the illness. That is why it is so important to develop genetic markers so that we can explore this kind of prevention effort.

Some new evidence points to the fact that the recurrent stresses may be produced by drugs or severe alcoholism. The reason that I have speculated about this is that if you look at the cocaine epidemic in the United States, it parallels a sharp and alarming decline in the age of onset of manic depressive illness. That is, manic depressive illness is beginning to occur in younger and younger people in the United States, and one possibility for that

would be that the increasing availability of drugs like cocaine that may activate the brain in a way similar to kindling and may produce, may active the vulnerability at a younger and younger age.

I would like to close with a few thouths about suicide, because here you come right up against the issue of morality and human responsibility.

The point here is that biological factors do play an important role in suicide

Fifteen percent of all patients with depressiondie by suicide. Sixty to 80 percent of suicides have a depressive disorder, and if you have an aggressive, impulsive personality trait combined with a depressive disorder, you are very likely to have a high risk for suicide.

We have shown in a number of studies, many investigators have shown that this particular impulsive, aggressive personality trait relates to changes in the brain serotonin system, one of the transmitters which has on inhibitory role, and people with low levels of serotonin function in their brain, who also happen to be depressed, are at much higher risk of suicide than those without, so here you have two biological conditions, one relating to a personality trait, one relating to an illness, both of which can combine to increase the risk of a behavior which is clearly showing reduced *voluntariness*.

So what I have tried to illustrate is that depressive disorders are indeed a combination of biological and psychological factors and I would like to close by quoting the Holy Father at a recent scientific meeting here in Rome. He said that our moral choices must be as informed as possible, and therefore, the pursuit of knowledge, the unlocking of the mysteries of nature indeed is *in the service* of our moral selves and can be said to be truly God's work.

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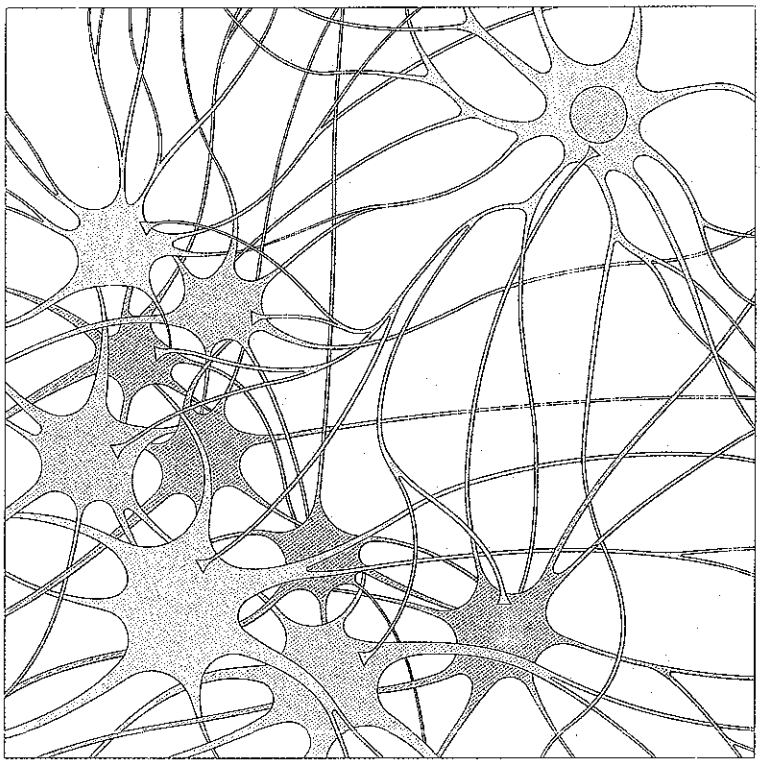


HERBERT D. KLEBER

Reducing the Demand for Drugs

Frustrated by the escalating cocaine epidemic, and the lack of a coordinated federal and national effort to fight it, the U. S. Congress created the Office of National Drug Control Policy in 1988. That office, under the direction of "drug czar" William J. Bennett, is unprecedented in the history of our government. Never before has a cabinet-level position been created for the purpose of coordinating all federal efforts focused on a single goal: reducing illegal drug use.

The legislation mandated that a national strategy to combat drugs be presented six months after the confirmation of the Director, and every February thereafter.

The Office of National Drug Control Policy is, by law, organized under a Director, Dr. William J. Bennett; a Deputy Director for Demand Reduction, myself; a Deputy Director for Supply Reduction; and an Associate Director for State and Local Affairs.

As the Deputy Director for Demand Reduction, I am charged with overseeing that portion of the National Strategy that is concerned with our Nation's prevention and treatment efforts. In addition to developing policy in these areas, my office chairs the Demand Reduction Working Group, made up of high-level representatives from the nineteen federal agencies involved in demand reduction activities. The purpose of this working group is to ensure that all Federal efforts to reduce the demand for drugs work in concert with each other, and within the guidelines of the National Strategy.

Our National Strategy is a *national* strategy, not just a *federal* strategy. It is not just a blueprint of what the federal government can do about the drug problem. Rather, it is national in the sense that we know the only way we're going to win the fight against drugs is to involve all key segments of the country — state and local governments, families, neighborhoods, houses of faith, schools, law enforcement, parents groups, and other voluntary associations.

Unlike previous "drug wars," the strategy is a comprehensive approach to fight drugs on all fronts. Rather than relying on treatment and prevention only, or interdiction and law enforcement only, we assert that the only way we will make real progress is by doing much more in all of these areas.

The drug effort is often cast into two categories; reducing demand and reducing supply. And in fact, the Office of National Drug Control Policy is, by law, organized according to these categories. But it is very clear that the two are not so distinct, and do interact in many ways.

It is much harder to do treatment and prevention activities when drugs are readily available in the community — when there is not law and order in the streets. Producing countries say that demand is driving the supply, and that if we would just quit using so much cocaine, there wouldn't be such an abundance of it coming across our borders. This is true, but it is just as true that supply drives and creates demand. In Hawaii we are now seeing the emergence of a new drug, ice — smokable methamphetamine. There has not been demand for it. No one in Hawaii has been saying, "We need a new smokable stimulant." Rather, demand is being created by the creation of a supply. So, it's clear that supply can create demand — the two are very linked. And in order to beat drugs, we must fight them on all fronts.

Americans now believe that drugs are our number one problem. Three out of four Americans say they have been touched in some way personally by drugs. That is an incredible statistic, but it suggests that we, as a country, now believe this to be a crucial issue that we must do something about. To reduce demand for drugs, there are three points of attack: treatment, prevention and research. Of course, research cuts across the other two points. Federal funding for drug treatment, prevention, and research has increased nearly 75% since 1989, to nearly $3 billion dollars.

In our prevention strategy, we say that the carrier — the vector — of this disease is the casual drug user, not the addict. The addict is not the role model; nobody wants to be the falling-down drunk or the burned-out addict who has lost his health, possessions, and family. The role model is the person who is using drugs at work and at school, who sends the message by his behavior that you can have it all, that you can enjoy the pleasurable effects of drugs and still keep your health, your possessions, your family, and your job. That's how most people start on drugs — they do not buy drugs the first time. Rather, they are often given drugs by friends or acquaintances at school, at work, at parties, or by older siblings. One of the things we must do in prevention is target these casual users, and deter those who have never used drugs from ever starting.

As a result, one of the foundations of our National Strategy is *user accountability*, which means holding both "casual" and "heavy" drug users accountable for their drug use. User accountability laws and policies provide clear consequences for possession or use of illegal drugs. For example, the U.S. Department of Transportation and state agencies hold users accountable through the suspension of drivers' licenses, pilots' licenses, and drug testing of bus drivers, train engineers, etc. State licensing agencies hold professionals such as doctors, lawyers, and real estate agents accountable by suspension or revocation of licenses for drug use. Public housing projects and neighborhood block coalitions have turned "free-drug zones" into "drug-free zones" by evicting and forcing out drug users, and by establishing resident patrols to enforce no-use policies.

What's more, since both children and adults spend most of their time either at school or at work, respectively, school and workplace policies and procedures have been developed to deter drug use. President Bush proposed, and Congress passed, legislation that requires all schools, including colleges and universities, to have clearly articulated and enforced no-use policies in order to receive any kind of federal funding. Some school districts have adopted a policy stipulating that the first time a student is caught using drugs, parents are notified and the student is suspended. If caught a second time, or if ever caught distributing drugs, students are expelled and sent to alternative schools.

Likewise, businesses, through clear policies, supervisor and employee training, and drug testing, hold employees accountable by imposing drug treatment or possible termination of employment upon discovery of drug use. And law enforcement programs like "Do drugs, do time" in Phoenix, Arizona, give those arrested for simple use or possession of illegal drugs a choice: pay a fine and undergo treatment or serve time in jail.

User accountability measures like the few I have just mentioned are innovative means by which Americans are reducing drug use. However, efforts to compel current users to give up drugs is only one part of our prevention strategy. Education has an important role in preventing drug use as well.

Schools need to implement drug education in an effective way. Education is only one part of the prevention activities that need to be aimed at children. While education may be a *necessary* part of prevention, it is clearly not *sufficient*. What is needed is a comprehensive approach to prevention that includes the family, the faith community, the workplace, service groups and the media, in conjunction with education. There is a growing consensus that merely providing information about drugs doesn't work. Knowledge is the solution only so far as ignorance is the problem. And ignorance is often not the problem. So a number of schools are adopting different approaches. The most promising is often called "refusal skills training," or "resistance training." It grew out of previous efforts to teach kids how to say "no" to smoking. Resistance training works because it correctly recognizes the enormous role peer pressure plays in influencing decisions to try drugs.

We also need to segment drug

education, since the approach for some is not the best approach for others. One approach to segmentation is to conceptualize four groups: high-risk and low-risk youngsters growing up in high-crime or low-crime areas. A different kind of prevention program is needed for the high-risk youngsters in the high-crime areas as opposed to the high-risk youngsters in the low-crime areas. This latter group is often comprised of the children of alcoholics, children from dysfunctional families, and those with psychological problems. These are the majority of drug users, not the high-risk youngsters in the high-crime areas, but the high-risk youngsters in the low-crime areas. Both of these groups need different strategies as compared to low-risk youngsters in low-risk areas, for whom a "just-say-no" method with appropriate resistance strategies may be quite sufficient. The country needs not just more drug education, but we need to develop different ways of going about it and targeting it most effectively. Drug abuse can stem from both physical poverty and spiritual poverty.

At the same time, schools need to develop clear and firm policies regarding drug use. If you combine effective drug education with firm and unambiguous policies, the outcome is much better than with just one or the other alone.

Our institutions of higher learning need to adopt the same approach. We should not tolerate institutions, dedicated to the life of the mind, that do not have or enforce anti-drug policies and look the other way. They have an important obligation to do more. Drug use is as inconsistent with scholarly endeavor as plagiarism, even more so. It extols present over future gratification. It also interferes with learning.

For adults, the principle target area for prevention is the workplace. We believe that U.S. employers should have drug-free workplace policies, including, where appropriate, drug testing, supervisor training, and employee assistance programs. We have learned that those who know whether an employee is using drugs are more likely co-workers, not supervisors. Whether a co-worker puts pressure on a drug-using employee to get

help, or reports the user to an employee assistance program, is a function of what the co-worker thinks will happen. If the drug user will be immediately fired, a co-worker will not likely report drug use. A comrade is a comrade. But a co-worker is much more likely to report drug use by an employee, however, if he thinks the user will receive treatment. Getting the drug user into treatment helps not only the drug user, but helps all employees, since drugs on the job make work more dangerous for everyone. Again, firm policies are needed, but rehabilitation programs are just as important so that individuals can get help.

Employee assistance programs can be very effective. A number of such programs have been studied, and they commonly show a success rate for drug and alcohol problems in excess of 65%. They are cost-effective for large employers, and it is a humane way of approaching the problem as well. Drug-free workplaces are an important part of our policy — it is an important place for early intervention with the person who is already an addict, and a crucial place to hold the casual user accountable for his use.

Ultimately, though, we feel that the fight will be won at the community level. All segments of the community need to be involved: the parents, educators, law enforcement and health professionals, service clubs, businesses, and government officials — entire communities must organize and work together to fight drugs. The U.S. Government's role is, of course, limited in terms of what needs to happen within communities. However, there are some ways we hope to help.

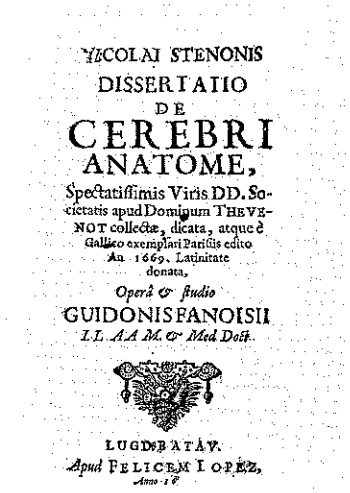
The Robert Wood Johnson Foundation sponsored a $26 million project in which communities between 100,000 and 250,000 had the opportunity to get up to $3 million for community-organized efforts to combat drug use. Although only eight communities will eventually get the $3 million, over 700 indicated some interest in applying, 300 of these organized themselves enough to send in the demanding application. Among the 292 who will not get the grants, I'm sure there are many quite deserving of support. The U. S. Department of Health and Human Services will devote $50 million this year, and over $100 million in 1991 for community coalition-building efforts.

We are also developing a national volunteer program which we conceptualize as a public/private partnership. The government would pay for training individuals who could then go back to their communities as volunteer leaders who could coordinate the development of parent groups, the role of our religious institutions, service groups, etc. What has been found to work in one community could be put to work in others without having each community reinvent the wheel. Since communities differ, there would need to be a variety of options available. There are a number of private groups already raising money to support community volunteer efforts, to pay for the training, innovative programs, outreach, etc.

In regard to treatment, we have to do two things simultaneously: we must increase treatment capacity to get rid of long waiting lists, so that people who need it can get treatment; and we must markedly improve the treatment system.

Unfortunately, what kind of treatment you get is determined quite often by what door you knock on, and that is not a good way to spend resources. Scientific studies done by a number of people strongly suggest that some treatments are better for some types of addicts than others. There is no one treatment for drug addiction. Anyone who tells you there is either deludes himself or is trying to delude you. I've been in this field for over twenty-five years now. It is clear to me that addiction is a final common pathway with many roads to get to it, and no single way to climb out of it. There are a variety of treatment methods, all of which can be successful if you pair the right person with the right treatment.

To address this problem, what is needed, especially in urban areas, are centralized screening and referral facilities to evaluate the addict and determine if the person belongs in a therapeutic community, an outpatient facility, a methadone program, or a residential facility. We need evaluation because addicts are very different. Some use one drug, most use two or more. Some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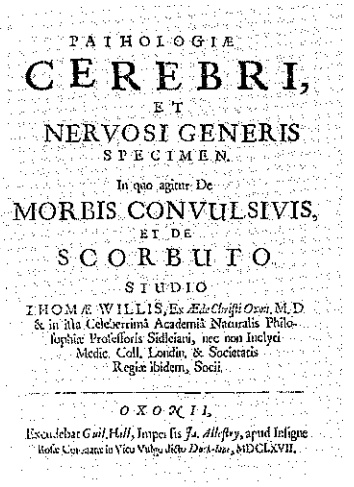
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CEREBRI,
ET
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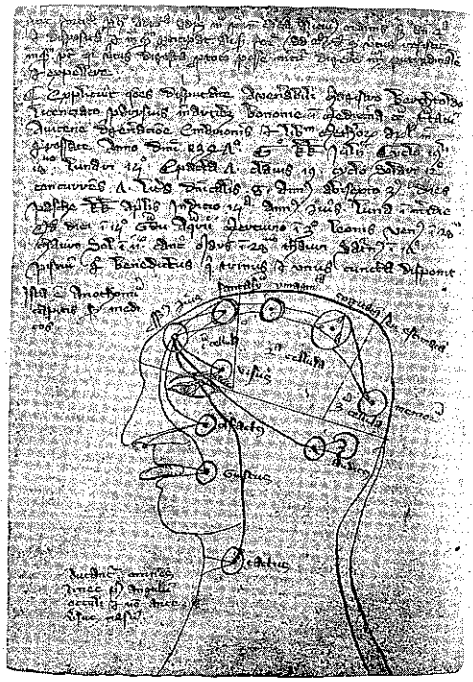
have major psychiatric problems, others only have minor psychological issues. Some need rehabilitation. These people can often be successful in treatment since, if you can get them off drugs, they have something to go back to.

But many of our citizens need "habilitation" — there is no "re" to go back to. If you want to help them stay off drugs they need to be given vocational tools, interpersonal skills, etc. In short, something to give meaning and reward to their lives so that when they stop using drugs there is something else they can do.

We want to be sure that the states are held accountable by the federal government in terms of determining treatment needs and making sure that the money is targeted appropriately. At the same time, we feel that treatment programs need to be accountable for their own success to the states and federal government. A recent study in the U.S. of six programs indicated that in Program A, 90% of the patients were no longer using illegal drugs, while in Program F only 45% were no longer using illegal drugs. We say in our strategy that the Program F's of this world should get assistance to improve their performance; if they can't improve, then resources should be taken away from them and given to another program that can. Of course, we must do that carefully to make sure that you take into account the difficulties of the patients being treated. There are tools to do that, to avoid penalizing programs that start with a more problematic population.



So, we need program accountability, we need trained staff, we need sites. No matter how much money we or the states put into the treatment of drug abuse, if we can't find a place to treat addicts, it won't do much good. Clearly, it is one of the major problems in the country. Even our former First Lady, Nancy Reagan, was unable to open a therapeutic community in California because of opposition from the community. We need research into better treatment methods, especially for cocaine, more trained staff, better data systems, and better surveys of drug use. Our goals are to markedly increase and improve the treatment system. Treatment does work, but not as often or as well as we would like. However, it is not adequate for winning a war on drugs. Treatment is taking care of the casualties. No war I know of was ever won by simply taking care of the casualties. We need to do it — it is the humane thing to do, it's important for the sake of the individuals and their families, it's important to decrease the social costs attendant upon addiction.

It is very clear to me that this is a fight we can win. We can dramatically reduce the drug problem. Some people don't like the war analogy, but it is a war, and we must be resolved to win it over time. We must avoid quick fix thinking. The fight against drugs will not be won painlessly *or* quickly. Winning the war will require time and much effort.

We can win the fight, and we needn't surrender to the counsels of despair. Treatment works, prevention works. Casual drug use has dramatically dropped since 1985, despite an ever-increasing supply of drugs. There is now evidence that the rate of heavy drug use has stabilized and begun to drop in some areas. However, the world is awash in cocaine and heroin — now is not the time for any country to lower its guard against the abiding threat of a new drug epidemic.

HERBERT D. KLEBER, M.D.
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RENZO CANESTRARI

The Roots of Violence

1. Theoretical Premises

In many research contexts, "violence" is a synonym for "aggressiveness." Though there is no complete correspondence between the two notions, in very approximate terms the former may be taken to be the behavioral correlate of the latter. It is, therefore, plausible for theoretical definitions to concern "aggressiveness" in particular, whereas characterizations (or, rather, operational definitions) involve "violence," above all. Violence in fact lends itself especially to observations in a naturalistic sphere — that is, in animal and, above all, human societies — made according to typologies derived, however, from experimental models of "aggressiveness."

The usefulness of keeping definitions and characterizations separate, in the aforementioned sense, becomes evident in interpreting the phenomena which concern violence and aggressiveness in man. Research on man, indeed, establishes insurmountable limits, both ethically (research must not be injurious to the experimental subject's physical, emotional, and relational integrity) and cognitively. In this last regard, the experimental or observational situation must appear credible to avoid refusals to respond or distorted responses if the subject glimpses the real objective of research: deception is a very frequent condition in social psychology experiments, precisely because the human subject pictures for himself mentally the task to be performed and may thus come to intuit the objective of the situation and, therefore, regulate himself accordingly, independently of the orders given him by the researcher.

We can comprehend how hard it is to identify experimental models suitable for studying relevant variables to explain the phenomena of human violence, with the continuous obligation to pay attention to ethical limits (which are rightfully insurmountable: let us recall the reserve prompted in the early nineteen-seventies by the experiments of Zimbardo at Stanford University on depersonalization — or, rather, on disinhibition of aggressiveness under conditions of potential aggressors' anonymity in relation to victims) and, at the same time, having to make experimental situations reproduce at least some essential features of real ones — i.e., those in which the phenomena of violence take place.

This premise is indispensable to justify the apparent complexity (in fact, ingenuity) of numerous situations in social psychology constructed around an experimental paradigm — that of the "aggression machine" (Buss, 1961) — which has shown itself to be extremely pliable to analyze the variables influencing the course of violent behavior.

We shall dwell here particularly upon two applications of the aforementioned paradigm, relating to the effects on aggressiveness of the presence of instruments culturally assigned to violence (such as firearms) and of erotic stimuli (as a presupposition for sexual violence, if not for violence *tout court*).

It is easy to find behavioral correlates in everyday life (indeed, it is precisely these which create a situation of social alarm whereby experimental research takes on relevance, if not its very impetus) for the data relating to both effects observed experimentally, such as the crimes committed with firearms and sexual violence (especially rape).

There is generally a lot of insistence — even by the least scandal-oriented mass media — on the fact that the crimes denounced, of one kind or the other, constitute the classical tip of the iceberg — that is, they are underestimates with respect to the real extent of such phenomena. Some characteristics, however, are almost never brought out which make these phenomena appear less exceptional and psychopathological than they are usually thought to be, but, for this very reason, more disturbing. In particular, the range of the potentially violent seems to be much broader than is generally believed, in view of both attempts on personal safety (homicides and attempted homicides) and sexual violence. As for the former, the statistics of the nineteen-seventies already showed that about 75% of violent crimes with the use of firearms (that is, homicides and attempted homicides) took place not between strangers (e.g., raper/rape victim), but between acquaintances and family members. This at once calls our attention to the fact that premeditation is certainly not the preeminent cause of these crimes as much as is the concurrence of "occasional" situational factors, with the addition of the presence of firearms, which renders manifestations of anger or fear fatal.

In the same way, research on *rape proclivity* conducted over the past ten years by Malamuth (cf. Castelli's report, 1990) has shown that there is a very widespread propensity towards rape in conditions

of security (i.e., guaranteed impunity), of unsuspected dimensions in young adults (including university students), with cultural characteristics (in the sense of stereotypes of the male role) quite similar to those of the authors of the crime of rape (so-called *sex offenders*). This proximity, which is extremely disturbing, makes it seem urgent to establish what makes the potential sex offender an actual one. Situations and environmental circumstances are again suspected to be the elements stirring up this type of violence as well; it thus seems quite appropriate to identify the most dangerous situational characteristics.

Awareness of the relevance of situational (or contextual) factors to the violent act makes knowledge of the data obtained in laboratory situations (with the ethical and cognitive restraints referred to) not only theoretically stimulating, but also socially important. Such situations are only apparently abstract: they in fact allow us to study the role certain stimuli (alone or in interaction) may play in inciting aggressive behavior.

2. Buss' Experimental Paradigm

We shall now analyze, as announced, the behavioral correlates of one of the typical experimental situations for the study of human aggressiveness, Buss' "aggression-machine" (1961), to bring out the implications for understanding the interpersonal and intrapersonal dynamics at the root of some violent behavior in everyday life — i.e., crimes committed with firearms and sexual crimes.

Buss' machine constitutes a very simple apparatus from a technological standpoint, but is exceptionally pliable experimentally. Its greatest notoriety was due to the studies conducted in the early nineteen-sixties at Yale University by the Milgram group (1964), which led to identifying the extent of aggressiveness rationalized as the execution of orders transmitted by a higher authority, so-called "destructive obedience." The experimental apparatus was — and is, with slight variations — the following.

The "victim" is placed in a room (or, rather, a subject playing the role of the student in a learning task; he is connected to the cables of an instrument located in another room which delivers electrical shocks of varying intensity according to its switches. The machine obviously does not transmit any electrical shock, but is built so as to render the experimental situation credible, and the victim is a "collaborator" of the researcher, who performs the tasks according to an agreed-upon plan and simulates pain reactions (with grimaces, cries, and contorsions) when the real experimental subject, who thinks he is alone, cooperating in an experiment relating to the influence of punishment on learning, flicks one of the switches. In addition, the victim has the chance to control (through a system of warning lights not visible to the experimental subject even when the two rooms are connected not only by an intercom, but by a one-way mirror) both the moment at which the switch is flicked and the intensity of the shock which ought to be delivered. This allows us to make the reactions plausible, convincing the experimental subject more and more that he is engaged in a test wherein the victim may be harmed.

The task assigned to the experimental subject is that of delivering electrical shocks, whose intensity progressively increases with the successive errors made by the victim in carrying out a learning test. On the apparatus over the switches there is an indication of the intensity of the current that can be delivered. For example, the first switch can deliver a shock of 15 volts, the second, of 30, the fourth, of 45, and so on, up to a maximum of 450 or 600 volts (that is, with 30 or 40 switches). It is clear that if the victim (intentionally) makes a number of mistakes, he comes to receive shocks which are potentially dangerous.

In the course of the experiment, the subject, on account of the considerable number of mistakes made by the victim, is faced with a grievous dilemma: to continue to "punish" the victim with (apparently) increasingly painful shocks, with the risk of producing lesions, or refuse to go on with the experiment, in fact blocking it.

It should be noted that in early experiments Milgram used workers and employees as subjects (from twenty to fifty years of age), not students, all volunteers, recruited through newspaper advertisements; marked resistance to continuing the experiment by inflicting dangerous electrical shocks on another individual was to be expected. In reality, over 50% of the subjects proved obedient, going on to the end of the experiment. In spite of the protests, they went on "punishing" the victim for the mistakes made.

The uncertainties of subjects were overcome by the experimenter (often not even present for the crucial part of the sitting), with increasingly severe remarks (direct or by intercom) and invitations, expressed in ever more authoritarian tones, to go on so as not to damage the experiment. Since the experimenter's insistence alone sufficed — though he in fact lacked a means to impose his will — to prompt obedience to his orders by even the most uncertain subjects, it must be inferred that, if the context presents the right conditions, even an authority figure with reduced (or utterly nonexistent) powers can manage to impose unwanted behavior, inducing subjects to carry out harmful or anti-social actions which were unthinkable before the

orders and outside such an oppressive context as is the experimental one, precisely because it is excessively simplified from a relational standpoint.

Milgram later showed that even when adopting samples of university students (and, therefore, of culturally more sophisticated people) the behavior willed by the experimenter was reproduced, in proportions quite similar to those of the less cultivated and homogeneous subjects, in anagraphical terms, of the initial research. He could thus infer that objectively violent behavior (in some experiments subjects had to place victims' hands directly upon a grille they thought was electrified!) could be induced through obedience to the orders of an authority figure.

The most disturbing message in these experiments is that such a figure does not coincide necessarily with a psychopath or a despot (as some literature on the authoritarian personality had involuntarily convinced us rather than demonstrated: Adorno et al., 1949), but may coincide with any individual who in interpersonal relations (in a small group situation, then) plays an at least apparent role of power and does so with conviction.

Later research has shown that the frequency of aggressive behavior characterized by destructive obedience varies in relation to diverse situational factors, such as the degree of frustration previously undergone by the experimental subject (through the action of the researcher or the victim himself, in the preliminary phases of the experiment), the degree of competition induced between the victim and the experimental subject, the number of experimental subjects (the presence of several subjects reinforces aggressive responses), and the presence of aggressive "cues." The latter are particularly interesting, inasmuch as they show that among situational factors there are also nonpersonal, nonrelational components which are linked to situational stimuli (either current or in the immediate past), whose action has a disinhibiting or inhibiting effect on aggressiveness.

3. The Weapons Effect

In carrying further Buss' experimental model, Berkowitz and Le Page (1967) attempted to verify the hypothesis of violence due to impulsive aggressiveness (which is a variant of the better known and more general hypothesis of Dollard and Miller concerning aggressiveness as a response to a previous frustration), according to which objects and individuals may take on meaning as "aggression stimuli" if repeatedly associated with an increase in anger and the observation of violent episodes; once this meaning is acquired, their presence in the subject's field of attention may suffice to make him "release" aggressive responses, as happens with other conditioned stimuli.

Berkowitz and Le Page took up Milgram's situation, but organized it so that the victim-subject would first have some kind of interaction (provocative and thus frustrating, or formal and relaxed) with the experimental subject. It was already known, from prior experiments, that the subject reacted, in the case of a frustration preceding the experiment, with greater aggressiveness (i.e., he delivered electrical shocks of greater intensity and presented fewer doubts about the appropriateness of continuing the experiment, even when the victim pretended to be suffering). The crucial variant in this experiment was constituted by the presence of a rifle or a pistol that was plainly visible (on a table near the machine delivering electrical shocks) for some subjects, whereas for others there were no weapons in the field of attention.

The behavior of the subjects exposed to weapons revealed the existence of a significant effect (known as "weapons effect") deriving from the interaction between *frustration and the presence of weapons*: the subjects who had undergone frustrations punished victims' mistakes with a higher number of shocks when there were weapons, as compared to when there were none in sight. Nonfrustrated subjects, on the other hand, did not show variations in their responses according to the presence or absence of weapons.

Later research has led — though not always — to results largely confirming the existence of the *weapons effect*, the interpretation of which appears, however, more complex than was initially assumed.

Leyens and Parke (1973), for instance, saw that the effect is produced even if real arms are not presented, but only slides of weapons (as compared to slides with a neutral content, such as flowers or furniture). Analogous results were obtained by Page and O'Neal (1977). Fischer et al. (1969) found an increase in aggressive responses only in male subjects exposed to different types of knives (jack-knife, kitchen knife, engraving knife), after having been previously frustrated. Frustrated females, on the other hand, revealed themselves to be more aggressive when neutral figures were presented. This suggested that aggressive "cues," such as weapons, might also have an inhibitory function regarding aggressiveness, inasmuch as they are perceived as a direct expression of aggressiveness and, therefore, markedly produce anxiety.

Diverse experiments in the nineteen-seventies confirmed that aggressive cues such as arms (or substitutes) may indeed have both a provocative and an inhibitory function in relation to aggressiveness. What determines the direction of the effect seems to be factors like the "degree of sophistication"

(i.e., the subject's awareness of the limits of the experimental situation) and the " apprehensiveness " prompted by the task. The more sophisticated or anxious subjects are (e.g., as a result of having taken part in similar experiments or doubting whether they are capable of performing their task properly), the more the presence of weapons has an inhibitory effect on aggressive responses (Page and Scheidt, 1971; Ellis et al., 1971; Page and O'Neal, 1977).

The interpretation of the " weapons effect " has not been univocal. Alongside researchers like Berkowitz (1971, 1974), for whom the disinhibitory effect of arms *in certain circumstances* as aggressive " cues " ought to be regarded as a sufficient reason for restrictive policy in granting permits to bear firearms (for a discussion, see De Fazio et al., 1981), there have been others (such as Zillman, 1974) who have manifested perplexity about the quantitative extent of the effect, inasmuch as both frustration and imitation (i.e., subjects' prior exposure to behavior similar to that which they are to adopt) explain a greater proportion of interindividual variance than the presence or absence of firearms.

In spite of these reserves, Baron's considerations (1978) are probably still valid; according to him, it is not so crucial to establish what the factor is which mainly determines the presence of aggressive responses as it is to establish the possibility of obtaining even more aggressive responses in the presence of " cues " such as weapons (in conditions like those described). If this point of view is accepted, it can be agreed that to regard aggressiveness as determined more by situational factors (or those external to the individual, such as " cues " or interactions with others) than by motivational or personality factors (internal ones) presents an undoubted advantage, that of being able to adopt measures or strategies to limit the presence of such " cues " or increase awareness of their aggressive meaning, thereby raising their inhibitory threshold.

Data show this is not a trivial interpretation. In Browning's findings (1977), already cited, about 72% of homicides and attempted homicides take place in the wake of wrangles between acquaintances or family members and are performed by persons not belonging to the underworld. To avert an unforeseen fatal outcome in interactions involving people who are not professedly very hostile, the possible importance of an increase — even if only limited — in the inhibitory value of the weapon as an aggressive " cue " or its removal from interacting individuals' field of attention is evident. And there is no doubt that attention extends as well to the objects contained in one's pocket or holster!

4. Erotic Stimuli and Aggressiveness

The other kind of aggressive cue to be taken into consideration involves erotic stimuli. It is hardly necessary to recall that the mass media frequently associate an increase in erotic stimuli (especially in the liberalization of behavior or the introduction of hardcore magazines and shows) with the spread of sexual crimes (basically actual or attempted physical violence directed against isolated women). Some researchers (Eysenck, 1978; Castelli, 1990) have called attention to the presence of methodological mistakes — including gross blunders — in argumentation in favor of the aforementioned thesis. It would be more appropriate — as well as scientifically better grounded — to consider closely the laboratory data and psychometric findings on those committing sexual crimes ("sex offenders "), which show that in certain circumstances the temptation to force a woman's will becomes hard to resist.

The situational factors assumed at the root of this behavior have been carefully checked, and the experimental model of the Buss machine has continued to be adopted. In this case, the victim is always a woman, and the laboratory situation foresees as variables the presentation to the experimental subject (obviously male, if not in control conditions) of materials with differential erotic connotations (e.g., photographs with artistic nudes of the *Playboy* variety, or decidedly pornographic photos, in addition to neutral photos of women dressed elegantly). The basic hypothesis is that arousal induced by the sight of a nude, as aspecific, can be changed into aggressiveness (Transfer Arousal Hypothesis), being transferred to other targets present in the subject's field of attention.

The enormous amount of research carried out has shown that the presence of erotic stimuli may have not only a facilitating, but also an inhibitory function with respect to aggressiveness. Zillman (1971) found that subjects who were at once aroused by the sight of erotic material and frustrated by the victim (e.g., by a negative evaluation or an insult) showed more aggressive behavior than subjects who were only frustrated, only aroused, or control subjects (i.e., neither aroused nor frustrated). This indication was long regarded as conclusive, inasmuch as the situation would seem to reproduce the characteristics of both the victim and the context usually assumed to be present in sexual crimes (an erotic stimulus which arouses, like a risqué show, a woman — whether provocative or not — who rejects the offers and thus frustrates the aroused individual, and, consequently, the aggressive response

in the form of attempted violence)

The effect in question is seen to depend largely, however, on different situational factors; the main ones are the following:

a) the quality of the erotic stimulus. The artistic nude inhibits aggressive responses, whereas the pornographic one increases them (Baron, 1974);

b) the order of presentation of erotic material in relation to possible provocation; the erotic material presented before provocation increase aggressive responses, whereas if presented afterwards it inhibits them (Donnerstein et al., 1975);

c) the time interval separating the presentation of the erotic stimulus and the moment of aggressive response; the latter is more intense if delayed; this somewhat goes against the expectations of common sense (Jaffe, 1975);

d) the climate (permissive or nonpermissive) in which the erotic stimulus presents itself; if the stimulus is erotic-aggressive and female reactions involve disgust at the violence suffered, there is inhibition of aggressive responses, whereas if the atmosphere of the stimulus is licentious or the female reaction involves indulgence or open satisfaction, then the aggressive response is intensified (Donnerstein and Berkowitz, 1981).

As we see, the erotic stimulus may have an inhibitory or facilitating function regarding aggressiveness according to numerous combinations of situational or concomitant factors; the equation between " erotic stimulus " and " increase in aggressiveness " therefore appears to be markedly reductive

This seems to be all the truer if we consider that some experiments by Malamuth (1981, 1984, 1986) have shown that certain individuals, in any event, have more aggressive reactions even when the reaction of the female protagonist in the material-stimulus involves disgust. Indicators of physiological activation (like the degree of erection) and of cognitive evaluation (like the degree of arousal estimated through subjective measures) confirm this relative anomaly. The leading theoretical interest in this (not insignificant) sample of the adult male population concerns the fact that an anomalous pattern of sexual arousal coupled with an increase in aggressiveness was later found by Malamuth in subjects convicted for or suspected of having committed sexual crimes.

In seeking to get some independent indicators from such behavior manifest in the experimental situation — and, of course, being unable to submit the potential authors of sexual crimes to a screening of this kind! — Malamuth worked out diverse scales to measure " rape proclivity " — i.e., the set of attitudes, opinions, and (negative) values which make committing sexual violence appear desirable.

Surprisingly, it thus turned out that the subjects with a " rape index " similar to that of sex offenders are much more widespread than was foreseen (about a third of the young male population interviewed, partly university students); b) most of the subjects with a high rape index in answers to a questionnaire admit they would be willing to commit an act of carnal violence (perceived, of course, reductively — i.e., as only an initial forcing of the potential victim's will) if conditions were favorable (that is, anonymity in regard to the victim, sufficient isolation to ensure impunity, and, last but not least, a high level of attractiveness in the victim).

5. Conclusions

Psychometric research (effected with tests and questionnaires) by Malamuth's group identified in some cognitive elements the predisposing factors (which must be rigorously distinguished from those triggering violence, of a situational variety, seen in the preceding paragraph) for sexual violence. Such factors are essentially attitudes favorable towards accepting violence in the sphere of interpersonal relations, the conviction that relations between individuals of the two sexes are by nature based on antagonism and opposition, and an attitude of generalized hostility towards women (Malamuth and Check, 1985).

The question as to whether stimuli provided by pornographic materials actively contribute to the formation and maintenance of attitudes favorable towards sexual violence or whether previously formed attitudes instead predispose people at one and the same time towards the use of pornographic materials and possible sexual violence remains unresolved (for obvious ethical reasons, since we cannot experimentally check the long-term effects on attitudes produced by exposure to stimuli wherein sexual violence shows the victim as debased and in some sense " punished "). The data deducible from research on short-term effects (ethically acceptable, inasmuch as they can be disactivated by the " debriefing " to which subjects are submitted at the end of the experiment) tend to confirm the hypothesis that erotic material acts as a primer (Wier *et al.*, 1985).

A rigorous evaluation of the knowledge acquired up to now cannot fail to mention the still unanswered questions in the domain of psychosocial theories of violence (in the form of lesions, rape, or other aggressive behavior manifestations). Nevertheless, the prudence which must also accompany this evaluation cannot diminish either the theoretical relevance of the influence — demonstrated by experiments recalled in paragraphs 2, 3, and 4 — of situational factors on

aggressive behavior in man. In particular, the importance of interaction between interpersonal aspects (leading to relations perceived as gratifying or frustrating) and situational stimuli tending to prime aggressive behavior should be considered most carefully (in view of its operative and also preventive implications).

It therefore appears legitimate to consider the paradigm of social psychology (even if its experimental models lead to only indirect measures of aggressiveness) as a necessary level of the scientific study of aggressiveness, along with neurophysiology (to identify neural centers and biochemical correlates of aggressive behavior, such as rage in decorticated animals), ethology (to observe the phenomenology of inter- and intraspecific aggressive behavior in varying conditions of environmental and social stimulation), and general psychology (to identify the relations between frustrations and aggressive responses and the role of learning and of imitation on the consolidation or inhibition of such responses).

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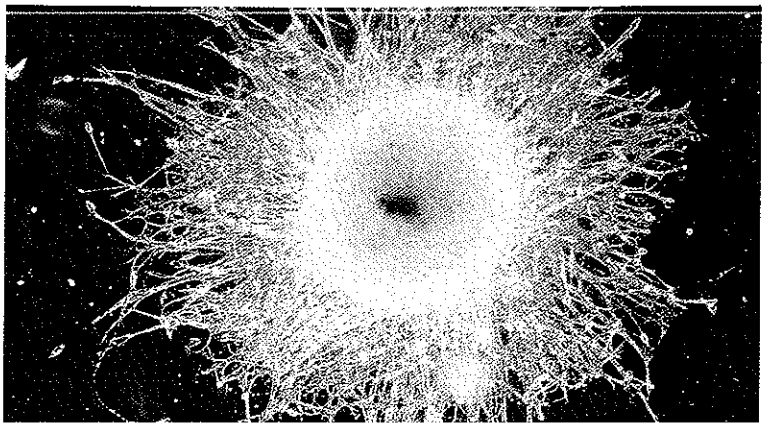


CARLO LORENZO CAZZULLO

Risk Factors and Developmental Factors: Premises for Prevention

In medicine the study of risk factors is not only a part of responding to unavoidable cultural necessities, it is also an element in dealing with the fundamental needs of disorders which require a substantial allocation and involvement of social and health resources because of 1) the large *numbers* of *users*, 2) the *possibilities* of *causing infirmity* and 3) *symptomatological characteristics*.

This is certainly true with regard to schizophrenia, affective disorders, and anxiety disorders.

Schizophrenia, indeed, directly affects about 1% of the adult population. In addition, it involves very high social cost when it has 1) an early onset, 2) leads to a considerable level of disability with regard to work or personal relationships (this in the case of inadequate medical treatment and care) and 3) involves the whole family environment in dramatic fashion wherever a direct work of support for that environment is not forthcoming.

Similar observations can be made about depression. Indeed, estimates of incidence in the population of the major forms of depression alone give a figure of slightly less than ten per cent. This incidence is very high, although lower than the profile of one case every five inhabitants obtained in counting the mere presence of depressive symptoms. Furthermore, patients affected by depressive disorders have a suicide risk which is at least fifteen to twenty times higher than that observed in the general population. They also have a very high probability of suffering from frequent relapses.

Anxiety disorders are also widely spread within the population. Estimates as to incidence indicate that at least 4-10% of the general population suffer from such disorders. Furthermore, anxiety disorders seem to be on the increase, especially in the most industrialised nations.

It is therefore evident, for all these reasons, that there should be an ever more precise and detailed identification of both 'risk factors in the strict sense' and 'developmental markers'. Knowledge of the first — that is to say, factors which can increase the probability that an individual falls ill — is a pre-requisite for any project of primary prevention. A knowledge of the second — that is to say, factors which influence the natural course of a disorder after it has taken root — is necessary in the implementation of therapeutic choices which are more relevant choices which take into account the specific biological, psychological, or environmental characteristics of each individual patient.

1. Schizophrenia

A) Risk Factors

We can distinguish genetic factors, biological factors, environmental factors, and psychosocial factors.

A. 1) Genetic Factors

The importance of hereditary factors in the etiopathogenesis of schizophrenia is no longer nowadays a matter for debate or discussion.

A very considerable body of studies of formal genetics has indeed clearly indicated that:

1) first degree relatives of patients affected by schizophrenia have a high level of schizophrenic disorders themselves — between eight and ten per cent.

2) amongst monozygotic twins there is a high level of shared schizophrenia — about sixty-five per cent. Much higher, that is to say, than the level of fifteen per cent observed in dizygotic twins.

3) the possibility of succumbing to this illness is similar for the children of schizophrenic mothers who are brought up in their natural families and for the children of schizophrenic mothers entrusted at an early age to the care of a healthy family.

On this basis, therefore, it is possible to argue that an accurate investigation of family origins constitutes the first utilisable instrument by which to evaluate the risks the individual runs of falling victim to schizophrenia.

A. 2) Biological Factors

The most probative data regarding biological factors concern immunogenetics (histocompatibility system HLA), neuromorphology and neurophysiology.

A. 2.1) Immunogenetics

Starting with the first 1974 study (Cazzullo *et al.*) there have been very many published accounts of links between schizophrenia and antigen specifics of the HLA, which has been considered as a possible genetic marker of schizophrenia.

The following, in particular, have been observed:

— a significant link between the antigen HLA-A1 and the hebephrenic form;

— a link between the antigen HLA-A9 and the paranoid form.

Recent studies of familial hepidemiology in two groups of phenotypically different proband schizophrenics — where one group had a positivity with regard to CRAG A1 antigens but the other was negative in this respect — have shown that the specific antigenic structure causes different risk levels amongst the relatives of probands. Amongst the relatives of patients who are CRAG A1 positive risk depends both upon the severity of the illness of the proband and the sex of the family relative.

Conversely, the severity of the illness in negative CRAG probands is not linked to an increase in risk levels of contracting the disease amongst family relatives.

It should be noted that the risk is always higher amongst women than amongst men.

Another significant effect of HLA typification is represented by an earlier age of illness onset amongst both hebephrenic and paranoid A1 positive patients. The same phenomenon is present is both sexes.

The only difference is to be found in a delay in the age of illness onset (4-5 years) in females as compared to males.

More recently, in analysing the II class of the HLA system, it has been observed that there is a link between the antigen DR3 and schizophrenia in its entirety, irrespective of the clinical subtype under consideration.

A 2 2 Neuromorphological Factors

During the 1950s and 1960s pneumoencephalographic studies demonstrated the presence of structural encephalic alterations in schizophrenic patients. These observations have been confirmed by more recent tomographic research and studies. Dilatation of cerebral ventricles — often of considerable intensity — and cortical atrophy, in particular, have been recorded.

Ventricular dilatation is present in a quarter of cases according to the most reliable international studies.

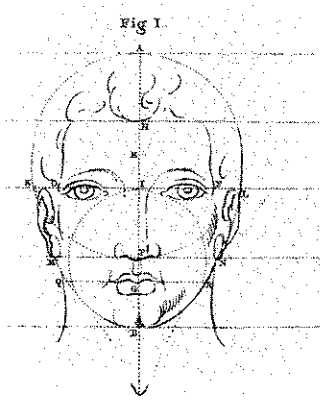
This alteration is an early anomaly. It is, in fact, demonstrable in patients suffering from schizophreniform disorder as well, and is present in subjects with personality disorders of the schizophrenic spectrum. These are conditions which often precede the onset of schizophrenia itself.

Ventricular dilatation also seems to be relatively stable because in the few patients subjected to a second tomography after a large number of years the VBR values have been found to be almost the same as those of the original test.

Ventricular widening is more frequent in patients with 'sporadic' forms of schizophrenia — that is to say, without a familial propensity for the illness.

An analysis of the incidence of schizophrenic disorders in first degree relatives in relation to the ventricular dimensions of the proband has, in fact, demonstrated a level of secondary cases which is three times higher in the relatives of probands with a normal VBR (9%) compared with the relatives of patients with ventricular dilatation (3%).

Using these data as a base it has been suggested that neuromorphological alterations enable us to identify a kind of schizophrenia which is not dependent upon (or at least not exclusively) genetic factors but is largely linked to environmental factors.



Amongst the other tomographical alterations we should remember cortical atrophy. This is something which is present in a third of the patients and only in a minority of cases is it associated with a widening of the ventricles. In this instance, however, we are dealing with information which so far lacks precise clinical and biological correlates.

Further information on neuromorphology is to be expected from new techniques of brain imaging — nuclear magnetic resonance and PET.

The first has not provided new information compared to the TAC. The second has produced data which demonstrate a functional hypofrontality in chronic schizophrenics, a phenomenon observed by the SPECT of Weinberger and collaborators also under cognitive stimulus.

A 2 3 Neurophysiological Factors

a) A first interesting neurophysiological parameter is what is termed SPEM. Indeed, beginning with the first study of Holzman and collaborators very many authorities have confirmed the presence of SPEM alterations in schizophrenic patients. The available data suggest, overall, that: a) SPEM malfunction is present in a high percentage of cases of schizophrenic patients (from fifty to eighty per cent); and b) that a similar irregularity is to be found in about fifty per cent of schizophrenic patients irrespective of whether they display psychopathological symptoms or not.

b) *Computerised EEG and 'EEG Mapping'*

An analysis of the data in published literature shows that certain elements which are characteristic of the power spectrum of the EEG are already to be found in the early stages of the illness.

Indeed, patients who have had the illness for less than two years display clear anomalies especially in

the alpha band: this fact has also been shown to be present in patients undergoing the first attack of the illness who have never received psychotropic drug treatment. The alpha band is reduced and other bands are increased. This is especially true of the low frequency bands and in particular in the frontal section.

c) *MRBMs* (Movement Related Brain Macropotentials)

A modern method based upon analysed potentials is movement related brain macropotentials (MRBM). These are usually expressed with a preparatory phase (BP: Bereitschaft-Potential), two motor phases (Motor Cortex Potential) and a terminal phase (SPP Skilled Performance Positivity), which amounts to a demonstration of the experience acquired during the previous two phases.

In chronic schizophrenics all the *phases* are reduced, but it is the final phase which is especially changed. Instead of a broad positive wave there is only a modest deflexion — something which indicates a weak reappraisal of the motor experience as not merely an executive act, but a motor-ideative act. In addition, in subjects undergoing the onset of the illness there is a selective reduction of the BP, which thus represents the primary and early alteration under way in schizophrenia.

A.3 Environmental Factors

Amongst the environmental factors, the seasons seem to play an especially important role. Here I am referring to their impact on the births of schizophrenic patients and on perinatal difficulties associated with the same category.

A.3.1. The Seasons and Births

Beginning with the first observation made by Tramer in 1929, and using the studies based upon the analysis of many thousands of cases, it is now possible to assert that there is a concentration of winter months in the births of subjects who subsequently develop schizophrenia.

This fact has many different possible interpretations. The most plausible such interpretation offered by experts in the field is that perinatal environmental factors of a preponderantly winter kind can cause such subjects to have organic cerebral damage which is responsible for a progressive behavioural disorganisation which, in turn, finally leads to the development of a schizophrenic condition.

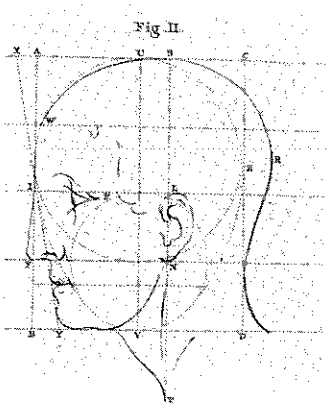
In relation to this hypothesis it has been observed that patients born in the winter months have a significantly higher incidence of ventricular dilatation compared to those who were born in the other months of the year.

The true nature of this phenomenon of the importance of winter births in schizophrenics remains a matter for debate and discussion.

A.3.2 Obstetric Complications

Another important environmental element to consider in examining risk factors in schizophrenia is that of obstetric complications.

It has, in fact, been shown that a presence of complications during the perinatal period increases the risk of developing psychoses in general and schizophrenia in particular during adulthood.



It is highly probable that this fact is not separate from the phenomenon of winter births in schizophrenic factors: it is precisely during these months that a higher incidence of both complications during birth and neonatal pathologies is to be observed.

Indeed, obstetric complications seem to be more frequent in patients with nonfamilial forms of schizophrenia, forms which are often accompanied by neuromorphological anomalies.

A. 4 Psychosocial Factors

In the development of schizophrenia very many social and familial factors have been suggested as having a predispositional or promotional role. Amongst the social factors we should record, on the one hand, membership in the lowest social classes, and on the other, transversal mobility — that is to say, phenomena of emigration and movement which lead to isolation and marginalisation.

In considering family factors, initial attention paid towards the schizophrenogenic mother has been shifted towards more complex pathogenic familial dynamics. Their common element seems to be the affective isolation of the infant and an open or latent conflict between the parents.

B. *Developmental Factors*

B. 1 Biological Indices

Amongst the biological factors which are useful in predicting the spontaneous or pharmacological development of schizophrenia we should record a) immunogenetic structure and b) neuromorphological characteristics.

B.1.a Immunogenetic Factors

It has been demonstrated with regard to immunogenetic factors that in vitro the CRAG A1 antigens have an ability to link themselves directly to certain neuroleptics (chlorpromazine and haloperidol, in particular) and thus effect a better response to these drugs on the

part of schizophrenics who have such an antigen group.

It is also worthwhile recording the recent observation that a higher level of suicidal behaviour is to be found in those schizophrenic patients who are carriers of the antigen DR3.

B.1.b Neuromorphology

Many experts have paid especial attention to the idea of ventricular dilatation being a marker of a specific subtype of schizophrenia characterised by:

— pre-eminent negative symptoms (affective fall-off, poverty of thought and ideas, energy loss)
— greater cognitive deficits
— worse premorbid functioning
— very low response to pharmological therapies
— suicidal tendencies
— worse overall prognoses, as had already been observed by pneumoencephalographical studies.

In a follow-up study carried out on thirty-three patients who had been hospitalised because of an acute attack and treated with neuroleptic drugs a progressive and significant reduction in points obtained on the BPRS by patients with normal ventricle size was observed, but the same was not true of those with ventricular dilatation.

This discovery, in addition to confirming previous observations as to the low effectiveness of acute treatment with neuroleptics, also suggests a different long-term prognosis for patients both with and without ventricular dilatation. This is in line with the hypothesis that the neuromorphological anomaly indicates forms of schizophrenia which are prognostically more severe and for which the application of alternative therapies seems necessary.

B.2 Psychosocial Factors

Finally, with regard to developmental markers of a psychosocial type, a position of primary importance is occupied by the Expressed Emotivity factor (EE) in the family environment Studies of EE, largely the work of the Brown, Briley, Leff, and Vaughn team, but also effected by researchers in other countries, show how the attitude of relatives towards the sick member of the family is a most important parameter in estimating the risk of symptomatological relapse on the part of the patient.

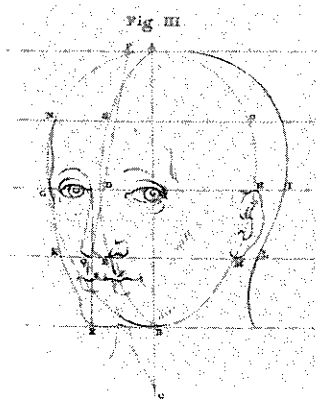
It has, indeed, been demonstrated that:

a) patients with family relatives who have a high level of EE have a level of psychotic relapse which is three times higher that of patients who have family relatives with a low level of EE;

b) neuroleptic therapy retains a preventive role as regards relapse in patients belonging to families with a high level of EE but not in those with a low level.

c) the time of contact with relatives has a prognostic significance but only in families with a high EE: patients who live in close contact with relatives who have high levels of EE run, in fact, the highest risk of relapse.

In a recent study carried out on a sample of Italian families in the urban area of Milan the percentage of families with high and low levels of EE was found to be similar to that observed in studies carried out in London. In the English families the high EE level seems to express criticism (a critical attitude) whilst in the Italian sample there is a very high level of emotional overinvolvement — that is to say, hyperprotectiveness and exaggerated emotional involvement in relation to the sick member of the family.



2 Affectivity Disorders

2.A Risk Factors

2.A.1 Genetic and Biological Factors

The importance of hereditary factors as elements of risk in affective disorders can be considered as being equal to, if not higher than, that which is thought to be the case with schizophrenia. Indeed:

1) the frequency of affective forms in the relatives of subjects afflicted by depression is on the order of twenty per cent — that is to say, considerably higher than that detectable in the families of probands who do not have such an affliction;

2) the members of the same family tend to have homotypical affective disorders if they become ill;

3) in the case of adoption at an early age the individual risk of developing affective disorders is linked to the characteristics of the natural parents rather than the characteristics of the adoptive parents.

Another factor which may be defined as biological is that of the age of the subject. The first observation of Kraepelin in his monograph *Manic Depressive Insanity* and *Paranoia* — that before the age of forty-five there is a certain diminution in the frequency of manifestations of the illness and that a short time thereafter there is a significant increase — has subsequently received constant confirmation.

Overall, we can now affirm that there do in fact exist clear periods of age which are at risk as regards the development of affective disorders. Indeed, in the case of bipolar disorder there is a period of more intense incidence for both sexes between the ages of twenty-four and thirty. In the case, on the other hand, of unipolar forms there is a unimodal distribution as regards men, with a peak being reached at about fifty, and a bimodal distribution as regards women, with a peak being reached at about thirty and sixty.

2.A.2 Psychosocial Factors

In considering psychosocial factors we must, first and foremost, examine events which cause stress.

The idea of events being of consequence in shaping a life which has a predisposition or propensity towards depression is certainly not new.

Starting with the first reflections of Abraham and going on to the Freudian observations of a little afterwards, the idea that traumatic events of early childhood increase the prospects of the creation of a pre-depressive personality has influenced many theories — and not only metapsychological theories — about these disorders.

From the beginning of this century, similar importance has been given to recent events. One need only remember the success at a clinical level which the idea of reactive depression enjoyed for a long time, and recall the fact that in many interpretive models depression has been held to be, always and in all situations, subsequent to internal and external events involving loss.

As regards early events — that is to say, events occurring in infancy or in early childhood — the data considered in their entirety bear witness to an incidence of depression as opposed to normality both where there is an evident and authentic excess of events and where a more negative and traumatic infancy has been experienced. Our experience leads to similar conclusions.

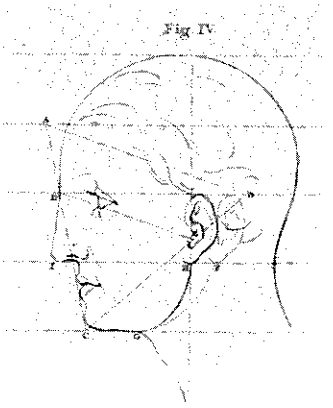
Indeed, in a joint study we discovered that about forty-two per cent of patients affected by major type depressive disorders had a positive case-history as regards early events as opposed to twenty-five per cent registered in the healthy section of the population.

It can, therefore, be concluded that early life events clearly represent a risk factor in the subsequent emergence of affective disorders even if their pathogenetic role is neither sufficient nor necessary but merely partial.

With regard to early events — that is to say, belonging to a period linked to that of the depressive episode — the evidence as a whole bears witness to an overall greater impact. This is so whether such evidence has been gathered employing normative methods, contextual methods, or, in more simple fashion, by counting the incidence of certain pre-exemplified events without reference to their level of seriousness. This over-representation should be connected in particular to events of loss value which have occurred during the previous six months or which reached a special peak during the preceding two months. Furthermore, it is also clear that a substantial number of depressives prior to depression did not experience either separation or other events, and that only in a small number of those subjected to such events was depression subsequently to be observed. Even though this involves a meaning different from that employed by Jaspers as regards "psychiatric reactions," one can thus conclude that recent events also represent a real risk factor in depression. But this depression is neither long-lived, given that it falls off after six months, nor, above all else, is it complete, given that the recent event/depression sequence requires the concomitant presence of other factors involving predisposition and/or trigger mechanisms.

2.B. Developmental Markers

In the same way as we have observed risk factors in a narrow sense, so can we identify schematically in the developmental markers indicators which have a biological-genetic significance and indicators which have a psychosocial significance.



2.B.1 Biological Developmental Markers

In considering affective disorders we should devote special attention to family factors in examining affective disorders, the age of the patient, the age at which the illness first emerged, the 5HIAA levels, the urinary excretion of MHPG, the dimension of the cerebral ventricles, and the level of cerebral atrophy.

With regard to family factors and affective disorders we should remember:

1) a positive family case-history is a good predictive index of the effectiveness of stabilising treatment with lithium salts, especially in the case of bipolar type patients;

2) major type depressives with a negative family case-history with homotypical disorders respond less well to anti-depressant treatment than patients with a positive family case-history.

As regards the age of subjects we should remember that:

1) the probability of affective relapse increases notably with the advance of age: in the case of mania, for example, there is an increase of about ten times (from 0.17 to 1.6) in the frequency of attacks over a period of ten years if one makes a comparison between patients in their sixties and patients in their twenties;

2) bipolar type patients who are under forty years of age can be stabilised more easily by lithium salts than patients who are over forty.

With regard to the age of onset, it should be emphasised that patients with a late onset (that is to say, where there is an onset when they are more than forty);

1) more often have accompanying anxiety symptoms;

2) haye a more pronounced tendency towards chronic development;

3) in the case of bipolar forms more easily display drug-induced colour tones;

4) are rarely stabilised by lithium salts;

5) during the depressive phase respond better to chlorimipramine and amitriotiline than to imipramine and nortriotiline.

With regard to fluid levels of 5HIAA in basic or cumulative terms after the administration of probenecid it is enough to mention that:

1) in comparison with patients belonging to a group of normal fluid levels the subjects of a group with reduced concentrations display a more pronounced propensity towards actions of physical self-injury which are repeated and carried out in a violent fashion;

2) the patients belonging to a group with reduced concentrations benefit more from amitriotiline and chlorimipramine treatment than from imipramine and nortriotiline treatment whilst patients with normal fluid concentrations respond better to these two last antidepressants.

With regard to the urinary excretion of MHPG, the many studies hitherto carried out, including many effected by our institute, indicate that

1) responders to nortriotiline and chlorimipramine have basic levels of MHPG which are in general higher than those found in nonresponders, even if these two antidepressants involve a considerable number of positive responses amongst the low level excreters;

2) a condition of being a high level excreter predicts with good precision a lack of stabilising effect on the part of lithium salts both in unipolar patients and in bipolar patients. A condition of being a low level excreter indicates a good prophylactic effect on the part of lithium, above all in the case of bipolar patients;

3) the high level excreters are more likely to display intense symptoms of anxiety as well during the depressive phase.

With regard to the dimension of the cerebral ventricles, research over the last few years substantially supports the conviction that:

1) pathological dilatation is associated with a higher rate of both anxiety symptoms and delirium congruent with mood;

2) in a very high percentage of cases where ventricular dilatation is present there is a marked lack of stabilising effect from lithium.

With regard, finally, to the level of cerebral atrophy certain preliminary experiments seem to indicate that

1) patients with evident signs of atrophy have a risk of suicidal behaviour which is significantly higher than that observed in depressives who do not have significant levels of atrophy;

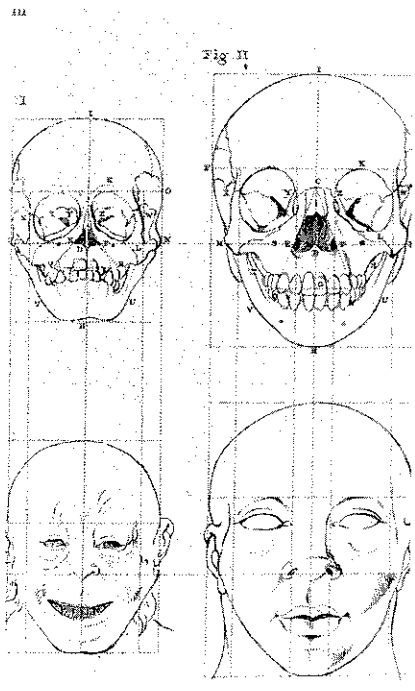
2) the presence of atrophy indicates a future increase in the probability of having drug-induced colour change;

3) the patients with cortical atrophy are less easily stabilised by lithium salts.

2 B.2 Psychosocial Developmental Markers

Amongst developmental markers of a psychosocial type, recent stressful events and the EE level of the nuclear family seem to be of especial interest.

The facilitating role of recent stressful events on affective relapse



can now be considered sufficiently proved and demonstrated.

With regard, on the other hand, to EE it now seems that on the basis of preliminary studies carried out on patients affected by depression of a neurotic kind one can suggest that:

1) depressives are especially sensitive to the critical attitudes of their families;

2) the presence of EE which is only relatively high is a factor which facilitates relapses of an affective kind.

3. Anxiety Disorders

3.A Genetic and Biological Factors

In this case as well the data of familial epidemiology suggest the role of genetic factors in predisposing the individual to anxiety disorders.

The risk of a subject developing such disorders is in fact twenty-five per cent if one parent is affected and rises to beyond forty per cent if both parents are afflicted.

A biological component appears to be particularly relevant in disorders involving panic attacks. In such cases the following have been observed:

a) hyperactivity of the locus coerulus, the unexpected functional activation of which is held to be at the base of the psychic — and, above all, somatic — phenomena of the acute attack;

b) an increase in activity on the part of the B adrenergic transmitting system;

c) an increase in cerebral hematic flux and in metabolic activity in the limbic site, and in particular in the hippocampus, during a panic attack.

The biological data concerning generalised anxiety are less clear.

Neurophysiological factors seem to be of importance in this area. Studies devoted to the higher nervous activity, especially on cerebral macropotentials connected with movement, have confirmed that anxiety is always a cognitive experience. Information in this regard has been provided by research into the wait wave, the wave discovered by Grey Walter (1964) and called CNV

(Contingent Negative Variation). CNV is linked, as has already been said, to a cognitive strategy which is organised in time and is the expression of an ability to associate in a temporal link two significant stimuli. There is a lineal relationship involving attention, emotive tension and the width of the CNV. On the other hand, there is no monotonic relationship between vigilance, the width of the CNV, in the sense that both a low level and a high level of vigilance reduce the width of the CNV (Tecce *et al.*, 1978). Of contemporary interest is the relationship between anxiety and immunity, something that has been the object of much active research during the last few years. The longer and severer the stress, the more marked is the immunological depression. B. Leonard (1988) in particular confirmed that during panic disorders the phagocyte activity of the T lymphocytes is markedly diminished, with the result that there is a lower capacity of self-defence against infections.

The state of anxiety produced by unemployment which lasts for more than nine months (according to studies carried out by Arnetz and collaborators, 1987) can also constitute a factor which causes diminution of the T and B lymphocytic response. The Kiecolt-Glasser group of the University of Ohio has engaged in more penetrating studies of individual privacy: divorced or separated men and women showed increased levels of anxiety disorder and lower defences against illness, and a reduction of both immunity responses and a fall in antibodies directed towards Epstein Barr, herpes I and II. Similar phenomena were observed in men and women in the course of unhappy marriages. Here anxiety syndromes were to be observed. Unmarried men, in a control group, were in general less subject to such afflictions.

Anxiety and the endocrine system advance in unison: the organism responds to both physical and physiological stress with the liberation of ACTH from the anterior hypophysis, of glucocorticoids from the adrenal cortex, of adrenalin or epinephrin, and of noradrenaline or norepinephrine from the sympathetic nervous system. It is enough to cite the modulation of the two neurotransmitters, adrenalin and noradrenaline, as an example: without stress the values for both are low, with prevalence on the part of noradrenaline, but under stress there is a notable bilateral increase with a net prevalence on the part of adrenalin.

3 B. Psychosocial Factors

Sociopsychiatric studies have demonstrated the importance of certain factors in the determination of anxiety. In societies with high technological development and in developing countries the kind of situations to which people are exposed are not primarily connected with stress agents of a physical nature.

The chief and most widespread source of stress is associated with psychosocial factors favoured by diffused pragmatic and industrial organisation of a dehumanising character, by an intense horizontal mobility (emigration) and vertical mobility (change in economic, social and political status), by a progressive weakening of family structures and by a lack of support on the part of social and religious organisations.

All these factors have created a complex of psychosocial stressors of an indubitable breadth which are able to challenge the psychobiological limits of human adaptation. Psychosocial stressors have been shown to be responsible for twenty-five per cent of light or moderate depression, but, above all else, for anxiety and other emotive disorders from which nine million members of the American population suffer.

In Sweden L. Levi, in affirming that one person in three has had stress experiences, argues that psychic aggressions are more pernicious and longer lasting in their effect on the organism — because of their variety, unpredictability, speed, and their penetrating impact — than physical aggressions. This makes the considerable increase in anxiety disorders and psychosomatic illnesses more understandable.

Once again the role of life events as a developmental factor in anxiety disorder is to be emphasised. These life events are temporally and causally correlated both to the recurrence of panic attack disorders and to the intensity of anxiety phenomena.

On the other hand, in a developmental sense, the problem pf anxiety is at the root of all psychic disorders: from neuroses, to psychosomatic illnesses, and psychoses, but it also enters into medical and surgical pathologies where the illness — whatever it may be — leads to a limitation or suppression of freedom. It is not, therefore, an exaggeration to say that anxiety is by its nature an axial phenomenon in psychic life, and for this reason it continues to provoke interest and effort on the part of experts and researchers in both the field of philosophy and the field of the neurosciences.

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GUSTAVE MARTELET

The Contribution of Faith to Mental Health

What a vast subject! Yet it finds its natural boundaries in the definition of the terms in question. As far as concerns faith, let us take as our starting point the definition St. Paul gives as his object in his Letter to the Romans: " Thou canst find salvation, it thou wilt use thy lips to confess that Jesus is the Lord, and thy heart to believe that God has raised him up from the dead " (10: 9) To believe, therefore, above all else, is to confess the Lord Jesus with a heart that thus enters into that salvation which only God can provide. What do we mean by mental? Lalande's *Philosophical Dictionary* says: " Mental is what concerns the spirit, is what belongs to the spirit, inasmuch as it is considered from a *purely positive and experiential* point of view. " Here, the experiential is the experienceable in the realm of the spirit — that is to say, what is objectively determinable in terms of results and forms of conditioning which are empirically testable. In this sense one can say with the *General Dictionary of Human Sciences* that " the mental is the definition of what is revealed by the working of the cerebral cortex. " The mental, therefore, refers to what remains of the spirit when it is considered in the physiological — and even cortical — conditions alone of its manifestation. In a much less radical way, but in relation to facts regarding the consciousness which can be positively analysed, one can say with Lalande that " the mental state of an individual is the state of health or alienation of his *psychic functions* " In short, the mental is the spirit when connected to psychism and to the organic conditioning which governs health or its alienation. It is precisely in this area that we are asked to locate the role of faith.

However, notwithstanding the apparent clarity of the task with which I have been entrusted, a fundamental clarification is called for — a clarification which concerns the nature itself of the spirit of which the mental is only an aspect. It behoves us to examine the etymology of this word

* * *

Mental, indeed, comes from *mens*. Now, *mens* in Latin communicates intelligence, first of all, then the spirit and meanings associated with it, and finally courage. For this reason, the semantic resonance is primarily spiritual and not only psychological, or even less psychophysiological — without excluding, on the other hand, anything that could be connected with the spirit, such as the *mental* itself. However, the sense of this word remains directed towards the truly spiritual area. St. Augustine is true to this meaning inasmuch as he makes *soul* an equivalent of *mens* and often, in order to define the grandeur of man, he prefers *mens* to *soul*. Be that as it may, it is through *mens* (in Latin this word is feminine like the Hebrew *rouah*) that the author of *De Trinitate* develops his doctrine in Book XIV on man created in the " image " of God, and attributes a depth to the spirit which is usually not associated with the " mental " in the modern sense of the term.

The Bishop of Hippon, when speaking of the spirit (*mens*), explains: " Without being of the same nature as God, the image of God, which is superior to every other nature, must be looked for in what by nature is best in us " (III, 11) because Genesis declares that man is created " in the image of God. " It is undoubted that St. Augustine, like other Fathers of the Church, does not dare to say that this " image " with which God graces the human being concerns him in all his aspects and includes his body and soul. St. Augustine, also, confines the attribution of such a privilege to the spirit alone. On the other hand, he affirms that the spirit receives the supreme dignity of being bequeathed with an interior kinship with God through — if I may be allowed to so express it — its invisible sides. " We are of the same race " a Greek poet also said, according to Ac 17: 29, and not a particle of divinity as all gnostics would willingly believe. These gnostics hold that the spirit is an *element*, instead of seeing in it *an act which subsists* and which is at the base of every person. Whatever the case, with St. Augustine we have distanced ourselves from a conception of the " mental " as being reducible to psychism, which in its turn is reducible to an objectivity which is more or less cortical! The spirit — without ever disdaining the psychic order or the setting of the mental — rises above them and makes them more noble by integrating them into its context, something that is linked to the personal mystery of God. Furthermore, it goes without saying that the " image of God " which is present in man has nothing whatsoever to do with a physical imprint of the nature of medals or wax seals. This " image " is addressed to us with a disposition of the spirit, a soundless echo which nevertheless speaks, which directs

us to the grandeur of God himself. As "image," the spirit has as its reference point a transcendent image which attracts it through affinity. It does this notwithstanding, or even more because of, the deviation in which their difference is to be found. The spirit, therefore, is thus an innate ability to go out of itself so as to find itself and unite itself with Him who, in *imagining* it, allowed it to exist.

The grandeur of the spirit as "image of God" is also, then, indestructible, because this grandeur does not come from the spirit but from God. If man comes to forget himself and to deny his transcendence, he certainly becomes alienated. But he cannot destroy the divine affinity that is within him and which is the result of the creative virtues of Being. As St. Augusine explains: "Even when the spirit (*mens*) is stained and disfigured by the loss of divine participation, it is no less in the image of God. This is because what allows it to be in the image of God is its being *capable of God* and participating in God" (*Ibid.*) For this reason the supreme good, the constitutive good of the spirit, its very identity, is not only the "mental" that could be traced back to structures or functions. The impossibility of man being really himself outside this "mouth to mouth," "heart to heart," "spirit to spirit" communion with God with which Moses was graced, (Ex 33: 11) is at the heart of the "mental" and more profound than man himself. From this comes the Augustinian word *par excellence*, in which each man feels his most profound truth is expressed: "You have made us for You, O Lord, and so long as our heart does not lie in you it will be without rest" (*Confessions*, I, 1).

* * *

What is at stake with regard to our liberty is defined by the amount of grandeur in our spirit.

St. Augustine realised this more than any other — a history of reconciliation exists for the "image of God." An odyssey which is at times tragic and in which the spirit can hesitate, become alienated, and "get lost" like a ship which is shipwrecked, can be the prelude to an encounter which is unlike any other. The spirit can sink because of a refusal to use it as a means of navigation on the open seas — like a ship that moves leeward in the middle of the ocean without a helmsman or a compass on board. Now, to reduce the spirit — that internal opening of the absolute — to the *mental* alone (understood as a self-sufficient psychophysiological montage) represents today that mortal conduct which is hidden under those rather facile nautical symbols. The alienation or the disorderedness of man, his fatal course in the water's current, does not come from a more subtle knowledge of the different forms of conditioning of the spirit. It is explained, rather, with reference to the tyrannical rule of a *pseudomental* wrenched from the great founding currents of the spirit. In depriving itself of a sovereignty which is made to serve and not to supplant, mental dominion becomes inflated and depolarised. It asphyxiates and finally suffocates before this opening of the infinite, which inculcates in it the wish for, and opens the way to, supreme integration. The spirit of man, which thereby denies its divine dependence for reasons of ignorance, tiredness, or illusion, brings out its evil in the most visible borders of the mental — towards which it is self-appointedly indifferent. Here, the possessed man of the country of the Gerasenes (Lk 8:26-39), who is in effect a man deprived of himself, may serve as a living example of this most surprising result.

His nakedness underlines the fact that he is cut off from himself and from others. His voice is nothing more than a cry which rejects answers. His only dwelling place is the uninhabited and the uninhabitable. He breaks the irons which should bind his wandering ill-fortune. He walks beside the graves and beside death. He no longer has a personality, and he multiplies his personality in diabolic fashion. He manages to make even pigs go mad! This picture, however popular it may be, contains aspects which involve forms of alienation which are more subtle and which are to be feared to no lesser extent. In these forms of alienation, nakedness does not only involve the physical but also affects the spiritual. The spirit is so bare that every relationship with its God comes to die. Wandering is the only form of behaviour available to a person who no longer retains his spiritual self with which he can receive the smallest touch of the absolute; the taste of death tortures every will to live. Being internally disintegrated, he disintegrates every form of support that might be offered to him. He thereby continues to direct onto himself that destruction of which he is the victim.

He builds up the fire that consumes him. Moved by desperation, he also is ready, at first, to deny Him who traverses our way so as to heal us. "What have you to do with me, Jesus, Son of the Most High God?" This is the stupid question — but at the same time greeting — that the Gerasene addresses to Jesus, who perceives in the deformations of the body, of the heart and the body, the privileged guarantee of his love.

* * *

What will be the remedy if certain imbalances — including alienation — possess their deepest root in the fact that the spirit, being "in the image of God," is seen as culturally reduced to the merely "psychic," not to say "cortical"? Where is the physician for a state of health which is shaken to the very roots of the mental? In the first stage the therapies do not seem to be lacking. Moreover, they are not negligible. However, how can one deny that other Gerasenes who are more unobserved than their ancient predecessor are often present in our streets and our cities? Furthermore, does there exist for those victims of unknown thirsts disdained by the spirit a remedy, a medicine different from that revealed to us by the Gospels?

The unique Physician remained silent before the man who symbolises the confusion of men who, in relation to their divine identity, are frustrated in other ways. Christ, the "image of the invisible God," as St. Paul calls him, the model according to which every human being has been created and remains firm, is in history the ultimate Form of the human. He is for us a new Adam, and we are old man, and he enters into contact here with a mental outcast of his own world. It is certainly true that the "divisor," who is given the lot of de-

stroying himself, is not the last person to wander about in such environs. But now the "strongly armed" has appeared. Christ, in being, as the Son, the pure relationship between God and Father (to whom we owe our existence), is the Defender in the flesh born of our fragile grandeur. Incompatible with the loss of the possession of ourselves which reduces us below the level of the spirit, He is the glory of humanity, but also at its service. He is the fraternal Revealer of the hidden God of whom we are only a distant and weak image. He can, therefore, satiate the wish which is born within us, as a result of the palpable absence of God, with divine Presence. This absence, which is at times unbearable, digs those holes into which our spirit sinks. The peak is reached when the meeting, which is unforeseen but nonetheless wished for by the Lord, drives the delirium into paroxysm, and this is a delirium of which he will free us. "What have you to do with me, Jesus, Son of the Most High God?" our Gerasene asked, doing what is done by so many other people. I will be concerned with you, Jesus replies in silence, until you find yourself again by discovering in me your lost truth. Look, listen, I am your fullness and your freedom.....

In this way, the Gospel prototype of our forms of alienation is at the feet of Jesus. He has vomited out all his negatory imaginings and his "mental state," to use today's phrase, has entered normality. Without doubt, for us, there will be nothing so miraculous as that which took place in the country of the Gerasenes. Even though the Lord has risen again, he remains immanent in the human future: he respects the development of our history, the faith which allows us to meet him, and he leaves us to his action. However, this Gospel tale allows us to understand the nature of a benefit which pervades us by means of the closely-woven net of our history and gives us, in progressive fashion, what was received immediately in the country of the Gerasenes. Man, remaining himself, has become unrecognisable: the madman who broke all his bonds is now master of himself — "sui compos," as the Gospel puts it — without the aid of any obstacle. The man who fled from himself in fleeing from his own kind sits as a disciple at the feet of Jesus — the supreme Reintegrator of the human.

If, as we have been told, the mental is "the spirit considered from the positive and experiential point of view," the result obtained by Jesus is, in this context as well, "positively" surprising. In calming the spirit that was entrusted to him, Jesus has just healed every form of behaviour in which a diabolical expropriation of the self is at work. The change is so inexplicable and so spectacular that the Gerasenes are frightened by it. Because the healing of a man does not match up to the loss of a herd of swine, they beseech Jesus to leave their country. The healed man would rather lose everything than see himself deprived of the known Lord! The Gerasene entreats the Master to be able to walk with him in the same way as the disciples will encourage Emmanuel to stay with them. Later on the pilgrims of the Easter supper, similarly restored by the presence of Jesus, will do the same as the Gerasene. But Jesus will make those men and women whom he cured of the evil of ignoring him or losing him witnesses of his own person, in that corner of the universe where they met him. On the other hand, because of the Gospels, which tell their stories, all these men and women become living examples of our alienation and its promised healing, in every corner of the world and until the end of time.

* * *

I have not analysed, in this brief paper, the process by which lost or compromised mental health is recovered or kept by means of faith. Here, it has been enough to show — through an Augustinian invocation of the mystery of the spirit and the exemplary case of the possessed man of the country of the Gerasenes — to what point the Person of Christ brings the benefit of his divine and completely human humanity to man in all his parts. Indeed, what Christ was for his privileged contemporaries he is still for those men and women who come to him in faith. He, Spirit, does not stop doing what he did when he was flesh: to give back to a humanity that he profoundly understands that Peace which nothing but He in the world can give, and which when received from him cannot be taken away by anything in the world.

In addition, since the alienation of the spirit invades the mental, whose functions it disturbs, the quieting by the Lord of that "troubled stag" — which is none other than ourselves — at the divine fonts of his humanity soon lives in the light by which our eyes illuminate the body itself. According to the words of the Gospels, what is most linked to the spirit in us is not the cortical or the psychic but our look: "When your eye is sound, your whole body is full of light.... If, then, your whole body is full of light, having no part dark, it will be wholly bright, *as when a lamp with its rays gives you light*" (Lk 11: 34-36). What is this lamp, therefore, which illuminates with such a glow, if not that which the Gospels tell us has "arrived" (Mk 3:21) in our times, and which is "the light of life" (Jn 8:42) And this lamp cannot do without living candelabra either to meet other Geraseans who still wander in our cities.

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Prospects for Psychopharmacology as a Means of Restoring the Mind

1. Introduction

Mental disease has so far resisted all attempts to clarify organic causes, up to the point that its actual diagnosis must rely on uncertain and subjective parameters, such as patients' medical history, behaviour, and symptoms. In the absence of adequate scientific knowledge, the treatment of mental disease has been faced in empirical terms. Initially, we resorted to popular tradition or serendipity, as occurred with all prototypes of modern psychodrugs: reserpine, chlorpromazine, iproniazid, imipramine, lithium, reserpine, and others. Subsequently, as in other fields, experimental models were used which enabled the first pharmacological screening in the laboratory. This allowed a systematic screening of a large variety of compounds, some of which were shown to be active and, therefore, provided a valuable contribution to the therapeutic armamentarium. The merits of these agents should not, however, mask the fact that they represent an expedient until a better knowledge of mental illness is acquired. This will be the theme of this conference.

The obstacles encountered in clarifying the causes of mental disease are not presumably due to a lack of suitable instruments, such as occurred in the case of infection before the microscope was discovered; the presently available instruments, in fact, are so potent as to explore molecular events at a molecular level. The problem lies rather in the lack of a reliable indication enabling us to distinguish what we are looking for among the thousands of biological parameters in our reach. This necessity is obviously greater, the more potent the instrument used and, consequently, the amount of detailed information provided. In the same way, the physician would have difficulty in formulating a diagnosis relying on all the laboratory tests that can theoretically be done, if the clinical examination of the patient would not provide him an indication on where to focus his attention. Unfortunately, the study of mental conditions has not yet provided the scientist with an indication of similar value. He is therefore compelled to resort to deductive rather than inductive working hypotheses. This, however, is of little importance, owing to the fact that any hypothesis must be verified experimentally.

2. Pharmacocentric hypotheses

In the past decades studies on the organic causes of schizophrenia and depression were guided mainly by working hypotheses derived from the experimental study of psychodrugs. Antipsychotics are generally antidopaminergic, whilst psychedelic agents, producing psychotic manifestations, often have dopaminergic properties. Hence the hypothesis, first formulated by Randrup and Munkvad (1965), that schizophrenia and other psychoses depend on an excessive dopaminergic nervous mediation. The first studies on iproniazid and imipramine, prototypes of two important classes of antidepressants, showed, instead, an increase in aminergic nervous transmission. The opposite was observed with reserpine which produces a state of prostration resembling some phases of depression. Hence the hypothesis that depression depends on a defect of the aminergic mechanisms. In this way the psychotic and manic states, on the one hand, and depressive states, on the other, were attributed to specular imbalances of nervous transmission. Subsequently, it was shown that the repeated administration of antidepressants produces quite different biochemical changes, as compared to the acute one. Moreover, atypical antidepressants were discovered, such as trazodone, which are substantially different from the traditional antidepressants in their pharmacological and biochemical profiles. The aminergic theory of depression was, therefore, reformulated, and others emerged.

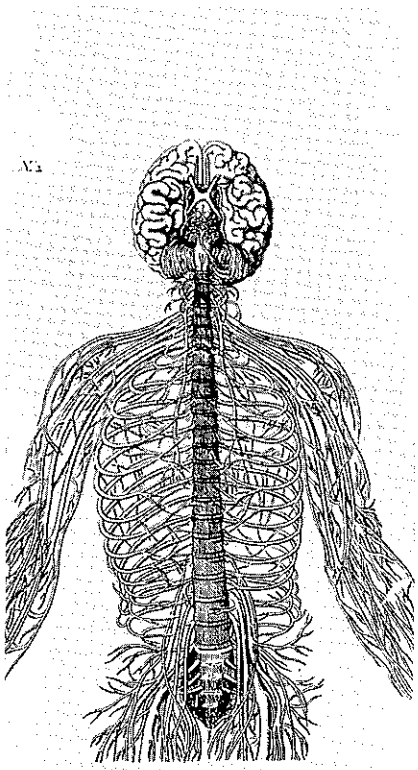
These working hypotheses aroused enormous scientific interest and stimulated during these last decades a constant flow of preclinical and clinical studies. Unfortunately, the study of the mental patient has not revealed the biochemical changes that these hypotheses postulated for schizophrenia and depression. Even the increased density of dopamine D2 receptors in schizophrenic patients, which was reported in previous studies and was perhaps the only proof in favour of the dopaminergic theory of schizophrenia, has not been confirmed in some recent, apparently more rigorous studies.

The failure of these pharmacocentric theories is not surprising, as drugs do not necessarily affect the core pathogenetic chain of diseases. A typical example is that of antipyretics in infection. In these circumstances, the notion that drugs provide an indication on the nature of the disease is misleading.

3. Biological hypotheses

A more promising approach is that based on the study of nature as a source of indications regarding the cause of the disease. This approach is based on the idea that all forms of life, including disease, depend on a few basic mechanisms that can be better reconstructed through the comparative study of different forms of life, rather than through the detailed study of each of them. In fact, in the first place these mechanisms are easily identified as a common characteristic of different forms of life, whilst in the second case they are often masked by the specific connotations of each of them. A classical example is that of tumours. The genetic information supporting them, termed proto-oncogene, has remained unaltered through a phylogenetic interval extending from fungi to man. This has simplified the identification of the proto-oncogene and suggests that it plays an essential role in life; otherwise, in fact, it would have been cancelled or modified. According to a hypothesis already formulated during the last century (Virchow, 1863), this role would be linked to the maintenance of life in conditions of extreme danger. This would occur through the mutation of the proto-oncogene into an oncogene which causes the cell to regress to the primordial forms characterized by an uncontrolled and unlimited duplication capacity. This biological hypothesis sheds a new light on the pathogenesis of tumours and opens new prospects for their treatment (Silvestrini, 1990a).

Life is also maintained by phenotypical adaptations which defend not life itself, but the specific characteristics of species and individuals by homeostatic processes. The comparative study of some particular aspects of these homeostatic responses led to the formulation of two working hypotheses on the pathogenesis of depression and schizophrenia which are described briefly below — hypotheses used with a certain success in the study of mental disorders.



4. Depression as mental pain

Ethologists distinguish between three fundamental types of homeostatic response to danger: attack, a measure to actively resist aggression; flight, characterized by passive protective measures against aggression; surrender, involving defeat and, consequently, submission. These three responses can be identified in a phylogenetic interval, extending from procaryotes to man, having a wider range than that of the proto-oncogene. This shows that they have the same efficacy as the survival mechanism: if not, evolution would have chosen one of them or sought others. Evidently, the specific characteristics of the responses vary depending on the species. In monocellular organisms they are easily recognizable: for example, the emission of toxins; thickening of cell membrane or flight peristaltic movements; symbiosis. In man, instead, these are highly organized but are still recognizable within the alarm or stress response (Cannon, 1915; Guyton, 1986). Stimuli eliciting this are part of everyday life and only rarely do they reach the necessary intensity; a physical aggression; a contrast of opinions; cold; fright; pain; a commitment, like an examination or sports competition; a bereavement; difficulty in family or professional relations, etc. Such circumstances trigger an adrenergic discharge, presumably through the mediation of hypothalamic mechanisms, followed by a release of cortisol or other hormones. The outcome is a variety of effects tending to invigorate physical and mental efforts, thus enabling otherwise impossible tasks to be performed: mydriasis, which besides widening the visual field, relays a threatening or intimidating signal to the adversary; increase in heart rate, arterial blood pressure, and pulmonary ventilation, which improves blood oxygen and nutrition; blood flow redistribution, which is beneficial to some tissues and damaging to others; increase in platelet aggregation so that eventual hemorrhages are arrested more easily; release of sugar from their deposits and their accelerated synthesis at the expense of proteins and fats so as to to meet the energy demands of the organism; improvement in vigilance, concentration, and more generally the capacity to rapidly analyse a situation; anxiety; increased threshold of pain and fatigue perception, a

phenomenon which permits one to operate beyond the normal physiological levels. These phenomena are accompanied by a momentary depression of appetite, sex, and other instinctual drives that in emergency conditions are useless and potentially dangerous. These adjustments are useful for two of the three fundamental responses mentioned above, namely, attack and flight. This is not so for surrender, which deserves a brief comment.

Everyday life offers continuous examples of stress responses which deteriorate rather than improve physical and mental performance. For instance, in some students stress before an examination reduces their performance, as also happens with some athletes before a sports competition. In some people stress decreases, instead of increasing, the threshold of pain and fatigue. At times, appetite and sex, which are normally depressed by stress, are instead enhanced. These responses were termed paradoxical, as they contrast with the idea that the physiological response of stress improves performance, enabling otherwise impossible tasks to be performed. Nevertheless, since they actually drive towards surrender they may be considered just as important as those of attack and flight. The same studies by Friedman (1989), even though based on a classification of stress responses different from the present one, go in this direction, showing that the tendency to hostility is accompanied by a high incidence of heart attacks.

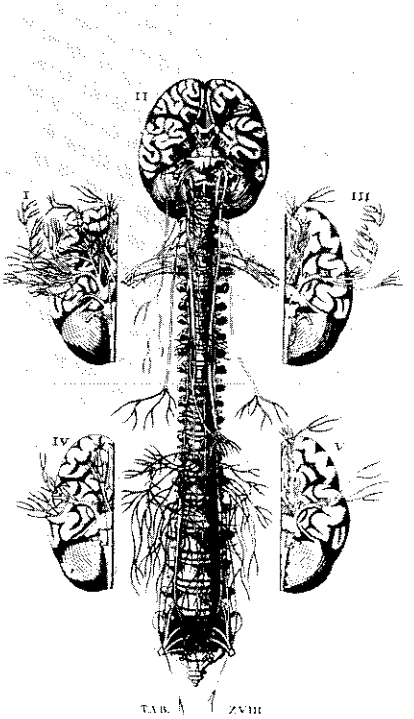
The exaggeration of the surrender response has obviously different pathological consequences from those accompanying exaggeration of the attack and flight responses (Silvestrini, 1990b). For example, if stress stimulates the appetite, its exaggeration will not lead to anorexia, but to bulimia and obesity; if it stimulates sexual activity, its exaggeration will not cause impotency and frigidity, but rather pathological states in which sexual activity cannot be exerted without a good dose of stress. If stress reduces vigilance, a situation of danger will no longer give rise to tension states and insomnia, but panic attacks as agoraphobia. Similar considerations can be made concerning depression, another disorder closely correlated to the psychobiology of stress (Gold et al., 1988 a and b). The hypothesis was formulated that subjects reacting to stress with a decreased threshold of perception of physical and mental pain are more vulnerable to depression (Silvestrini, 1989).

The biological hypothesis that depression is due to a state of mental pain correlated to the stress response has two implications:

a) if depression derives from the type of stress response, then its organic bases are not to be found in normal conditions, but within the individual reactivity to stress;

b) depression can be cured by drugs capable of interacting with the stress response and increasing the threshold of sufferance and mental pain;

Due to practical difficulties, the first point was experimentally verified only recently in collaboration with G. Nappi. The results, however, are not yet available. The second point was confirmed in the discovery of trazodone, the first atypical antidepressant (Silvestrini, 1989).



5. Humoral mediation and schizophrenia

The prerequisite for homeostatic responses is the capacity to perceive and elaborate information and transform it into appropriate commands for the effector organs. In monocellular organisms these informative functions do not rely on specialized structures, but are part of the functioning of each elementary system. In multicellular organisms they depend on neurons with increasingly sophisticated modalities as phylogenesis proceeds. From the isolated neuron one passes to the peripheral ganglia and then to the central nervous system, in which highly specific nerve structures reside.

The information system utilizes two different mechanisms of signal transmission: humoral transmission and the nervous network. The humoral mechanism involves chemical mediators transported mainly by the circulation, through which they may reach and activate simultaneously the nerve endings of the entire organism or a large part of it. It is therefore comparable to the sound of a siren or a bell which can be heard by everyone living in a large area. The nervous network, instead, establishes more specific connections, resembling a telephone which transmits messages to each subscriber. The humoral mechanism is much more primitive than the nervous network, but was preserved in the evolution and coexists with the second as their roles are complementary. The first is used when a generalized increase or a decrease of the vital processes is necessary as occurs, for example, during the circadian cycle and the stress response. The second is associated with those functions necessitating an autonomous regulation, for example, motor. The co-existence of these two mechanisms is difficult, however, because the central nervous system is much more sensitive to humoral mediators than the peripheral one. In the first case, in fact, the nerve receptors have an extremely high density, whereas in the second case they are rare and surrounded by large amounts of inactive material acting as an insulator. This problem has been resolved in different ways, the most important being the blood-brain barrier,

which protects the nervous system from the humoral mediators of nerve transmission.

From these data the hypothesis is formulated that schizophrenia and, more generally, psychoses, may depend on a malfunctioning of the blood-brain barrier. Unfortunately, the central levels of adrenaline and other humoral mediators are seemingly unaltered in schizophrenia (van Kammen and Sternberg, 1980). These levels should, however, be verified not only in basal conditions but also during the stress response. Apart from this, the above hypothesis was reproposed in the light of recent studies suggesting the existence of a second class of humoral mediators, termed facilines and antifacilines. These substances do not have a direct action on nervous receptors but increase or decrease the sensitivity to dopamine, adrenaline, and serotonin. They are therefore comparable to a knob which in a radio adjusts the volume independently of the wavelength of the single sounds.

These results prompted an investigation on the possibility of an involvement of this second class of mediators of humoral transmission in schizophrenia and other psychotic states.

6. Conclusions

Medicine has two souls, which have always confronted each other with alternating fortune. The first views disease as a component of nature to be fought against with respect, after its biological significance has been understood. The second views disease as a deviation from the natural order, to be fought against with every possible means and, if necessary, resorting even to empirical solutions. It would be disloyal not to admit that most of the modern medical breakthroughs, those which have effectively fought disease and suffering before having unravelled the underlying causes, are related to this concept of medicine. Despite this, the greatest aspiration of medicine is to get to the root of the disease to cure it. Therefore, the prospects for psychopharmacology as a means of restoring the mind essentially depend on our capacity to elucidate the organic causes of mental disease.

To express the full impact of this basic concept let me conclude with the words of Virgil: " Felix qui potuit rerum cognoscere causas. "

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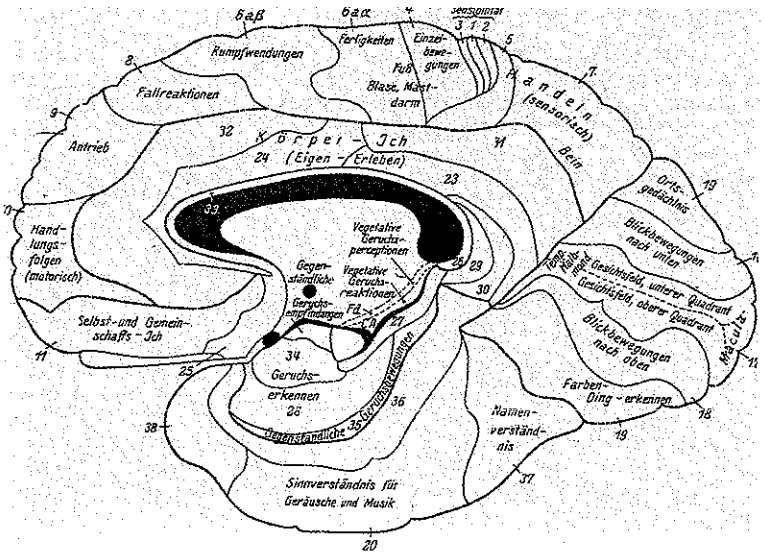


HERBERT Y. MELTZER

Recovery from Schizophrenia: New Advances in Pharmacological Treatments

Introduction

Schizophrenia is a disease of the brain which afflicts approximately 1% of people in all countries or populations which have been studied with reliable methods. The major clinical characteristics of schizophrenia are: 1) delusions, hallucinations, and abnormalities in cognitive functions such as logical thinking; and 2) lack of motivation, withdrawal, diminished ability to experience pleasure, blunted capacity to feel a wide variety of human emotions and poverty of thought content. The former symptoms are currently called positive symptoms, and the latter, negative symptoms, even though the historical reasons for these designations are unlikely to be valid.

Many students of schizophrenia think of it as a quintessentially human disease that no other species within the animal kingdom experiences. Whereas anxiety and depression can be clearly discerned among other primates, there is no evidence that a schizophrenia-like disturbance in behavior ever occurs spontaneously in other primates. Nevertheless, research with laboratory animals has been absolutely essential in providing the information about brain and behavior that has produced our current understanding of schizophrenia and given us the power to rapidly identify promising drug therapies. As a uniquely human disorder, it is not unreasonable to hope that probing the mystery of schizophrenia will provide some insights into the very nature of humanity, to the issues of both our continuity with and distinctiveness from the rest of the animal kingdom. Chronic abuse of stimulant drugs, such as methamphetamine, may produce in man an illness that has some features similar to paranoid schizophrenia. Some observers believe that the drug phencyclidine, ironically called angel dust in America, produces an even closer replica of schizophrenia because it mimics some cognitive features of the disorder. Hallucinogenic drugs, such as lysergic acid diethylamide (LSD) or mescaline produce visual hallucinations that are not typical of schizophrenia and do not produce the characteristic symptoms mentioned above.

The concept of schizophrenia and its boundaries

The human mind, when it malfunctions because of inborn or acquired defects, often in the face of some stressful imperative, expresses its deviation from the normal in diverse ways. Broadly speaking, these disturbances in function comprise the mental (or neurological) disorders. It is essential, to progress in understanding, prevention, and treatment of these disorders, that we have a valid system for their classification and diagnosis. The condition we call schizophrenia was first isolated from the sea of behavioral dysfunction and mental anguish by Emil Kraepelin, a late 19th-century German psychiatrist with great systemizing insights. Kraepelin identified a psychosis beginning in late adolescence which he thought incurable, leading frequently but not always to a demented state, which he therefore named dementia praecox. However, in 1911, the Swiss psychiatrist, Eugen Bleuler suggested that the group of patients with dementia praecox were part of a larger group of mental disorders characterized by disturbances of cognitive, affective, motor, and volition functions which he called schizophrenia. This is the term that has endured. It does not mean "split personality." It does refer to a disintegration of thought, feeling, and executive function. Bleuler noted that recovery, though rare, was sometimes possible in this group of patients. However, even the optimistic Bleuler believed that a complete *restituto ad integrum* was probably not possible.

Since the time of Bleuler, there has been considerable progress in our knowledge about schizophrenia and, as will be pointed out, optimism about outcome. Schizophrenia is now diagnosed according to explicit criteria that can lead to high reliability in its identification by trained professionals, although early in the course of the illness diagnostic ambiguity may be common. There are other psychotic (e.g., schizoaffective) and characterologic (e.g, borderline and schizotypy) disorders whose relation to schizophrenia is still disputed. For research purposes, the broader group of disorders including schizoaffective and schizotypal states is sometimes referred to as the schizophrenia spectrum group. Whether narrow or broad criteria are applied, the likelihood is high that what is called schizophrenia represents a group of related brain disturbances which are expressed in a range of disturbed behaviors which may be pleomorphic.

Evidence from twin, adoption and family studies provide strong reasons for the view that schizo-

phrenia may be a genetically determined disorder, although most cases have no family history of the illness and there is currently much interest in environmental factors such as prenatal developmental dysplasias, birth trauma, and adolescent stress as possible etiologic factors. Because only about 50% of identical twins develop schizophrenia, it is clear that some nongenetic factors determine whether an inherited vulnerability to develop schizophrenia will manifest itself. As of yet, we do not know on which chromosome(s) the genes for schizophrenia are located. It is highly unlikely that only a single dominant gene is involved in any form of schizophrenia. We know that schizophrenia usually strikes the young, peaking between 15 and 25 and that it is somewhat more common and severe in males than females. Schizophrenia may first manifest itself in young people who excel in academics and social skills. In these individuals, it usually begins relatively abruptly. In others, it begins insidiously and in such cases, there may be considerable disturbance of personality and eccentric behavior prior to the apparance of gross psychosis.

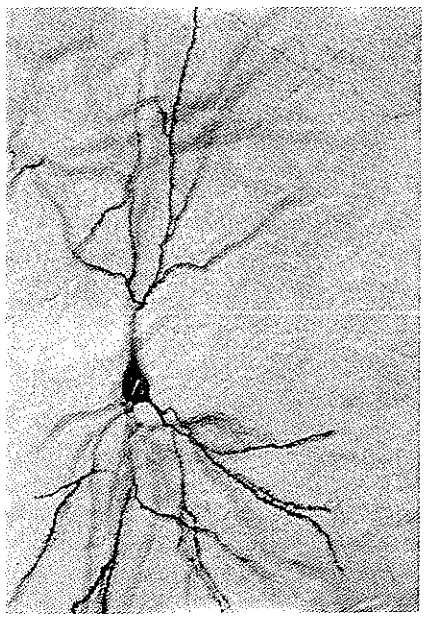
To the patient with schizophrenia, the world is often horrifying during an acute episode. Persecutory delusions, false beliefs that people are discussing them or that newscasts are specifically directed to them, delusions that thoughts are being inserted into or removed from their minds or that their will is controlled by evil forces, that they are commanded to harm themselves or others, are unfortunately not uncommon. Sensory overload, the feeling that sights, sounds, smells and touches of great intensity are flooding into their bodies without the possibility of modulation or control, are believed to be present in the early stages of the illness on the basis of reports of articulate patients. At the same time, there may be a deadening of the volitional, feeling, and pleasure-experiencing capacities. These symptoms make normal functioning impossible.

During the phases between acute episodes, schizophrenia can be highly variable in its symptoms and effects on social function. Negative symptoms may be of greatest significance for disturbances in social function even though positive symptoms are absent or present at lower intensity than during an acute episode. The ability to work or go to school is often very limited with conventional therapies.

During both acute and chronic episodes, patients with schizophrenia may be mildly to grossly impaired in neuropsychological functions, including attention, learning, memory, and executive function.

Biological basis of schizophrenia

In the last 20 years, we have obtained some knowledge of the pathophysiology of schizophrenia. We believe the neurotransmitter dopamine may be of the greatest importance in the etiology of both positive and negative symptoms. The disturbance in dopamine is the target of treatment, especially drug treatment, which has been designed to correct excesses or deficiencies of dopamine in different regions of the brain. Psychosocial treatments designed to minimize the stressors which cause the underlying illness to exacerbate and to enhance the individual's ability to cope with these stressors may also act via their influence on dopaminergic neurotransmission. These will discussed in more detail subsequently. Recent research using brain imaging techniques such as x-ray based computerized tomography and sound-wave based nuclear magnetic resonance, as well as post-mortem neuropathological studies, have suggested that there are some structural brain abnormalities in some patients with schizophrenia. These appear to be irreversible and most observers believe they may be present from birth, although they remain unexpressed except perhaps for some modest impairment of the individual's capacity to achieve, until the first full-blown expression of the psychosis, which may be related to surges in dopaminergic activity or failure of compensatory systems to modulate dopaminergic activity to be effective. Abnormalities in the frontal cortex, the temporal lobe, and the limbic system are believed to be the basis for schizophrenia, but definite evidence is lacking.



Treatments

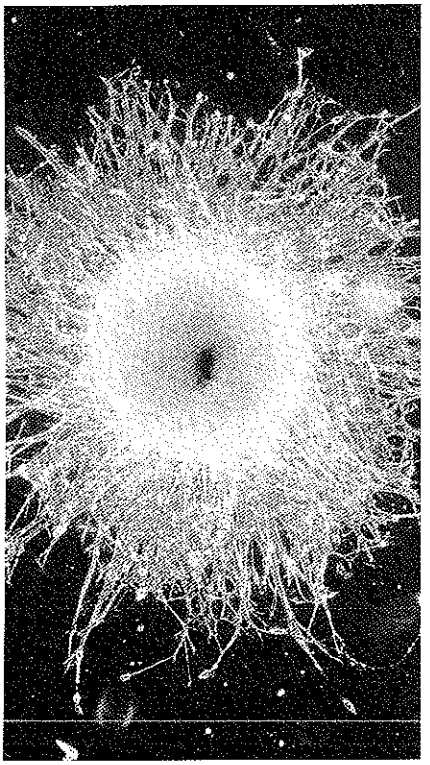
We now have a wide array of means to help many patients with schizophrenia recover, at least partially, from the state of disintegration, bewilderment, and despair which accompanys a psychotic episode. I will briefly describe the key elements of the best current treatments, discuss some of the societal issues which limit recovery, and suggest what might be hoped for in the near future with regard to new therapies and their application.

Pharmacotherapy

The main element in the treatment of schizophrenia is drug therapy. Since 1954, a group of drugs, called neuroleptics because they can impair motor function, has been developed, which can ameliorate most or all of the positive symptoms described above in 70-80% of schizophrenic patients. Examples are chlorpromazine, haloperidol, and fluphenazine. Within days to weeks of beginning treatments with one of these agents, delusions and hallucinations usually begin to diminish and then completely disappear. A paranoid belief system may

be replaced by trust in health care professionals and family. Loud, argumentative voices that may have made derogatory remarks about the patient and seemed to arise from within the head become softer and then silent. False beliefs of external influence over thought and behavior, or even of divinity, may be replaced by a sense of self-control and realistic self-appraisal. Sadly, remission of these psychotic ideas is incomplete many cases. Remissions usually become less complete with each recurrence of psychotic symptoms. Moreover, the neuroleptic drugs are only weakly effective against negative symptoms which become very disabling. Neuroleptic drugs are unable to reverse the structural brain abnormalities which have been identified by brain imaging and the cognitive disturbances which are the result of these structural abnormalities, as well as the chemical imbalances related to dopamine and other neurotransmitters. Moreover, the neuroleptic drugs often produce a series of side effects that mimic Parkinson's disease and in about 20% of cases, reversible or irreversible abnormal movements of the facial muscles, including the tongue, and some limb muscles, called tardive dyskinesia. These side effects cause serious compliance problems leading to discontinuation of medication by patients, without medical approval, and relapses within days to months after cessation of treatment.

Recovery may begin on seeing hospitalization as a sanctuary, a respite, such as the church has provided for many spiritually troubled people. A good psychiatric hospital staff will attempt to provide the right amount of stimulation for each patient. This will facilitate the process of limiting sensory overload. Drug treatment can initiate the process of recovery from delusions and hallucinations. This may begin within days, but it usually takes weeks to months before maximal results are achieved. Skilled mental health workers may be able to establish a trusting relationship with an acutely ill schizophrenic and hasten the end of the paranoid self-punitive, highly anxious phase of the illness. Even when treatment does lead to the end of the acute phase, a period of profound depression may set in. This may be related to the recognition that a catastrophic event has occured or reoccurred, i.e., a profound break with reality, or it may represent an intrinsic part of the biology of the illness, an inevitable consequence of correcting the chemical imbalance which led to the illness in the first place.



Because of the effectiveness of neuroleptic use inpatient treatment for schizophrenia was initially curtailed out of the well-intentioned belief that community treatment was now possible and superior to chronic hospital care. Later, however, the realization that community care was much less costly than chronic hospital care led to the virtual disappearance of long-term hospitalization in many western countries except for the most intractable cases. The mental hospital as an asylum for those who have few personal or external resources to cope with an often cruel, insensitive, and frightening social condition is, sadly, less of a viable option in today's world with its intense competition for societal resources than was the case prior to the development of the antipsychotic drugs. The vast savings in the prior cost of full- time hospitalization for the severely mentally ill, most of whom are schizophrenic, appear to have been used for other purposes. Some of these funds have been used for expanded outpatient services, of course. Nevertheless, these factors have contributed to the mentally ill homeless who can be seen in large cities throughout the world.

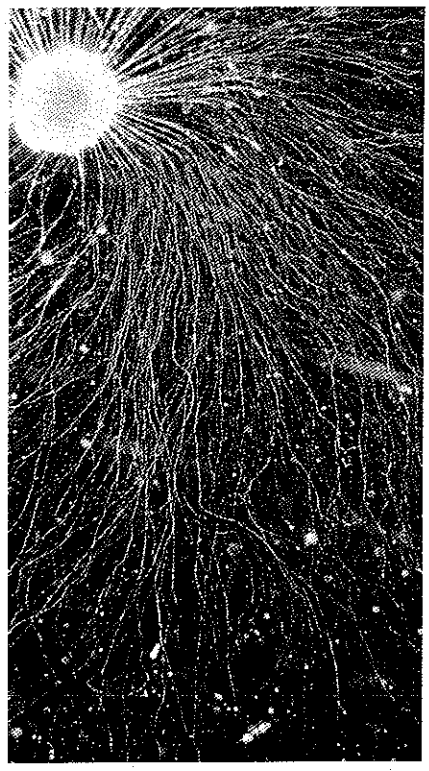
Clozapine

Recently, evidence has been obtained from a study which I codirected that a drug called clozapine, which has been available for over 20 years, has many significant advantages over the standard drug therapies. We have found that clozapine is effective in about 60% of the patients who fail to respond to any of the neuroleptic drugs. Moreover, it does not produce Parkinsonian symptoms or tardive dyskinesia. With this drug, some of the most disturbed schizophrenic patients, patients with previously intractable positive and negative symptoms, can be restored to a level of functioning that at its best can

approach the normal range. In our experience, rehospitalization has been reduced up to 85% and about one-third of the patients are able to attain the capacity to work and to live stably outside of hospitals, sometimes with families or friends, sometimes alone. With clozapine treatment, about one-third of those most difficult to treat patients are able to begin or return to paid or volunteer work. The sense of self-worth increases greatly. These factors all contribute to much less depressive feelings.

Clozapine appears to be superior to the typical neuroleptic drugs for non-treatment-resistant schizophrenic patients as well. Thus, it would seem to be the drug of choice for schizophrenia. However, clozapine produces a toxic effect on bone marrow in 1-2% of patients who receive it for at least 12 months. This rate decreases subsequently. This toxicity has limited its use and made it costly to use safely because of the need for weekly blood monitoring, at least during the first four months, and a surveillance system to ensure that monitoring does take place. Intensive research is under way to understand the biological basis of the greater effectiveness and lower incidence of Parkinsonian side effects and tardive dyskinesia with clozapine so as to develop an equivalent drug that could be used without special precautions in the full range of schizophrenia. We have proposed, on the basis of studies with laboratory animals, that a strong blockade of one type of serotonin receptor and a weak blockade of one type of dopamine receptor is a useful model to identify clozapine-like drugs. This theory has now led to the clinical testing of a number of clozapine-like candidates throughout the world and it may be expected that within the next decade such an agent will be found. The continuous use of such an agent from the earliest stages of schizophrenia is possible, perhaps even before psychosis emerges, in those who can be identified as having latent or incipient schizophrenia on the basis of some combination of biological and psychological assessment, as well as family history.

At some future time, perhaps within five years, genetic markers should be available to confirm the diagnosis in many cases. Early treatment, if not prevention, may be expected to have a powerful influence on the course of schizophrenia, since much of the defect in social function which develops during schizophrenia is a direct result of the disruption in social relationships and demoralization which ensues from the initial and subsequent psychotic episodes.



Psychosocial treatment

Psychosocial treatments synergize with optimal drug therapy to help in the rehabilitation of the patient with schizophrenia. There are numerous elements to this process: education of the patient and his family about the nature of schizophrenia, including its causes, course, and treatment; training to enhance social skills; enhancing stress management skills while at the same time providing structure within the daily regime to minimize stress; assistance with job training and placement or schooling; assistance in housing; and direct disability income payments when remunerative work is impossible. Intensive individual insight-oriented psychotherapy has not yet been shown to be helpful in clinical studies, but specific patients may derive some benefit from this type of treatment. In any event, psychotherapy is beyond the means of all but the most affluent patients. Group therapy and support groups for patients and their families are usually both more cost-effective and therapeutic than individual treatment.

Outcome and recovery

Schizophrenia, as Bleuler observed, is rarely a self-limiting process, at least in the first three or four decades after its initial appearance. There is some evidence that the positive symptoms of schizophrenia may spontaneously remit in later life in a significant subgroup, but this needs confirmation. In any event, such recovery, if it occurs, is too late to prevent a life of mental anguish and inability to fulfill any of the individual's potential. However, with optimal drug and psychosocial treatments, it may be possible for as many as one-third of

schizophrenic patients to recover from their illness to the point that they are functioning within the normal range. With clozapine, or especially other drugs that may be its equal, starting treatment at an early age and stage of the illness may lead to even more complete recovery.

Future developments

Society has a great stake in facilitating the recovery from schizophrenia. The cost of schizophrenia in the U.S. may be as high as 40 billion dollars a year, made up of direct medical costs, lost income, and disability payments. The worldwide cost in incalculable. Of course, humanitarian concerns should impel all compassionate, thoughtful persons to work for optimal treatment of schizophrenia and for intensive research. Sadly, both state-of-the-art treatment and research effort commensurate with the problem and the challenge do not occur at the present time. The reasons for this are many: belief that schizophrenia is not a disease but a manifestation of some type of normal or characterological deficit; fear of violence from the patient with schizophrenia, belief that schizophrenia is hopeless; and simple unwillingness to reach out to the less fortunate. All these mistaken beliefs or characterologic limitations are at least theoretically amenable to education and persuasive appeals made in the right way. In the United States, families of patients with schizophrenia and other serious mental disorders have formed the National Alliance for the Mentally Ill, as well as other organizations, to influence public policy and attitudes. They have been very helpful in obtaining support for the U.S. Schizophrenia National Plan and a broad neuroscience research effort funded by the U.S. government called the Decade of the Brain. A worldwide organization of families with a member with schizophrenia is a goal that might bring this illness to its justly prominent place in public concern.

Organized religion, of course, is a powerful means for change in the attitude of society towards schizophrenia and other forms of mental illness. Affirmation by religious leaders to their congregations that schizophrenia is a real illness, a treatable illness, and that compassion for one's fellow man should extend to the attitudes of both public policy makers and the average person. Recognition that the patient with schizophrenia can, with proper help, become a functioning member of society can be of value in destigmatizing schizophrenia.

Conclusions

We can all be justly proud of how much progress in understanding and treating schizophrenia has been made since the pioneering work of Kraepelin and Bleuler. We must, however, rededicate ourselves to the achievable goals of new knowledge to understand the etiology of schizophrenia, develop methods of prevention and superior treatment, and to provide a high level of care to patients with this illness throughout the world.

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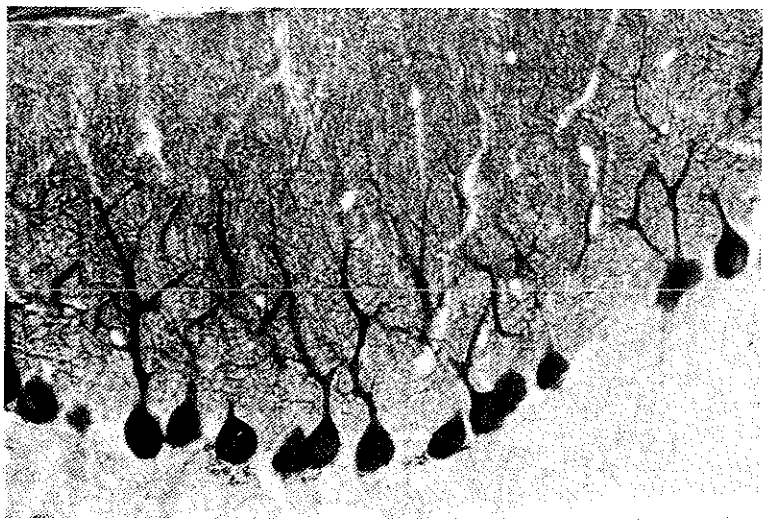

CORRADO MANNI

The Human Mind and the Future of Resuscitation

May I be allowed at the beginning of my contribution to express my gratitude at the honour shown me by being invited to participate in this august assembly before so many illustrious personages from the world of theology, of philosophy, and of science. And to do this as a representative of the discipline which I chose for my life, bringing a modest contribution on a subject which is rather foreign to me but which I consider fundamental for all those who are engaged in a practical activity. Naturally, I must confess that the topic is not particularly simple and that I felt difficulties and hesitation in addressing myself to it. This is because I was afraid that at some stage I would go off the point, that is to say, outside my field and thus run the risk of not being totally convincing: if such is the case, I offer my apologies in advance.

In exploring the relationship between the human mind and the future of resuscitation I have borne *three models* in mind. The first is *real or structural* and involves the complex mechanisms which are present in all aspects of organic life and which are connected by an inflexible logic. The second, which is *rational or superstructural*, is of essence abstract and dominates all human activity through logic and reason. Finally, there is the *spiritual*, which is pure reason, pure logic, pure feeling, and therefore the most elevated product of the three.

The material and the spirit, the immanent and the transcendent, are contradictory aspects, united by reason, but the second is the real, the dominant, because in it is to be found the real reason for existence.

I do not know to what extent this premiss will meet with a consensus. I know for certain that if man disturbs his judgement and privileges the immanent his sense of tomorrow disappears, he loses his perspective, and he fails to be aware of the grave moral crisis into which he has fallen.

Spirituality, unfortunately, which is pure rationality, pure logicity and pure feeling, is not a consumer good. For this reason few appreciate it: amongst those that do are those who have a scientific goal, a goal not sustained so much by intellectual curiosity as by a desire to prepare a better future for the whole of humanity (*Pool* 1).

Personally, I believe that scientists, or more generally those that are engaged in research, have before them three *three great horizons* to explore: the world of things through *practical activity*, necessary for survival in the best of ways; the *world of reason* through theoretical speculation, understood as the synthesis of the multiplicity of phenomena; and the *world of the future* — the ideologizing of all that we today consider to be the greatest aspiration. Spiritual meditation, which represents the world of the future, although it is a private activity carried out by each individual according to his personal convictions and orientations, is a general duty. This is because after the pleasures and the idleness the non-ephimeral content of our existence is in that place where our mind finds its most complete expression. The human mind, before the transient and the eternal, the mortal and the immortal, when sustained by spiritual meditation is no longer completely disarmed but reaches an awareness of its own existence.

Unfortunately, daily duties and concerns keep us distant from these thoughts, but it is precisely for this reason that we often fall prey to dejection — something which is all the greater in the person who does not manage to find a plausible and reasonable explanation for his own activity.

It is certainly true that the individual who halts at the level of small significance does not encounter problems and is not tortured by doubts that he will err, and this is because he uses a method of which man has learnt to make good use. The person, however, who dares to challenge the infinite, experiences a bewilderment when confronted with the immensity and complexity of phenomena, and is compelled to search continually for a method which will allow him to verify the accuracy of his opinions.

Empiricism has taught us that organisms are equipped with a series of mechanisms which are strictly interconnected and which are directed towards a determined project, and to whose formation proteins contribute to the highest degree. Empiricism, however, has not explained the singularity of the brain. The brain's functioning gives rise to a property which is qualitatively superior to the other organs. This jump is incomprehensible if one does not accept as a given fact that the passage from nonbeing to being reflects a process which has in itself that which is new, and that the inverse — that is to say, the passage from being to nonbeing — is its specular aspect. Life and death, therefore, are both essential.

Of course, this is only an abstract thesis which remains as such until it finds support in a verification that

we have sought in that activity which we find congenial — that is to say, in professional activity. By its extraordinary nature this activity represents the point of contact between life and death — things which may be also understood as the most comprehensible aspects of those categories which belong to the immanent and the transcendental.

Intensive care is a young discipline, but it is unique in that it allows an observation of the most touching problem of existence — the passage from life to death. The path it takes is begun with a definition of the various case conditions involved and the demonstration that death is a gradual process which, in certain cases, is reversible.

At one point the distinctive indicator of life was breath. This is no longer so because this function can be controlled and aided by means of special instruments such as automatic respirators or the iron lung. This last not only permits an extensive prolungation of life but also an active presence.

Subsequently, the heart was thought to be the decisive organ, and when it stopped the definition of the state of death was held to be clear. Today even cardiac arrest is a reversible phenomenon. Indeed, even after a long period of arrest its functioning can be reactivated. This can be achieved with external cardiac massage. When this does not work and the patient is in a suitable context one resorts to internal cardiac massage associated with the administration of drugs which promote ventricular febrillation and allow the defebrillator to recover rhythmic motor activity. There also exist more sophisticated instruments for cardiac treatment — amongst these the counterpulsator is the most suitable. When this is not effective the heart-lung machine is used. The artificial heart is in the early stages of application and therefore it has not yet reached a definitive structural form. But all the premisses exist for thinking that not very much time will pass before this intensive care aid will enter into common clinical practice.

Heart transplants are the glory of surgery. From many points of view the technique is miraculous, but its use is still comparatively rare. This is because there are not enough organs to transplant and because the advances in intensive care tend to reduce their number by increasing the capacity of the heart, and above all, by the more accurate ascertainment of cardiac death.

In the presence of sudden death it is necessary to pay more attention to the thermal state of the patient — a fact proved by innumerable examples. A recent case has been written up in the well-known English journal *The Lancet* (*Editorial* 2). The patient involved was a young Canadian woman (*Kristijanson* 3), who was found by a policeman at eight o'clock in the morning on the eighth of March 1989, in a car where she had passed the night. She did not give any signs of life inasmuch as there were no signs of breathing, no perceptible heartbeat, and only a contraction of the neck muscles. Resuscitation began twenty minutes after the body was found, and after admission into hospital the pupils were found to be dilated and fixed; the extremities were rigid and cold; reflexes were absent; and the heart was in a state of asystolia. At the point of commencing rewaring the rectal temperature was 26 degrees centigrade. Three days after the accident the woman left the hospital without any cerebral deficit whatever.

It is certainly true that mechanical assistence of circulation has allowed the achievement of great successes, but the rate of sudden deaths has not diminished. This is chiefly because the cerebral centres are very sensitive to anoxic insult and because their process of extinction has a different character. The first activity to give way is the integrated, or rather the presence-awareness. Afterwards there appear functional alloeoses in the growth area of the pathology. Finally, there come structural or organic alloeoses. With regard to resuscitation, the younger or simpler nerve structures, compared to the older and more complicated structures, are the first to reappear, while those areas which in philogenetic terms emerged later are the first to undergo extinction.

The cerebral cortex is the part which is the most sensitive to anoxic insult. There then follow, in succession, the subcortical-mesencephalic zone, the mesencephalon, the protuberantia, and finally the medulla — whose upper segment is more resistent than its terminal part. The upper part of the medulla can be submitted to interruptions of blood circulation without serious damage for up to eighty minutes, whilst the intestinal nervous plexus is thought to be more resistant (*Cannon* and coll. 4). When the ischemic damage is not uniform, something that happens often, the cerebral centres do not decline, and they do not revive according to a determined process. Indeed, awareness and intelligence are not always the first to be subjected to functional deficit — as Rossen and his collaborators demonstrated some time ago (5). They conducted an unorthodox experiment on one hundred and six voluntary subjects and eleven schizophrenic patients and caused the arrest of cerebral circulation up to the level of one hundred per cent. This was done by applying an insufflatible cuff around the neck and raising the internal pressure as far as 600 mmHg. These researchers were thus able to demonstrate that after 5-10 " a disturbance in the movement of the ocular globes occurs and that there then takes place a loss of consciousness. In some of the subjects a restriction of the visual field to the level of amaurosis was noted, whilst consciousness and hearing remained intact. After this point the researchers observed clonic and sthenic convulsions which on occasions were generalised and paresthesias in the form of formications or pangs, above all else in the legs and hands. At this point the symptoms became so serious that the subject was forced to take off the cuff. If the experiment was taken beyond the 100 " level the corneal reflex disappeared, the Rossolimo and Babinski signs made their appearance, and there was an involuntary loss of urine and faeces.

The heart-lung preparation, whose cerebral function is totally absent while the heart and lung remain active, is a terminal case condition which is theoretically reversible. When the right conditions exist for a recovery — even though a state of deep coma remains — the first signs of elementary cerebral activity emerge. Thereafter the ocular-blepharal reflexes become reactivated and mydriasis is lowered to

the point of taking the form of a more closed myosis with punctiform pupils. One then passes from the happallic syndrome to hyperactive coma and then to coma vigil. In this last there are present ataxia, consciousness disturbance, mental confusion, aphasia, sensorial and motor apraxia, anarthria and affective exaltation. When the state of coma stops and when consciousness returns, there sometimes remain, but often in a transitory fashion, focal cortical lesions which provoke alloeoses regarding sight, hearing and smell.

A knowledge of cerebral case conditions which follow a serious anoxic insult came to allow a formulation of an appropriate pathogenesis about them and the establishment of a method for their correction or prevention. It was thus discovered that the principal cause of cerebral damage is the total or partial *lack* of perfusion of the brain and further discovered that intensive care should seek to reactivate cerebral circulation. When this goal has been reached through the use of all the instruments utilised for cardiac intensive care the result has been the recovery of certain patients. The great majority of these patients, however, die — either because the treatment comes too late or because the reactivation of the circulation is not constant. Indeed, it often happens that the cardiac action does not manage to achieve a sufficient pressor condition for adequate cerebral blood-flow. In such a case the recovery of the cerebral functions undergoes an irreversible halt.

Another factor which is responsible for an incomplete perfusion of the brain is the formation of small thromboses on the inside of the terminal arteries — caused by a halt or slowing down of blood circulation — which involve the appearance of multiple cerebral infarcts. These last, in their turn, are responsible for necroses of the cerebral tissue. The timely employment of anticoagulant drugs prevents such a complication. Another cause, which is responsible for protracted coma and which is often observed, is the formation of cerebral edema provoked by damage which occurs in the area of the internal coating of the capillaries and which makes these capillaries permeable to large molecules.

In studying the regressive phenomena of insufficient cerebral blood-flow in cats it was discovered that a role of similar importance is played by metabolic factors and that these provide the nerve cell with its principal energy sources — such as glucose and glycogen. Aerobically, the glycogen is transformed into pyruvic acid which, in the presence of oxygen, is incorporated into the Klebs cycle. This process can only take place in the presence of phosphates of a high energetic power with ATP, UTP, of some electrolytes, of moltiple enzymatic systems, and of vitamins 81, 86, and 02. ATP is the primary source for the chemical energy of cerebral tissue, the maintenance of electric activity, the integrity of the cellular membrane, the sodium pump, the synthesis of the proteins, the nucleo-acid of the lipids, and the utilisation of glucose. In the event of a lack of oxygen there is an inhibition of glucolysis, a fall of the ph level of tissues because of the conversion of pyruvate into lactate, and the creation of an environment which is not favourable to the action of the glycolyte enzymes.

When conditions of circulatory arrest are present, all these metabolic processes are deformed, altered or performed incompletely — with serious alloesis regarding the constancy of internal capacity. When homeostasis is disturbed specific functions of certain organs undergo such a resultant damage that within a short time there can occur a distintegration of organic unity and thus death. After the post-war period great advances were made both in our knowledge of metabolic disturbance and in its correction. Today electrolyte imbalances of an acid-basic order can be immediately identified, monitored, and rapidly corrected. In this way another major obstacle was greatly reduced and metabolic deaths have by now become rare.

The involvement of the immunity state was the other factor working against intensive care: after a serious accident the powers of immunity defence are depressed and this fact often provokes infections which cannot be cured, even after a rapid and intense antibiotic therapy. A further aid, regarding cerebral intensive care, which hitherto has been prevalently theoretical, has emerged with the discovery of the nerve growth factor (NGF) by Levi-Montalcini. This allows the repairing of the verifier alloeoses in the nerve cell (6). Clinical application would be based upon the fact that the NGF is a polypeptidic hormone which contributes to the development and the survival of the sensorial neutrons of the neural and synaptic crest, both in vivo and in vitro — taking part in nerve regeneration after traumas and playing a role in the differentiation of sympathetic neurons by means of specific genes (*Milbrandt* 7).

Given the regenerative and trophic activity of the NGF it is believed it can also be used in the prevention, or at least the attenuation, of mental deterioration, and, above all, else against the loss of memory. These indications, however, have not yet found experimental confirmation. Indeed, there are those who sustain that the NGF could be damaging (*Marx* 8).

Cerebral death is a process which involves all the organs, but the point of departure is always the cell, whose alloeoses come about in stages. Some afflict the cellular membrane with multiple receptors from the exterior; others, on the

other hand, affect the interior and thereafter all its multiple functional complexes.

A vast range of products with various effects exists to counteract these receptors. Much confusion still prevails with regard to the latter complexes and the contributions to the question are still subject to observation. The NGF, the group of proteins called citochines, and many other factors are thought to be regulators of growth and of the differentiation of cells in embryonic tissues and adult organisms. A glycoprotein has been isolated which functions as a factor of cholinergic neuronal differentiation and acts on the post-mitotic sympathy neurons specifically inducing the expression of the synthesis of acetycholine and the cholinergic function — but which suppresses the synthesis of catecholamine and the noradrenalinic function. This glycoprotein is thought to be a factor in differentiation and to control the phenotypical choices of the neurons without altering their survival or growth (*Yamamori* and collaborators 10).

Another factor in the repairing of neurological damage has come with the discovery that the transformation gene — the oncogene — appears to be a homologue of the NGF and that certain oncogenic products can induce the differentiation of the receiver cells, thus obtaining an intricate interplay between the processes of differentiation and of transformation. The phosgene, for example, is thought to act as a sensor of the signals entering the cellular membrane with the purpose of converting them into responses of long duration and overseeing the regulation of the cellular cycle (*Marx* 11).

I realise that continuing along the lines of genic analysis may seem going beyond my own field, but such is not the case: biological processes do not recognise frontiers and many of them, which are to be observed in both physiological and pathological conditions, are also present in the ambit of resuscitation. A deeper exploration of the phenomenon of cellular replication is not only useful in explaining the mechanisms at work in those two major phenomena — cancer and senility — but also in understanding the processes of repair that are to be observed after acute or chronic pathologies which afflict nearly every organ. In our opinion a preliminary condition to every project of genetic manipulation is the establishment of whether cellular growth and cellular immortality are quantitatively or qualitatively different. The prevalent opinion, as is well known, is that immortality is growth sustained by the presence of specific entities — the oncogenes — which through the synthesis of oncoproteins are responsible for growth *ad infinitum*. It has recently been discovered that immortality is the outcome of the loss of a gene which was perceived as a suppressor, and it is also thought that a balance exists between these suppressor genes of immortality or malignancy and those that are, on the other hand, only genes of cellular growth (*Marx* 12, *Sager* 13, *Harris* 14, *Vogelstein* and collaborators 15, *Baker*, 16, *Trent* 17).

Because we are not interested in the pathogenesis of cancer, the phenemenon would not be of relevance if it were not for the chromosomic instability which is at the base (*Cavenee* and collaborators, 18, *Dryja* and collaborators, 19, *Murphree* 20, *Vogelstein* and collaborators, 21, *Baker* and collaborators 22) of the overwhelming majority of examples of the pathology.

However, we are not in a position to establish if the oncogenes make the cells immortal or, on the other hand, if they function as molecular interruptors (*Milburn* and collaborators 23). But it seems to us that the fetishistic vision of the gene is exaggerated — like the concept of genic homeostasis — and that it is simpler to consider immortality as a property which is potentially present in all living material. Thanks to its special structure, the genome has within itself the property of dividing itself *ad infinitum* without modifying its own genetic patrimony. After all, this different opinion regarding genes is not a great loss — inasmuch as their principal task remains intact: through differentiation they decide all philogenic and ontogenetic phenomena (*Jimenez* and collaborators, 24). In compensation, gene therapy would receive a great advantage, both against cancer and against all the other illnesses caused by gene disorders.

The results achieved by intensive care bear witness to the correct course so far taken. But they also attest to the urgent need to go beyond existing research and to concentrate attention on the environment and interior of the individual cell in order to modify its behaviour. To achieve this goal it is not enough to keep a positive conception, to continue with the empirical method, and to trust to observation, because with these one will have a knowledge of only a part of the phenomenon, but not a vision of the whole. In the same way, one will not be able to make predictions or make programmes for the future.

Living day by day and solving problems as they present themselves certainly have great merits, but they do not have the merit of orienting research and society towards a better future. Basically, the countries which live in a state of prosperity believe that the present way of living is the very best that one could wish for and believe that medicine has reached the zenith of its possibilities. The realities, however, are different. In fact, notwithstanding appearances to the contrary, the major problems have not been solved and to free ourselves of them

we must look for different paths. That is to say, we need to keep on perfecting mechanical techniques but we should not dream that these can solve the problems of resuscitation.

Biochemistry has great merits. Its principal merit is its highly successful fight against infectious diseases. In all the other fields, its successes halt at the symptoms, and even with the very best intentions one cannot hope that most serious illnesses that exist can be eliminated solely through the use of drugs.

Genetic manipulation of somatic cells has immense prospects before it because it penetrates into the intimate mechanisms of cellular life and changes cellular behaviour. With such manipulation it will, perhaps, be possible to obtain a solution to the problem of cancer and of many other congenital and metabolic illnesses. Naturally this is only a hope and a wish, given that this therapy is still in its early stages (*Cullinton*, 25). But even when all the present hopes are fulfilled humanity will have gained years of life and not of prosperity, unless an interior life is developed which allows us to look with trust at what must inevitably come after every advance.

And it is for this reason that our most important task consists in a retrieval of *ideology*. This term is very much debased nowadays because it is wrongly used for very disparate situations — situations which have created social and scientific stagnation. Ideology, understood as the greatest contribution that the mind can conceive in advancing a future of moral and material well-being, is the best antidote against the continual and persistent degeneration to which we are almost habituated.

This degeneration, if it is not speedily combatted, heralds a ruinous future. However, our task is not that of giving moral indications to society. Therefore, to return to resuscitation, I am confident that in the future, as in the past, it will manage to use those scientific opportunities which it is offered to give greater relief to the ever increasing number of people who turn to us.

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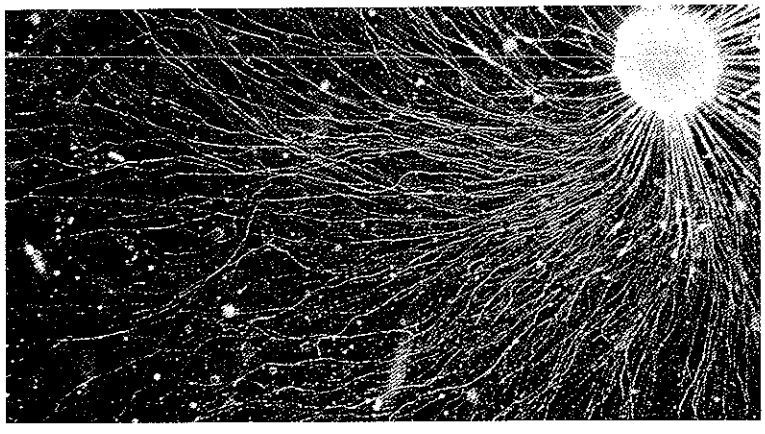


GOTTFRIED ROTH

The Brain and Pastoral Medicine

The Conference on the Human Mind, in its general topic, thematic subdivisions, and individual papers, reflects multiform connections with the formal object of pastoral medicine, with the specific subjects and problem areas of this science, which has developed from the mutual service of theology and medicine. The interdisciplinary structure resulting from this exchange goes beyond the immanent sphere of human medicine, which is essentially always a science of nature and a science of the spirit, since with its constitutional elements it is rooted in theology.[1]

From the correlation of the subject with the concepts of health and illness there results the development of an anthropological domain relating to pastoral care and a psychopathological domain relating to religion—for our other reflections as well, which must serve to present the meaning of the human brain from the standpoint of pastoral medicine. General conceptions on man as a being constituted by spirit, soul, and body — that is, as a natural and spiritual being — will be developed as considerations on the development of the relationship between the spirit and the brain.

According to Coreth,[2] man is spirit as the soul of the body, and body as the instrument of the spirit and personal totality. The unity of spirit, soul, and body is significant for medicine, especially for pastoral medicine. The main causes of human illnesses result from the union between body and soul, from the type of this union, from the relative independence of the body, from the instrumental need of the body for the soul, from the soul's precedence over the body. These basic facts are at the root of comprehension for health and illness in a broad, integral sense. "Any order in the soul and the spirit of man at the same time fosters his body; on the other hand, this means that man's body also constantly and in all things needs to be penetrated by the human spirit."[3] Moreover, it must be stressed that man cannot become ill as a person.[4] In other words, "the person can be the place, but not the bearer or subject of illnesses. There is no primary illness of the person, and even less is the destruction of the human person imaginable."[5]

For the standpoint of pastoral medicine, it is important that the body has worth as an instrument for the soul; this refers to healthy man, to the anthropological fact that the body is a support for the spiritual soul—in the context of psychopathological conditions, it can also be an obstacle for it.

The very up-to-date style of thought in cybernetic neurophysiology also offers a notable interpretation of the scholastic formula: *anima forma corporis*. According to Paul Chauchard, "scientific materialism today provides us with a functional vision of life which is quite dematerialized: atoms incessantly penetrate into living matter and then abandon it. There is nothing stable. The only stable thing is not the material elements, but their organization: a wall whose bricks are changed but which maintain their architectural form. Is this not precisely the scientific transfer of a fact which Thomistic philosophy had already established long before modern science: the structure of matter is the equivalent of its substantial form. The same is also valid for the problem of the relationship between soul and body.... To stress the way the living body of man is maintained as a unity amounts to awareness that the soul is the form of the body, responsible for the definite type of integration.... [As regards brain structure and its complexity] here, too, the structuring is the equivalent of information and the brain, from a philosophical standpoint, refers us to the soul as the form of the body."[6]

In our own time — 1964 — Viktor Emil von Gebsattel has written that psychosis is "a set of disturbances in mental functions which depend on the *soma* — i.e., somatoses — [and not], in any event, just "a so-called mental illness."[7] Georg Trapp tells us that "illness in the physical sphere may block the possibility of the spirit's expressing itself and manifesting itself in such an incisive way that the phenomenon of mental illness may result.... By interpreting psychoses as physical illnesses specifically blocking the personal, spiritual domain, the customary concept of illness could be maintained and at the same time the pathological character of psychoses. In this context there were repeated references to the incontestable and proper moment when the spiritual being as such cannot be subject to any form of disgregation and deformation because the organic is not proper to the simple reality of his being."[8]

V.E. Frankl states in his "ten theses on the person," "In truth, there is no mental illness. For the spirit, the spiritual person, cannot become ill; it exists even behind psychosis, though scarcely visible to the psychiatrist's gaze."[9] This is valid for the possibility of suc-

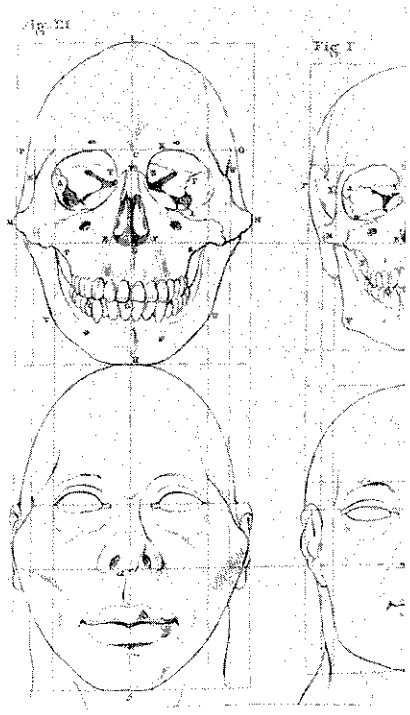
cumbing to illness and also for the effect of somatic therapy. " An illness may influence the psychophysical organism alone, but not the spiritual person; this also applies to treatment. Nor is the neurosurgeon's scalpel capable of touching the spiritual person. "[10] The same may be said of so-called psychopharmaceutical therapy. The drug exerts an influence precisely upon those brain structures which, as material substrates for spiritual-mental functions, are in a position to modify them.

J. Wyrsch has also devoted himself to this question and quotes from *De Anima* the very phrase in which Thomas Aquinas, in speaking of our nomenclature, states that only organic psychoses are possible: " The reason is that we see that so many enfeeblements of the capacity for thought and of sensual capacities do not touch the soul as such, but rather result from the weakness of an organ. Indeed, the thinking soul and every soul thus seems to be immortal, and the weakening of its activities does not seem to result from the fact that the soul is fleeting, but rather from the enfeeblement of organs. "[11] Wyrsch interprets this passage as follows: " There are only organic psychoses. The soul as such is indestructible and therefore cannot become ill; only the body, whose form it is, can, and consequently the manifestations of the soul — indestructible as such — are disturbed. "[12] Some somatic motives for physical illnesses are also indicated — *in senectute, in aegritudinis, in ebrietatibus* man is particularly predisposed to physical illnesses. We are dealing, then, with the psychoses of old age and intoxication, as well as psychoses manifesting themselves together with already existing illnesses.

Concerning the problematic of the " animation " of a human anencephalic, we should say, " The question as to whether an anencephalic developing after the unification of a human egg cell with a human sperm cell is really a man should be posed more sharply. In analogy with the old distinction between *actus hominis* and *actus humanus*, there is no doubt that the anencephalus enters within a *status hominis*; but in the absence of the brain he will never be capable of realizing the *status humanus*, for he lacks the substrate exclusively reserved to man for activities such as feeling, thinking, and willing — i.e., an intact, fully efficient (human) brain. The genome causing such a deformation is no doubt to be attributed to the *status hominis*, even though it impedes the passage of *potentia humana* into *actus humanus* and *status humanus*. The status *hominis* is always given, since the human anencephalic has arisen from two human cells. But there may always be an *anencephalus absolutus* or some other kind of *anencephalus partialis* to any degree. Even the comparison between brain death and a loss of reactions should be seen in a more differentiated way.

The comparison frequently used with brain death should, if anything, appear only in a broadly analogous fashion, for a brain has never been formed that can conclude its activity in death — its functions are nonexistent.

Even in the case of an *anencephalus partialis* (*meranencephalus*) we can speak only of a dissociated brain death in broad terms — no doubt a human being with a very serious deformation, with rudimentary central nervous functions of a



vegetative kind making possible a short survival period after birth, i.e., a condition which, without artificial support with a view towards a transplant, is not compatible with survival.

In the same way F. Seitelberger stresses that " the essential criterion for the personality is biological membership in the species of *homo sapiens*. The fertilized egg cell is a shoot teleologically projected towards a human-type individual already possessing the potential to mature through brain activity towards that level of subjectivity instrumented with broad self-determination which is defined as personality. Here we find the main difference as regards that animal form of development on which the human moral status is based. The fertilized egg is just as much of a person in the course of maturation as are the embryo, the neonate, and the child not yet aware of themselves. At no stage in this development towards the full expression of the personality does there exist an absence of qualities or a defect, but only a teleonomous course of formations which are complete in themselves. The first conglomerate of cells and the neonate are no different in this regard; they have the same ethical value and the same human dignity — it is only that their individual development differs. "[13]

The problem of brain death has been clearly presented in the literature from a neurological-psychiatric standpoint; there is broad agreement here. In the case of brain death which has been clinically, electronically, encephalographically, and radiologically proven we are dealing with a corpse with partial functions that are artificially maintained, but not with a living man. In the case of proven brain death, turning off any apparatus cannot be regarded as renouncing therapy or as killing, since we cannot let a corpse die or kill it.[14]

The consequence for pastoral medicine is that the man who has entrusted himself to the physician or was entrusted to his care has two rights as a patient, even if he has lost consciousness: as long as there is still a spark of hope about maintaining his life, he has a right to medical care, and until his death is proven with certainty, he has a

right to avoid organ extraction for the sake of transplants.

From the standpoint of pastoral medicine, it must also be added that the death of a man has a theological aspect as well *in hora mortis*. Medical vision is necessary, but needs to be completed, since "if modern 'thanatology', which precisely measures and describes, which proceeds with the methods of scientific physiology and pathology, has reached an uncontested conclusion, it is the understanding of how difficult it is to recognize what really happens in man's death."[15]

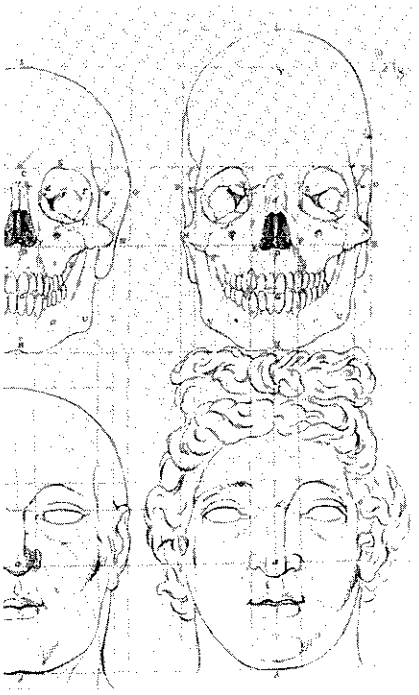
We must also refer to two areas of problems which have special ethical status in psychiatry; on the one hand, it is a question of discerning between real guilt and a pathologically performed misdeed; on the other, discerning between genuine and false extraordinary phenomena with religious content.

The symptoms of the forehead and brain are caused by (mechanical) lesions, malignant tumors, or other locally circumscribed illnesses. What is striking is a particular transformation in the conduct of the patient involved. In addition to the loss of spontaneity and the appearance of apathy — or of its opposite, restlessness — along with a decrease in the effectiveness of intelligence and memory, there results a decay in morality, augmented instinctive sexual behavior, with a lessened sense of modesty; the orbital syndrome in particular (at the base of the brain in the forehead) is characterized by a lack of tact and distance, by loss of ethical and moral inhibitions, by emotional disinhibition, by a lack of moral feelings and ethical deviations. It is *a matter of* behavior which must be traced back to a disease of the forebrain in regard to its orbital domain — behavior which should not be attributed to a personal fault in either penal law or moral theology. This is analogously valid for the pathological disturbance of the brain at the temples with manifestations of disinhibition and life-endangering and/or ethically abnormal behavior.

The last clinical example involves endogenous psychoses which are neurotransmitter disturbances and disturbances in brain metabolism that nevertheless display a significance for pastoral psychiatry through systems of madness which are religiously colored.

In the course of paranoid-schizophrenic psychoses there are some manifestations of madness marked at first by a deep-seated growth in religiosity, but then passing into pseudomystical and pseudoprophetic gestures and leading to pseudoecstatic phenomena — i.e., to numerous phenomena usually called "religious insanity." Differentiated psychiatric-pastoral diagnosis is therefore needed to observe, if necessary, the pathological character of extraordinary religious phenomena and to effect practical therapy with psychoactive drugs (with psychotherapy which is pastorally shaped).[16]

The same holds for psychotic and epileptogenous syndromes manifested in a pseudo-obsession. The psychotically conditioned loss of the self (when cerebral and organically caused), in the most serious form of disturbance of the sense of oneself, leads, with the respective pathoplastic and psychodynamic assimilation of the persecution complex, to the phenomenon of obsession.[17] These are psychoses conditioned by certain cerebral and organic substrates in the framework of which a good many religious phenomena which are not authentic are manifested, partly as unsuccessful attempts at self-healing (J. Klaesi), to defend oneself against the tremendous estrangement provoked by an illness and psychotic fear. We must also refer to pseudoreligious visions manifested as a reaction to hallucinogens, which are not mystical events, but the sensual expression of a cerebral intoxication (the mysticism of drugs).



Both brain diseases — which are mostly genetically conditioned in the molecular dimension of biochemical dysfunctions — and therapeutic influence upon them through neurotropic substances (psychopharmaceuticals) confirm the highly scholastic interpretation of mental illnesses as illnesses of the brain, along with the nineteenth-century formula regarding them as organic, as well as the common view of current (human-biological) psychiatry.[18]

Conclusion

Among the essential tasks of pastoral medicine — and of pastoral psychiatry, too — are differential diagnoses, not the least of which is neurological-psychiatric diagnosis, on the basis of which we can distinguish between genuine and nongenuine, especially pathological phenomena. The mystics have engaged in discernment of theogenous, diabologenous, psychogenous (anthropogenous), and pathogenic (psychopathogenic) causes of what they see and hear, recognizing optical and acoustical hallucinations as such, over against genuine religious phenomena. On the basis of its field of competence (alluded to at the outset), pastoral medicine is in a position to make its contribution as well for the purposes of clarification, including the area of intact or disturbed brain functions.

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[2] EMMERICH CORETH: *Was ist der Mensch?* Innsbruck 1973

[3] Franz Buchner: *Von geistigen Standort der modernen Medizin* Freiburg im Breisgau 1957, S. 57.

[4] Rudolf Kautzky: *Die Bedeutung der Person des Menschen in der modernen medizinischen Wissenschaft* Arzt und Christ 10 (1964) 162-174

[5] Viktor E. von Gebsattel: *Beiträge zu einer personalen Anthropologie* Schweinfurth 1964, S. 72.

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[10] Siehe 9

[11] *De Anima*, I, 10.

[12] Jakob Wyrsch: *Zur Geschichte und Deutung der endogenen Psychosen* Stuttgart 1956.

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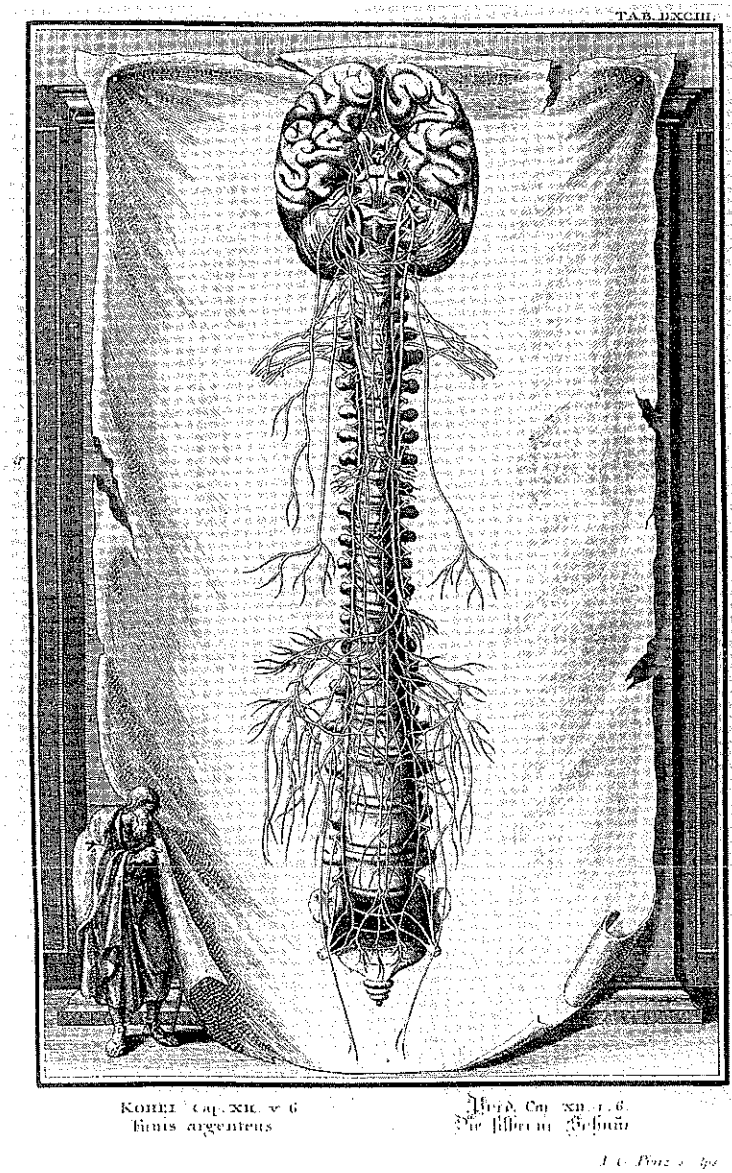


IGNAZIO CARRASCO DE PAULA

Psychoanalysis and Psychotherapy

In the fourth century before Christ Aristotle postulated a dual orientation in the human mind. He distinguished between theory (*epistemonike* or *theoretike*) and praxis (*logistike*). This distinction, through the medium of the Scholastics and the Kantian school, has lasted to the present day. The relationship between these two intellective functions appears as a strange combination of the complementary and the antagonistic, of supremacy and of dominion. Whereas *epistemenike* is superior with regard to the penetrative capacity of its intuitions and its syntheses, *logistike*, in overall terms, is on a higher level because it evaluates and takes the final decision as to what should be chosen and what deserves to be carried into effect.

Antagonism between theory and practice, which is an intrinsic feature of the human mind, is to be found throughout the long history of thought, in the various ways of arranging hypotheses, and in scientific conquests and achievements. In special fashion within the world of human sciences, this dichotomy appears even in our days as one of the great fractures which break and atomise the knowledge that we have of the phenomenon "man." The sphere of general knowledge and the sphere of applied knowledge constitute two worlds which almost cannot communicate with each other. Each has its own set of questions and its special language, its own methods, and its own history. Their coming together is more the product of mere coincidence than the result of an awareness that they participate in a shared task and have the same subject of study in common. From this last factor flows the need for them to compare and evaluate the various discoveries and conclusions that they have made with those achieved by the other disciplines which are concerned with *homo sapiens*.

This framework presents all the symptoms of an acute phase in the field of the sciences which study behavioural and mental processes. We have general psychology, which has the task of studying the great questions regarding these processes such as cognition, motivation, learning, etc., and we have applied psychology, which must tackle questions that need immediate and effective solutions such as, for example, the determinant factors of attitudes and ability, character traits, symptoms of psychic disturbance, etc. This last is the field and concern of psychotherapy, and psychotherapy often finds itself in the position of having to formulate diagnoses, prognoses, and therapies for the psychic disturbance of patients, and often in very dramatic contexts.

2) Psychotherapy has never shown itself too worried about making sure that it has a coherent theoretical base — a high level of generalisation concerning its concepts and the methods which are involved in the therapeutic process. Nevertheless, from the very outset the psychotherapeutic schools have emphasised the absolutely scientific character of their system. By such an affirmation, they often did not seek to maintain that all the methodological requirements of experimental science were respected, but, in more modest terms, that in a reasonably acceptable certain percentage of cases they were able to treat, or at least considerably reduce, the psychic disturbance of their patients.

One of the reasons why psychotherapy has always maintained a good distance from theoretical psychology is perhaps to be found in the polemical dichotomy between the *nometic* (which is concerned with the general laws which govern the psychic functions) and *idiographic* (which is concerned with single or individual realities). This dichotomy is in line with the distinction between sciences of nature and sciences of the spirit which was proposed by Windelband in 1894.

If ever a discipline should have adopted as a basic postulate the principle that abstract man does not exist but that there are only concrete individuals, such should have been psychotherapy. But an adherence to the cause of only-the-individual, which involves going beyond the context of the ancient saying "not the illness but the patient," leads to no longer being a science. This is because one of the conditions which is necessary for a passage, for example, from pure and simple observation to scientific study consists in a minimum of generalisation of the conclusions which have been reached. Observations, in themselves and when isolated from their context, can never constitute a science.

Psychotherapy, therefore, very wisely escapes the temptation to adhere to proclamations in the G.W. Allport style. In accepting, nevertheless, the possibility of a general science of the psyche as a fundamental base and guarantee of its own formality or scientific status, psychotherapy ends up by deceiving itself with the illusion that it can find a necesary scientific base in it-

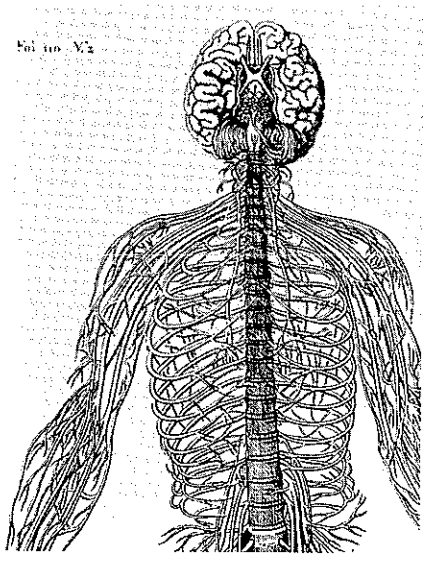
self, and by itself. Not only would it not have need of academic general psychology but, on the contrary, given, above all else, that it encounters hostility from such a quarter, it would be more practical and economic to find something in its place which psychotherapy could use for its own purposes and ends.

The epistemological base that this illusory aspiration rests upon appears to reside in the extremely equivocal postulate that the therapeutic successes amount to a trustworthy and sufficient scientific demonstration of the validity of the clinical methods, the theoretical principles, and the hermeneutic rules upon which the therapeutic process is based. Such a situation could be summed up by reference to the famous Cartesian principle, as the following statement well shows: *I treat / I exist as a therapeutist / I am in the right as a psychologist*. This is a typical historical example not of harmony but of confusion between theory and practice.

Once the epistemological limits of the results of psychotherapy had been made clear, it became very easy to effect a criticism which was not very kind, if not sharp and sarcastic. On the other hand, there has always been in medicine, and there will always be, a valid principle of confirmation or verification: whether what has been prescribed has a beneficial effect on the patient — independently of whether conditions of experimental verfication have been respected or not. The problem, rather, is that that benefit should not be a mere subjective experience — which would, however, in itself, have a considerable value — but that it should be connected with something which was real in organic and functional terms. And this, in turn, presupposes an ability to define and to distinguish mental illness. With the considerable difference, however, that while this distinction can usually be made in the presence of observable and quantifiable structures and somatic functions, it becomes a much more difficult and complex endeavour when psychic structures or functions are involved. The recognition of a line of demarcation between the healthy mind and the unhealthy mind is not an exclusively experimental problem. This is because the noun which is defined by the binomial ill/healthy — that is to say, the mind — is full of metaphysical and philosophical implications.

3) What has hitherto been said is demonstrated in emblematic fashion by psychoanalysis. Perhaps no other therapeutic school has arisen — at least in the mind of its own founder — which has had so strong an impulse to present its own affirmations and its own results as being rigorously scientific, and which offered, at the same time, its own general theory of the human mind. Thus it was that whilst, on the one hand, Freud could write to his friend Fleiss in 1896 that "during my youth my aspirations lay in the realm of philosophical knowledge, and I am now about to fulfill this wish by passing from medicine to psychology," on the other, he insisted throughout his life that either psychoanalysis was a science or it did not exist.

Without now entering into the details of the development of his thought, it seems that Freud did nothing else in the various and increasingly complicated and all-embracing formulations of his system



than develop and complete his first early insight — something that had been expressed as early as 1895 in his "Project for a Scientific Psychology." The project was much more than an unsuccessful attempt to explain psychic phenomena in terms of cerebral anatomy. In it there were already to be found the three key elements of the interpretation of human psychism — the topical, the dynamic, and the economic — which constituted the permanent nucleus of his doctrine, together with the genetic or evolutive vision, which was to be added subsequently.

Fortunately Freud understood that the path indicated by one of his masters, the neurologist Meynert, was not feasible. The existence of the neuronal structures postulated in his project could not be proved other than in the laboratory. The psychology of the time, on the other hand, used then as it uses now, concepts which could not be verified experimentally. His intuitions on the topical, dynamic, economic, and evolutive structuring of the psyche could be presented in a more accessible context as long as they were translated into mentalistic terms.

Freud then created an original system of an extraordinary complexity which belonged to both the psychological and the psychotherapeutic camps. Psychoanalysis was never presented as a provisonal hypothesis which could be verified. Nor was it proposed as one of the many plausible interpretations of human psychism. Psychoanalysis was the scientific truth about man. The epistemological basis was made up of observations which Freud considered absolutely valid and trustworthy, and which were therefore, as he wrote to Rosenzweig in 1934, "independent of scientific verification." If proof was needed of the fact one had only to consider therapeutic success — always according to the principle that in medicine the proof that really counts is therapeutic effectiveness, towards which all the rules of good clinical research are directed and ordered.

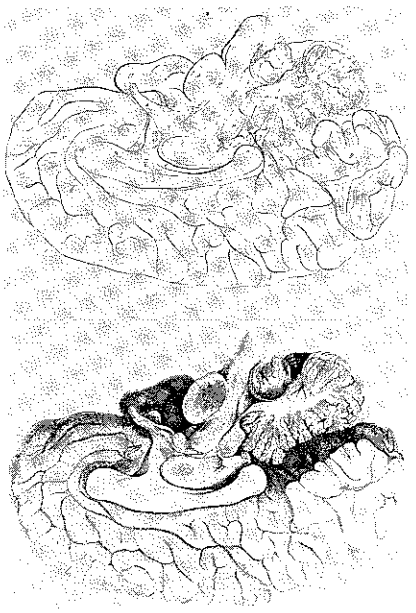
Freud and his disciples passed from the pathology of the human mind to interpreting man and the history of man in psychological terms. This error is not a feature of

the psychoanalytic school alone. Other currents in psychotherapy have tried to understand the entire past, present and future complexity of the human phenomenon — but certainly with much less fortune and internal coherence. And, indeed, other disciplines outside psychology have sought to utilise the Freudian hermeneutic in order to give impetus to their own research in their own specific fields — education, politics, the history of art, biblical exegesis, etc. may be given as examples.

The acceptance of psychoanalysis at the level of anthropological cosmology obliged those who were not orthodox Freudians but wanted to draw inspiration from his therapeutic style to make a distinction between doctrine and method — as if these were two independent, or at least separable, realities. Thus arose a new break between doctrine and praxis. Whilst the system came to be seen as a simple hypothesis still to be verified and anyway not indispensable, the method was seen very differently. The method, both with regard to the exploration of mental phenomena and in relation to the treatment of psychic disturbance, had to be considered as valid and immune to any suspicion whatsoever — this was because psychoanalysis (in its different versions and as expressed in copies of varying degrees of authenticity) actually *worked*. Or at least this was held to be the case until the nineteen-sixties.

4) The experience drawn from daily life, not to mention that drawn from the centuries, should have given rise to a more cautious attitude towards the principle of therapeutic verification. Any doctor who has had experience of (and, if we consider the various products of alternative medicine, will certainly continue to encounter) thaumaturgical preparations and marvel cures whose scientific bases are unknown but nonetheless have an undoubted positive effect on the health of his patients, will know that in the human mind the *factum* does not always coincide with the *verum*.

As is well known, from the nineteen-sixties onwards the splendid security of psychotherapy entered into crisis. On the one hand, its presumed effectiveness was seriously called into question by a series of research projects which sought to test the real effects of psychotherapy and the authenticity of its mechanisms of action. On the other hand, behaviouralist doctrines irrupted into the psychiatric field — doctrines which had a very rigid (and reductive) experimental scientific base: their different models of conditioning not only managed to explain the acquisition of anomolous forms of behaviour but also provided instruments for the formulation of a therapy. These instruments did not need complicated theories and constructions and thus they did not have to make constant appeals to the faith of the protagonist. Behaviouralism wanted to prescind from everything which cannot be measured — not only did it want to ignore everything that took place in the intimacy of the "mind," but in addition it wanted to prescind from the patient himself. If we have a symptom "R" associated with a stimulus "S," we can provoke another more important response, and thus reinforce its association with the stimulus, in order to replace the symptom. What actually occurs between "R" and "S" is not of any interest.



Finally, the considerable development and advance in psychopharmacology should be taken into account. Without definitively eliminating the last bastion of psychotherapy — I am thinking here of the *transfert* — this allowed therapy to be freed from its exclusive dependence on the particular abilities of the therapist.

In these conditions psychotherapy has been called upon to perform two tasks. On the one hand, it must make a suitable reply to the need to recover its own clinical identity. On the other, it must pay more attention to the scientific credibility of its own principles and its methods, and adopt a language comparable to that used by other disciplines.

5) Whereas the psychotherapies which draw inspiration from the psychoanalytical model do not manage to pass the severe examination to which the actual results of therapy are subjected by the experimentalists, it is also true that the techniques which derive from behaviouralist principles, for their part, have not been slow in displaying serious limitations. Psychotherapy cannot be conducted only in a laboratory environment; the patient cannot be stripped of everything that is not reducible to quantifiable data. If the behaviouralist manifesto had triumphed, it would not only have destroyed psychotherapy but the very idea of mental illness — it would have been exposed as something which was fictitious, lacking in substance, an invention or an imaginative creation of the mind.

But the patient is not only a machine which produces responses, or at least it has not yet been possible to reduce him to that level. The presence within the person of untestable variables which disturb the binomial stimulus-response and thereby deform the supposed laws of reinforcement demonstrated that a reductive approach could not be the definitive solution, and that very few patients would have accepted not being treated as actual people for very long.

The idea that the only thing which exists and which is true is that which passes the experimental test is wrong. It leads to an unjustifiable impoverishment of human reality. A psychological disturbance

can never be tackled, let alone cured, if the ill subject is kept to one side. Therein is to be found one of the great questions of psychotherapy: can one work on the symptoms alone? Does one have to modify only the pathological manifestations or, on the contrary, should one aim at achieving a transformation of the whole person? Whatever the case, the overcoming of reductivism has led to a recovery of mental concepts which, in this case, have been filtered through greater scientific vigour. Present-day models of cognitive psychotherapies are now moving in this direction.

The acquisition of truth and comparison with the discoveries of the other disciplines requires that every branch of knowledge — including psychotherapy — present its own scientific credentials. But, and this should be well understood, no one alone can dictate the rules of the game and determine the criteria of truth according to his own particular tastes. Scientific knowledge is not the same as experimental knowledge. Will it therefore be necessary to re-establish the distinction between sciences of nature and sciences of the spirit, with the result that each will go its own way? In my opinion we should recover the concept of analogy. Today, words mean simultaneously one thing or many things which are totally different. Science can be understood as experiment only, or it can refer to a whole series of things which are very different and distant from one another — the construction of machines, divination, artistic creation, statistical calculation, etc. But between the univocal and the equivocal there is analogy. And this is the field to which the term science belongs: there is a shared part which is applicable to all scientific knowledge, and a part which is specific to, and a function of, the object of study particular to each discipline. It is wrong to think and to hope that the mind can be studied, diagnosed, and treated according to the same schemata with which research is conducted into subatomic particles or the reflexes of rats.

On the other hand, within the sphere of natural sciences it is not possible to trace a line of clear demarcation between what respects and what does not respect the rules of experimentation. Similarly, it is not possible to establish a precise point where the physical ends and the metaphysical begins, and *vice versa*. The more one emphasizes experimental verification the more one artificially impoverishes the psychic object. In the same way, the more one extends reflection beyond experimental facts, the more one increases the probability of falling into unreal theorizing.

It is necessary to be aware of these limits and to work in our own fields with a readiness to consider our own knowledge through the point of view employed by other people — something which could, indeed, be of complementary benefit. This seems to be something which is especially pressing in matters relating to the subject of this congress: the human mind is neither the brain, nor the capacity to respond to physical stimuli, to coordinate and to carry out physiological functions, nor to perceive sensations or to experience affects, nor to grasp meanings and construct concepts. It involves all these levels — the organic, the physical, the physiological, the psychic, and the spiritual — and in so doing it integrates them into one whole, without cancelling the special nature of each phenomenon, which cannot be reduced to the nature of the others.

In my opinion, the problem of psychotherapy is not a question of establishing if psychotherapy in itself and with regard to the theoretical bases upon which it rests can satisfy the conditions required by the natural sciences. Whatever the case, we should apply a Copernican revolution to the problem and ask ourselves if the sciences of nature are suitable for a study of the psychic processes. Psychotherapy needs to return to the human person, whether he is healthy or ill. Not because normality is manifested in what is pathological but because the subject of normality and the subject of illness constitute one and the same person.

Man, in his somatic and psychic condition, is an elusive object of study. Perhaps it is for this reason that there is a certain reluctance to pass inside. Never before have we had available so many data, never before have we known so many things about him, and yet never before has so much reluctance been felt about posing the radical question: what is the human mind? What is man? It is much less embarrassing to ask ourselves how he is formed, how it acts, what he produces..... Things have reached such a state that an encyclopedia of philosophy, anthropology, psychoanalysis, and so forth has been published which does not have the heading " man. "

One could imitate the boldness with which, in an attempt to solve the whole question once and for all, it was said that man " is an unfledged biped. " But a new Diogenes could reply, " Behold your man " and hold a plucked cockerel in his hand. Perhaps, at a basic level, one can find herein an explanation of many of the disturbing phenomena which a hopeful society asks psychotherapy to solve.

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FERNANDO ANGULO

The Human Mind: Individuality and Freedom

The current conception of man has been enriched by the different contributions of the field of science. The one which occupies us here today is that which refers to the human mind; biology, biochemistry, psychology, psychophysiology, psychiatry, psychoanalysis, sociology, and so on illustrate different angles of a complex system, the human mind, which regulates the conduct of men as individuals and as included in a social group, for it also regulates social group conduct.

The human mind has for years been a valued, well-cared-for, and protected object — or else attacked for its role as a center for operations and command of man's behavior, thought, and affections. The classifications, determinations, and delimitations attempted in regard to it have always remained insufficient, partial, or tendentious, leaving aside aspects which escape our current scientific models.

I shall not embark upon philosophical or anthropological considerations here on the different conceptual connotations with which the human mind has been presented throughout mankind's history. I shall just point out the diversity of conceptual approaches seeking to explain it which will surely appear and enrich these sessions.

What will undoubtedly be common to all is the fact that the "knowledge" we possess on the human mind is instrumented by us into reflections, practical applications, behavioral norms (ethics), professional practice, and so forth.

My concern in attending these sessions is both professional in terms of the field of psychiatry and related to reflecting on medical practice, which, as a result of the technical advances being achieved, daily finds itself increasingly channeled towards making decisions and having patients make decisions on aspects which were previously left to the regulation of chance and nature.

To integrate scientific advances, supposed improvements in favor of mankind's freedom, and to be able to maintain ethics not grounded upon superficial pragmatism, it is important to reflect on the possibilities for *individuality and freedom* of the human being.

By *freedom* we mean "the power inherent in the subject with respect to his realization, which may be defined as the *capacity for self-determination*"; by *individuality,* "the condition of an individual," "characteristic or set of characteristics distinguishing an individual from others" — with the individual representing "each being of a species or genus."

We see that the notions of *capacity* and *quality* are those expressed in these two concepts. The capacities of the human being and his qualities are formed and settled throughout his growth and development, and these capacities and qualities defining freedom and individuality are of a psychological nature and form part of the human mind.

As knowledge advances on the laws regulating the functioning of the human mind — and hence of human conduct and its motivations — the concepts of *individuality* and *freedom* must become more nuanced and less naive. On the basis of contributions made at the beginning of this century by psychoanalysis, levels which are joined — from instinctive aspects differentiated in terms of *need* and *desire* to the more evolved aspects of the ego and superego superstructures permitting man's differentiation from the animal world.

In the starting up of human life the instinctive "quantum" governing initial conduct serving life (instincts of self-preservation) will gradually be modulated in the context of interaction with parents or the adult world providing care, in such a way that psychic structures will progressively be established which permit transition from an immediate instinctive discharge, in keeping with an excitation/discharge biological model, to an evolved instinctive system, which is called "pulsional," where the system of satisfaction is complex and may be subjected to intermediate processes distinguishing us from animals and marking us as human beings.

I shall not go into a detailed exposition here of the conceptions of the mental apparatus and the psychic function investigated and described by psychoanalysis.

I shall focus my attention on two concepts clearly defining qualitative aspects of motivation and human conduct which may help us to gain insight into the concepts of *individuality* and *freedom*.

These concepts are *need* and *desire*.

The concept of *need* refers to the search for instinctive satisfactions in the baby on a very biological level, still without psychological organization, for there is a lack of mental representation and capacity for psychic manueuver in the sense of putting off satisfaction or deflecting the object.

In the self-preservation and sex-

ual instincts we find aspects of *need* and *desire* in different proportions.

In the evolution of instincts and dialectic of need towards the pulsion and the dialectic of *desire* the mechanism of *unconscious repression* principally intervenes, permitting the organization of higher mental structures: the ego, the superego in relation to the id. Without this psychic mechanism, the individual, instead of being able to enjoy his vital resources in an evolutionary way, would remain trapped in the recording of *need*, with a significant decrease in his awareness of individuality and hence in the use of his freedom. Freedom starts from a positive repression organizing the notion of limits, individuality, and otherness. The clinical example which is clearest to understand the visage of *need* in human conduct is found in drug addiction, where the only mechanism binding one to the object is *need*. We also encounter *addictive personalities* who are not necessarily addicts, but whose mode of relating to any object is according to the model of *need*. These are very serious psychological disturbances of use to us in exemplifying the concepts we are setting forth.

Current research on the functioning of the human mind, over the long course of its organization and maturation in the individual, and on the varying balances reached in adulthood has especially developed in the study of psychosomatic medicine.

In bold strokes, we may state that different modes of functioning have been detected whose differential traits are situated along the line passing from *need* to the organization of *desire*.

If maintenance of the recording of *need* is prolonged in adulthood, we observe a mental functioning wherein there is mental insufficiency in representation, a tendency towards the excitation/discharge behavioral model, a bad organization of identifications and of the notion of individuality, with little functioning of symbolic behavior (channeling the norms of the social group), and excessive mimetic plasticity regarding external identifying stimuli. At the other extreme we find the individuals in whom the dialectic of desire has been organized, in whom the world of psychic representations is well constituted and rich, the individual's way of functioning depends mainly on the capacity for mental elaboration of life situations and conflicts, identifications are well sedimented, and the limits of individuality and otherness, well constituted. In this mode of psychic functioning obtaining what is desired starts from a creative dialectic with the other. In the mode of functioning of *need* and in the line of behavior obtaining what is desired (confused with what is needed) starts from a relation of dependence on the other, who in such cases is not sufficiently differentiated from oneself. Between the two poles described here there are numberless possible combinations apprehensible only by directly studying concrete individuals — it would be useless to attempt a typological classification. Let it suffice to take into account in our analysis the two major factors at work — *need* and *desire*.

Day-by-day clinical practice has gradually brought us to these qualitative aspects of human functioning in both conduct and affections.

If we change perspective and devote attention to the social group, to current western culture, and reflect on the way this psychological functioning agglutinates and projects itself socially, we can point out how priority is given at present to the value of the rational in social, cultural, artistic, intellectual, and other messages — the most highly evolved part as regards the human psychic function — while in our time the affective and instinctive is very much left aside.

Nevertheless, it does not cease to be present simply because it is not mentioned; on the contrary, this baggage of human functions seems to pass along the line of what is acted on.

It is conveyed through perceptual, sensitive messages, but does not appear as integrated into communicable verbal discourse.

We know that techniques for publicity, market studies, and the promotion of mass phenomena are particularly based on these instinctive aspects of the human being. In the streets we are accustomed to seeing references to various commercial products that sustain their impact through direct messages to human instinct, to sensuality.

We want to stress here that this manipulation of the human being's instinctive and sensual aspects, dissociated from communication and affective discourse within the cultural framework, are mainly addressed to the register of *need*, with all its entourage of phenomena — little psychic elaboration, relational dependence, bad organization of individuality and otherness, and, as a result, fostering conduct which cannot be included in the register of freedom, freedom understood in the broad sense of the term as conduct elaborated and carried out after a process of reflection involving active choice.

In all the modes of psychic functioning we can attain in our individual maturation, there remains a core bound up with the dialectic of *need*.

It would seem that in our current culture (and we observe this clinically today through the pathological variations in psychic illnesses) priority is given to a psychic functioning of the behavioral type, with little mental content and greater reactivity to the dialectic of *need* than to that of *desire*.

Consequently, the limits of individuality and freedom cannot be

evaluated by simple observation of behaviour, but through a knowledge of the psychic processes and domains at stake, whose final expression is in concrete behavior.

We are apparently going through a period in which the word freedom is quite present. It is easy for the trained observer in the field of human psychology to perceive that we are perhaps in a time of uninhibited or unbridled behavior, but we cannot at all confuse behavior as action with the psychological and mental elaboration culminating in free behavior.

Behavior is the heir of *need*, and psychological and mental elaboration, of *desire*, the place from which individuality and freedom may arise.

It would be desirable to organize reflection on applying technical innovations directly affecting basic aspects of the human being in the light of this knowledge. These contributions can nuance evaluation of the degree of freedom and individuality involved in decision-making.

I am referring here to the problematic posed in current medical practice having to do, for instance, with genetic counseling, prenatal diagnosis, and many other areas in which the application of technique is seen to be closely linked to the idea of the patient's freedom. There may be ethics marked by a moral tradition, but sometimes supposedly scientific ethics are defended which are derived from extreme rationalism. I feel the paper I am presenting today ought not to be forgotten when it comes to delimiting this scientific ethic in a nondemagogical framework.

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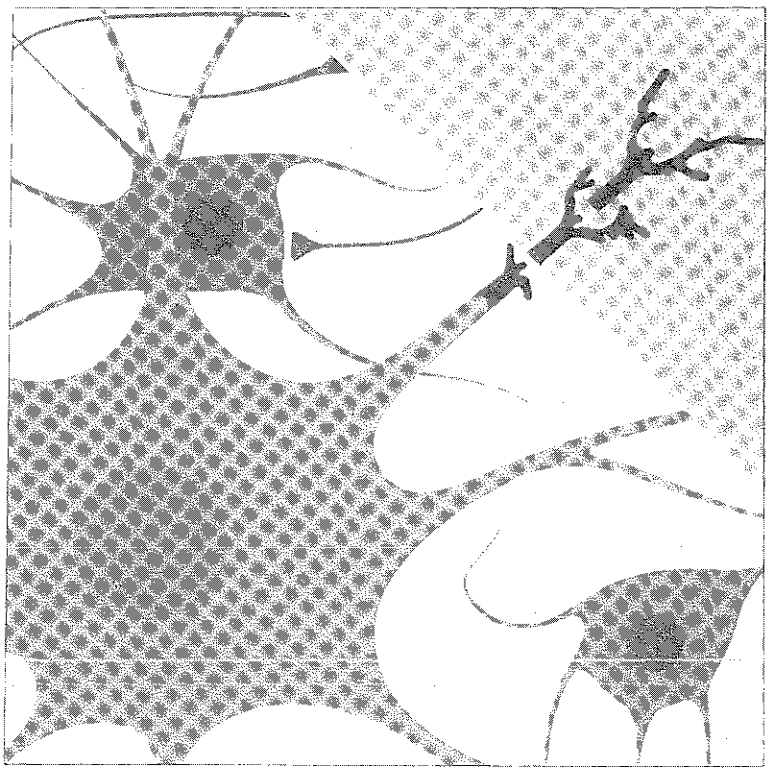

O.S. ADRIANOV

The Problem of Localization and Organization of the Cerebral Functions

The question of the double nature of man as a biological and social (spiritual) being and of the comprehension of this dualism always has been one of the most important and contradictory problems in the history of human civilization. As the securing of this dualism is connected primarily with brain activity, the efforts of many scientists are directed towards understanding the problem of cerebral function localization. Nevertheless, the question of how and what may be localized can hardly be answered definitely.

In the history of brain research the basic stages of the development of morphological, physiological, and clinical investigations have coincided in time. The well-known works on brain physiology (I. Sechenov, Simonov, X. Hitzig, D. Ferrier, G. Munk, K. Luciani) appeared in the 1870's and 1880's, along with the publications of Russian anatomist W. Betz and Austrian neurologist T. Meynert on the cellular organization of the cerebral cortex in men and animals.

The connections of brain morphology and physiology were expressed especially at the beginning of the twentieth century, when fundamental investigations of the cerebral cortex organization — cytiarchitectonics — (A. Campbell, K. Brodmann, K. von Economo, M. Rose) were stimulated by the outstanding research of I. Pavlov, V. Bechterev, Ch. Sherrington devoted to the problem of brain integrative activity and behaviour. The investigations on the topographical correspondence of motor cortex structural architectonics to functional organization discovered by Cecile and Oscar Vogt and others became the start of "modern functional neuroarchitectonics" (W. Kirsche).

The significance of many clinical investigations of these questions (J. Jackson, P. Broca, K. Wernicke, C. Korsakov, G. Rossolimo, W. Kozevnikov, V. Bechterev, K. von Monakow, J. Dejerine, K. von Economo, M. Krol, W. Penfield and H. Jasper, A. Luria, S. Sarkissov, and other neurologists) is also clear.

In the 1930's, on the basis of clinical-morphological comparisons, I. Filimonov came to the idea of simultaneous and successive principles of the representation of various functions in the brain structures. I. Filimonov concluded that symptom localization and function localization cannot be identified. The presence of symptoms only points to damage in some part of the system representing a given function.

At the beginning of the 1930's the problems of cortical and subcortical architectonics were elucidated anew from the evolutionary and systemic standpoints in the studies by S. Sarkisov, I. Filimonov, L. Pines, and their collaborators. These investigations in comparative morphology and ontogenesis of different brain structures allowed us to understand better the pecularities of human brain organization as compared with animals.

The criteria of the onto- and phylogenesis of the cortical regions and their rational classification were formulated at the Moscow Brain Research Institute. At this Institute the original doctrine on the individual variability of human cortex architectonics was also postulated. The serial brain cytoarchitectonical studies of various peoples have shown the impossibility of the superiority of one race or nationality being brought out on the basis of brain construction. According to these studies, the large individual brain variability can apparently be connected with psycho-physiological pecularitites of different people — their temper, capacities, type of nervous activity, etc. Such studies were also very forward-looking in our time, in the new conditions of technical progress, and would serve for better understanding of general and peculiar mechanisms of the brain activity.

According to the comparative neuromorphological data the brain's being perfected proceeded chiefly by a large increase in the size of so-called forebrain associative structures (frontal, temporal, parietal regions, and corresponding subcortical bodies). These systems are closely connected with the functions of understanding and using language, forming spatiotemporal characteristics, with critical and senso-emotional evaluation of behaviour and its programming in new social or biological situations, or in human mental and spiritual activity.

The human brain is also characterized by the very complicated fine morphology of different neurons and their interconnections. So, with the help of computerized morphometry, the so-called degree of regulation of column (vertical) organization of the cortical neurones (W. Kesarev et al.) can be quantitatively estimated. This degree of regulation is broader in men than in apes and monkeys, as well as in the associative cortical structures in comparison with the projective (sensory) ones. In most of the hu-

mans the language perception regions are represented in the left brain hemispheres, in the temporal and frontal regions. So the fact of their greater degree of regulation as compared to the symmetrical regions of the right hemisphere is of special interest.

The study of brain neuronal organization — the architecture of the single neurons, their complexes and interconnections — became possible after the discovery of the method of chromosilver impregnation of nervous tissue made in 1873 by the outstanding Italian scientist C. Golgi. With the help of this method the Spanish histologist D. Ramon-y-Cajal, and after him other scientists (Lorente de No, S. Sarkisov, G. Polyakov, I. Szentagotai, T. Leontowitch, etc.), have described the fine neuronal composition of different brain structures, which promoted further investigations of the brain microworld on synaptic and neurochemical levels.

The brain is a very complicated but reliable system with a surplus number of elements in most of the structures. So it has billions of neurons and glial cells; one neuron is connected with many others by the help of numerous synapses. The number of synapses on the surface of a single neuron may surpass 5000 and more.

The analysis of our own and other data on morphological, physiological, and neurochemical aspects of the " brain behaviour " problem has permitted us to formulate the conception of the principles of the cerebral functions' systemic-structural organization (O. Adrianov, 1976-1987):

1) The integrative brain activity is determined by the complexity and character of the afferent messages, biological selectiveness, and the level of automatization of behavioural reaction, the role of memory trace, and emotional-motivational factors in the current functional state of the organism (the level of its vigilance).

The brain functions are realized on the basis of regulating interactions among various brain systems: projective (sensory), associative, integrative-trigger, and limbico-reticular.

The projection systems deal mainly with the analysis and synthesis of unimodal messages (visual, auditory, somatic, motor, olfactory). Associative systems (both cortical and subcortical) chiefly realize the synthesis of the various modal messages, i.e. the more complicated forms of integration. The integrative-trigger systems principally form the synthesis of the multimodal messages with biologically significant (motor, emotional-motivated) influences. The motor, orbital, fronto-orbital cortex, hippocampus (partly), hypothalamus, and some brainstem structures belong to these systems. The basic goal is to program different efferent (including behavioural) reactions and their fast realization by efferent neurons of the spinal cord and brainstem in the muscles and glands. Finally, the limbico-reticular system (or systems) — structures of the so-called limbic brain — chiefly provides energy and synthesis of motivational, emotional, and vegetative influences.

2) The behavioural reaction is always a combination of rigid (genetic) and probability (dynamic) functional activity (I. Pavlov, N. Bechtereva, O. Adrianov, A. Kogan et al.). The fact of correspondence of two basic forms of brain structural organization to two forms of functional activity — inborn design of CNS framework and flexible, plastic forms which are reorganized according to the various functional states or types of activity — must be underlined. Such reorganization is characteristic mostly of the microlevel of brain organization. Nevertheless, computerized morphometric data of our Institute have shown that the discovery of the plasticity rebuildings in the large brain systems (macrolevels of brain organization) is possible.

3) So the study of the problem of cerebral function organization poses the necessity of " bridge construction " between micro- and macrolevels of the brain and needs the analysis of the role of these interlevel connections in the architecture of physiological or pathological reaction.

The microlevel (microsystem or microensemble) of the brain is made known by the combination of neurons, glial cells, and vessel populations which can provide the elementary processes of intracentral integration of excitation and inhibition. It can be either the module (vertically organized column) of the cortical neurones, their fibres, glial cells and vessels, or " nest-organized " combination of functional and structural units in subcortical structures. The processes of excitation and inhibition in such microensembles must be reduplicated by analogous processes in many other ensembles. For this purpose microensembles must be joined in the macroensembles. The macrolevel (macrosystem or macroensemble) of the brain appears to be such a brain combination which integrates many microensembles and is capable of more complicated responses followed by perceptive or efferent realization, including the various behavioural reactions.

Owing to methodological and technical complexities the problem of various ways and mechanisms of the brain macro- and microworld interrelations is poorly studied now. But the answer to this question will offer the opportunity of revealing many of the secrets of the brain's normal and pathological activity.

4) The ability of brain micro- and macroensembles for multifunctionality (functional multisignificance) is the very important condition for normal functional realization (I. Filimonov, 1949; O. Adrianov, 1976). The idea of such multifunctionality contradicts both the notions of functional equipotentiality in the cortex and of strict functional localization. According to our conclusion, each of the brain systems, participating first of all in realization of its own basic, genetically determined function, may also be included in the activity of other cerebral systems, in order for their own basic activity to be more adequately and expediently provided. For example, the associative, integrative-trigger, and limbico-reticular systems promote emotional and logical perception of the biological and semantic meanings of the sensory messages going through projection systems; these last can promote the realization of the important, genetically determined functional prerogatives of the other brain systems. Such interrelations

can be provided with the main brain systems and their connections, though we cannot yet completely answer the question about the pathways of these relations. In future it would be very essential to investigate cortico-subcortical and subcortico-cortical relations using analysis of interaction of the associative and limbico-reticular systems of integration. This analysis lies at the foundation of the unity of the logical and mental operations with their motivational, emotional, and vegetative characteristics.

5) The principle of systemic (dominant) neurochemical selectivity of the various brain structures is of great importance for the explanation of the cerebral organization problem. During the last two decades research into dynamic (functional and structural) chemoarchitectonics has come to light (Ungerstädt and many others) and we now have many detailed schemes of various ascending neurotransmitter systems starting with the neurons of deep brain structures (dopaminergic, cholinergic, GABA-ergic, serotoninergic) and in recent years — also modulatory peptidergic systems. The study of their balance with the body hormonal status seems to be one of significant approaches to the understanding of personal human peculiarities, a psychophysiological portrait: the selectivity of memory processes, emotions, motivations, creative ability, sleep, and other activity. The analysis of these system interrelations can also be useful for the better diagnosis and treatment of CNS pathological states. In particular, with collaborators we have recently concluded that damage to the associative system (thalamo-strio-frontal) does not itself result in disturbances of some complex functions (memory, ability for generalization, abstraction, and prognosis), but changes in the brain metabolic balance. If we can smooth out this balance by stimulating some of the neurotransmitter systems, disappearance of the behavioural deficit results. So, according to these data, there is no reason for the hypothesis of rigid localization of some symptoms or syndromes.

The various approaches to brain organization research and study of their reorganization in pathology are now completed by some modern methods: computerized positron-emission tomography (PET) and nuclear-magnetic resonance, which provide an opportunity to study brain metabolism in vivo. We can conclude that the static idea of *the localization of functions* can be replaced by the more dynamic conception of *the organization of functions*. The fragments of the simple functions can relatively reliably be localized either at the beginning or at the end of the whole function. At the same time the idea of localization cannot be applied to the " middle " function links since those are organized on the basis of the abovementioned complicated principles.

People's need for the integration of brain knowledge led to the foundation in the 1960's of the International Brain Research Organization (IBRO), and in the 1980's — of neuroscience societies which deal with various aspects of research on the normal and pathological brain. Recently, the President of the USA, George Bush, announced the last decade of our century as a decade for brain research. We hope that a multidisciplinary approach to the problem of brain functional organization will be at the center of our future generations' attention.

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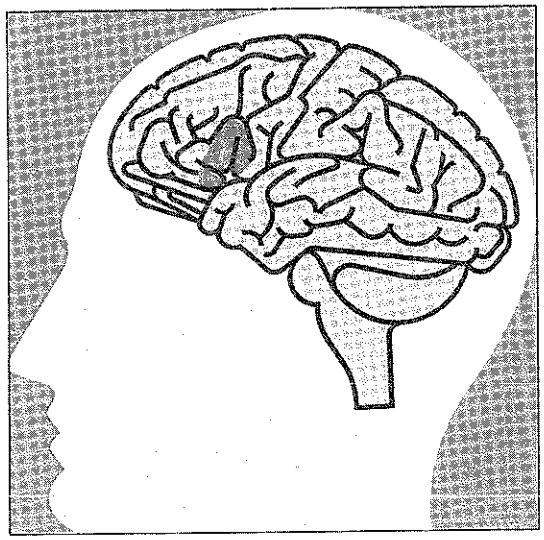


ZDZISLAW RYN

Survivor's Syndrome

Thank you most cordially for the invitation to take part in the Vatican Conference on " The Human Brain — the Human Mind. " I have come here from Poland, a country whose population bears the stigma of the past war, and, above all, the stigmata of the Auschwitz " death factory, " until the present day. For this is the term used for this place, where the greatest extermination of Europe's population — the concentration camp in Auschwitz, is being referred to. Relatively speaking, the Polish people experienced the greatest losses of all nations taking part in the Second World War. 6-7 million people, mainly Poles and Jews, died in the Nazi concentration camps and extermination centers in the territory of Poland. The extermination was conducted in a planned and premeditated way. It involved, above all, the intellectuals, men of culture, scientists, scholars, and the clergy.

The conditions at the camps exposed the prisoners to the impact of extremely traumatic factors, such as hunger, beatings, humiliations, strenous labour, the continual threat of death, and accompanying mass executions of other prisoners. Medical research shows that one year of stay at the camp was equal to four years of normal life. That is why the frequency of occurrence of some diseases among former prisoners of concentration camps is by far greater than among the rest of the population. This concerns particularly heart and circulatory diseases, as well as mental diseases. The mortality index among this population is four times higher. It is estimated that only about 20 per cent of the prisoners survived the camps. Only a handful of these survivors are still alive and they say that they have been given a second lease on life. Many of them do not understand how they managed to survive the camps and get away scotfree.

The statistical information concerning the death of millions of people does not call forth an adequate emotional response among contemporary people. It is only a closer look and an attempt to understand the experiences of individual prisoners that allows one to reconstruct the world of " Heaven " and " Hell " of the camp experience.

The main objective of concentration camps was death and mass extermination. Camp sickness was to last but briefly and it was to lead unavoidably to death. The creators of camps did not foresee any long-term effects of staying in these places, as concentration camps were to be " death plants. " Their ideological fanaticism robbed them of all imagination and, consequently, they did not take into consideration the possibility of surviving the camps. Neither did they foresee a further evolution of concentration camp sickness which, as we know nowadays, has gone across the borderlines between generations. We shall never learn how those who perished in the camps suffered and how they were " sick with death. "

The nightmare of concentration camps reaches much further; it continues in the recollections and memories of those who survived. The majority of ex-prisoners did not manage to adjust to normal life after the war. For the intensity and depth of the experienced traumas led to a curious reversal of criteria relating to what is normal and what is pathological; what was pathological in the camp had to be recognized as " normal. " That is why former prisoners cannot easily communicate with those who have not gone through the experience of concentration camps, even with their closest relatives, such as their own children.

The KZ Syndrome

The stigmata of the camp are experienced very acutely by the prisoners themselves and are easily perceived by the environment. In world literature, the term KZ-syndrome, describing the etiological relation between this illness and the concentration camp traumas, has been widely accepted. However, the above concept refers to a wide variety of ailments, both somatic and mental, as well as personality disturbance, as has been proved in Poland (Kępiński, 1970).

The intensity and the type of personality disturbances depend, above all, on the age at which the individual persons were imprisoned, on the duration of stay at the camp, as well as on the intensity of the stress situations experienced. Particularity deep and lasting marks were left by the various methods of " dehumanizing " the prisoners, attempts to " break their personality, " the sophisticated methods of moral deprivation leading to demoralization and degradation, such as, for instance, suppressing all positive emotions and rewarding antisocial and amoral attitudes (Bettelheim, 1962; Glińska, 1967, 1969, 1969a; Sterkowicz, 1969; Dimsdale, 1974). According to Kępiński (1967), imprisonment

in a concentration camp changed the prisoners' moral image of themselves, leading to permanent personality disturbances. These changes were invisible shortly after the liberation. Personality disturbances were revealed mainly in the sphere of character and emotions, as well as changes in social attitude towards life. In the mental sphere, there occured a permanent depression and a lowering of life activity, which were accompanied by a loss of all sense of life. The predominant symptoms were the fear of life and the fear of death (Leśniak, 1964, 1965; Półtawska, 1965). The aforementioned changes have been confirmed by research based on a complex personality disturbance model (Jakubik, 1986). It proved decisively that the self-concept among former concentration camp prisoners differs considerably from the self-concept among persons of the general population. The characteristic features of the self-concept among ex-prisoners were a feeling of external control, a decreased feeling of one's own value, a low level of self-acceptance, and a weak feeling of one's identity.

Children and adolescents were particularly susceptible to traumas. The axial symptoms concerned the emotional sphere, with the predominance of the so-called primitive emotions: fear, anxiety, anger, explosiveness, as well as the obsessive-compulsive symptoms (Sarnecki, 1966; Półtawska et al. 1966; Witkowski, 1968).

The adolescent prisoners of a concentration camp in Lódź were subjected to sophisticated methods of deprivation: brutally separated from their parents, closed off behind barbed wire, they were forced to hard physical labor; they were beaten and starved. Forty years after the war in a group of 100 exprisoners of this camp who were subjected to medical examinations, as many as 97 had the status of a war invalid as they revealed at least 2 protracted somatic diseases. The majority of them suffered from depression, emotional instability, irritability, and explosiveness, as well as disturbances of sleep. Post-traumatic encephalopathy was diagnosed ten times more frequently in this group than in the control group. Divorces, family conflicts, and suicides, as well as educational problems with raising children, were also recorded much more frequently. All of the ex-prisoners had a strong sense of being wronged by the war and the camp. The war made it very difficult for them to develop properly as human beings, to gain the desired kind of education and social status (Zasępa, 1986).

In the evolution of the abovementioned personality disturbances one can distinguish a few characteristic phases: the phase of maximum mobilization of defence mechanisms in order to survive the camp and the phase of exhaustion. In the post-camp period there developed a phase of protracted asthenization of personality, a phase of depression and loss of life activity. It was only in isolated cases that a good adaptation to post-camp life was observed. In a few isolated cases, an excessive social, professional or political activity, aiming at " making up " for lost time, was observed. It seems that the latter type of mechanisms was activated by political prisoners, the members of the camp resistance movement, as well as doctors.

Similar phases can be distinguished in the dynamics of the KZ syndrome. In the first years after liberation, it was somatic diseases that prevailed. They were connected with general exhaustion, hunger, and the experienced traumas. Afterwards, a phase of latency of the disease was observed, lasting several months or even years (Cohen, 1972). Subsequently, disturbances in social adaptation resulting from personality problems and protracted neuroses or neurotic-like states, with the predominance of depression and fear, were observed. In the subsequent phase, symptoms of premature aging as well as premature sclerosis were recorded. Finally, a predominance of symptoms of the organic brain damage occured: characteropathy, encephalopathy, dementia, epilepsy, and psychotic reactions. The results of the research carried out in Poland in subsequent decades indicate a fast intensification of symptoms indicating organic brain damage and premature aging.

The above disturbances have a protracted and progressive character, whereas their treatment brings about only the disappearance of symptoms. A considerable number of these patients stay at social care homes or old people's homes, as they do not have families or cannot adapt to the conditions of family life.

Among the majority of prisoners, the prison reality has survived in their habits, stereotypes of behavior, reactions, and, above all, in the nightmarish camp dreams. The ex-prisoners have a feeling of their own separateness and of being different from other people. After being freed from the camps, they entered a world which was " strange " and incomprehensible for them. A feeling of rejection and isolation arose.

The camp habits concerning eating, dressing and way of sleeping have also survived; oversensitiveness to the sound of German speech, particularly commands and orders, to the sight of a German uniform, to the striped camp uniform, to cries, smell of burning and camp food, the stench of unwashed and sweaty human bodies etc., have also been preserved. Reacting with fear at the sight of a crowd, particularly a line, a roll-call, communal work-offs, and waking up in the morning has remained with these

people until today. Habits connected with eating, such as: eating in a hurry, eating in a standing position, in seclusion, eating from the same dish, eating without moderation etc. are still brought back to mind today. Treating bread, a symbol of life in a concentration camp, with true veneration, as well as an obsessive need to hoard it, have likewise survived. It is a similar story with the habit of collecting different objects, refuse, and things no longer needed by anybody.

A common mental experience of ex-prisoners are the nightmarish dreams connected with the camp reality. Falling asleep is often equivalent to a return to the concentration camp reality: to the barracks, the tiring roll-call, to the death wall, or to the gas chamber. In an atmosphere of powerlessness and inertia, as well as fright in the face of approaching death, a violent waking up takes place. Then, there is fear of falling asleep again, as sleep is equivalent to a return to the camp. Disturbances of sleep and nightmares have become a permanent element of post-camp disease.

Second generation

The post-camp disease of one or both parents has exerted an indelible influence on their children. It is in the second generation that personality disturbances, social immaturity, disturbances in adaptation, as well as neuroses, occur more often than in the population at large. The symptoms of social pathology such as broken marriages, alcoholism, and crime also occur more often in this group. Incidence of somatic diseases is also higher.

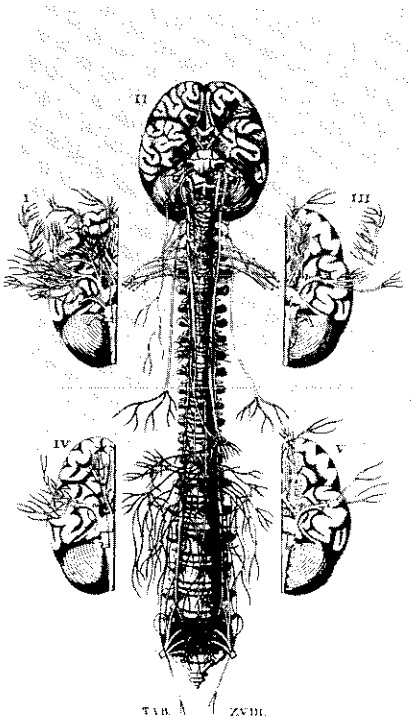
The types of behavior as well as reactions and different mental states acquired and preserved in the camp, particularly fear and the feeling of danger, have survived in the post-camp period. What is more, they have been transmitted to the children. In this way, through imitation and learning, the distorted camp habits have been transmitted to the second generation.

The children of former prisoners attained a lower level of education and a lower social and professional position in comparison with the control group. Only 1/3 of them do their jobs with satisfaction. The remaining ones are passive, subdued, and dissatisfied. They have a feeling of having been wronged and are much less stable in their professional life. The divorce rate is also higher than in the control group (Kempisty, 1986).

The situation of widows

Following the arrest and death of the prisoner in the camp, there began a gehenna of the families left behind: wives, parents, or children. The situation of the widows and orphans seems to be by far the worst. It is the widows who were in the most difficult situation: struggle for physical survival, adaptation to the new situation, loneliness. Observing the plight and the sufferings of widows who had lost their husbands in the camps, one may point out how in an unintentional way, the occupier had managed to extend the consequences of war and concentration camps to further millions of people.

Realistic recollections of the moments of their husbands' arrest and the traumatic experiences with receiving the news about their death



in the camp have remained in their memory until today. These were overpowering blows which have left their traces on the women's psyche for the rest of their lives. Many persons reacted to the shock with a deep psychosomatic crisis combined with an emotional block. These acute reactions have sometimes become chronic and they have survived for many years, leaving a specific locus minoris resistentiae in the mentality of the victims. Some widows experience specific imaginary and perceptual projections of their late husbands. They experience the physical presence of their husbands. They conduct conversations with them. The dead loom over them as good advisers, spiritual guides, and protectors.

There are also cases of widows who still believe that their husbands are alive; it is only that for some unexplained reasons they cannot disclose their whereabouts or return to normal life. Widowhood is sometimes a source of positive experiences, such as a feeling of faithfulness to the husband as a victim in the struggle for higher ideals, as a hero of war.

There have evolved typical events to cultivate the memory of the victims of concentration camps such as celebrating the anniversaries connected with family life, saying Mass for the dead, praying for the dead, etc. Another expression of reverence for the memory of the dead is collecting souvenirs from the camp, such as letters, personal items, etc. The majority of widows do not feel a need to visit the camps in which their husbands have died.

Living through the shock of their husbands' arrest and then their death in the camp caused not only short-lasting disturbances, but many long-term consequences. In the personality of the widows, they find their expression in permanent depression, decreased life activity, excessive concentration of attention on persons who have survived the war and in neurotic concern for their health and well-being. A deep sense of wrong has remained with the widows: due to loneliness, abandonment, the hardships and discomforts of life, injustice, inability to experience married life, having children, etc. Despite the passage of time, among the majority of widows the above traumas

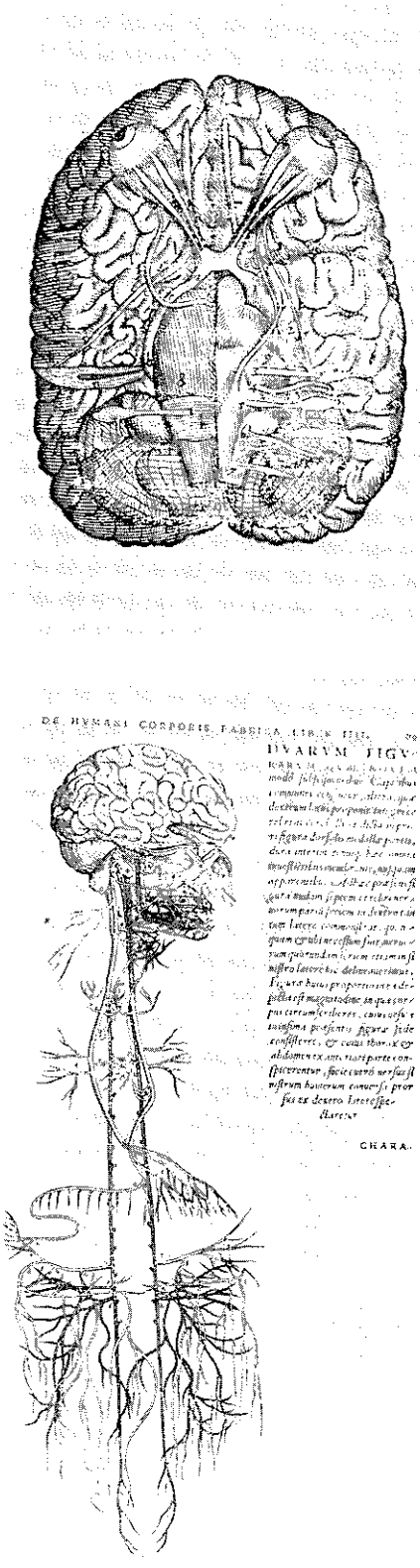
have survived in the form of increased nervousness, oversentitiveness, changing moods, depression, a sense of wrong and regret, as well as interests limited to the problems connected with the loss of one's life partner.

It is worth emphasizing that despite painful losses, none of the interviewed widows assessed negatively her husband's conspiring or patriotic activity. On the contrary, all of them regarded this activity as worthy of the price which their husbands had paid and which they themselves have been paying until today. In some cases, the widows took over not only the burden of maintaining the family, but also of continuing the work of conspiracy after the murder of a husband. In this way, the widows of concentration camp prisoners have written one of the most beautiful chapters in the book of Polish and women's heroism. In such an atmosphere, the lost husband has often become a mythical hero for the family. The attitudes of orphaned youths and children have been shaped in a similar atmosphere.

* * *

The Polish society bears the indelible stigmata of war and concentration camps. It lives with them as with a bleeding but noble scar. If the society tries to erase this stigma, it is because it is still painful, because it hurts. This stigma is history and Polish fortune, but it is also the present and the future.

Antoni Kępiński wrote that the world still cannot take in what happened in concentration camps. Most probably it will take a long time for people to take it in. Thus, a psychiatric prognosis of survival may be referred even to this reality: namely, if man of the future is to survive, he will have to reconcile two opposing attitudes — that of a cosmonaut and that of an artist. This was the situation in the camps. In this inhuman world, the ones who survived were those who were able to adopt the abstract attitude of an artist or else an altruistic stand. Even if they perished — their gesture has survived in the human memory. Our young generations are looking for such symbols, which may help in the difficult process of psychotherapy.



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The fundamental social and political changes that have recently taken place in Poland have allowed us to uncover the other side of the coin. Intensive research on the victims of the Stalinist regime has begun. It comprises three populations: persons imprisoned and persecuted in Poland in the years 1945-1956, persons exiled to Soviet gulags (the so called, Siberians — Sybiracy), and the families of Polish officers murdered in Katyń and in other, still unknown places of mass extermination. It is only a complex analysis of the victims of Nazism and Stalinism that will allow us to shed light on the "survivor's syndrome" in Polish society.

The stigma of war and of concentration camps, both Nazi and Soviet ones, has survived on both sides, among the vanquished and the victors, the victims and the oppressors. The stigma in question will survive much longer. It will continue long after the heroes of the past war. Without getting to know this stigma, one cannot fully understand the transformations taking place in Polish society and in reborn Poland.

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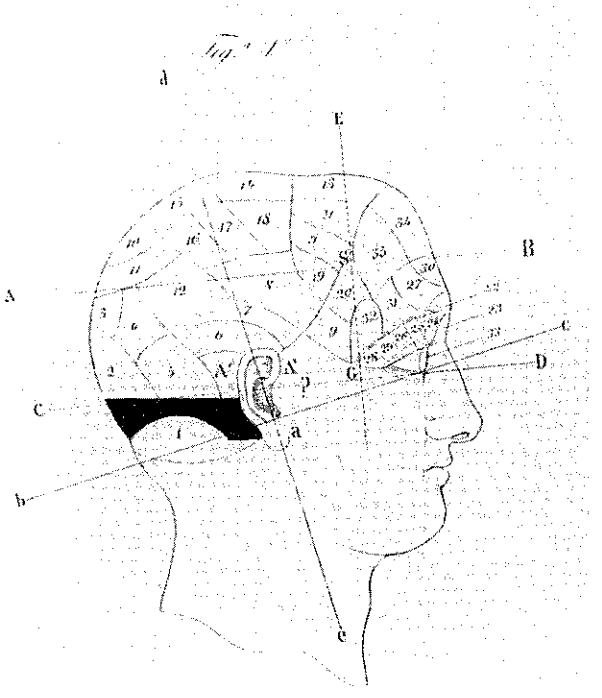


NICOLÒ MARIA LOSS

The Development of the Doctrine on Man in the Old Testament

1) The subject with which we are concerned and the phrase which introduces it invite us to reflect upon the biblical concept of man — a concept which developed in the Old Testament and was received and canonised in the New Testament in the light of the advent of Jesus Christ. This reflection should seek to identify the original contribution which the Bible grafted onto the spontaneous facts of the common consciousness that we have of ourselves and to obtain a more perfect knowledge of our own real identity.

Two essential characteristics of the biblical religion help us in recognising and evaluating this contribution: the fact that it possesses both a very solid sense of God and an equally strong sense of man, and its indissoluble link with the history of men, especially with regard to Israel. These are the two points which most strongly characterise the biblical religious universe in comparison with the other universes in which the peoples of the ecumene lived and live.

With regard to man — with regard to each single, individual human — the Bible not only forcefully asserts his personal dignity and value before the rest of the cosmos, of which it declares him to be the purpose and the highest expression, but it also asserts with equal clarity his personal value and dignity even before God — who is declared to be his creator and lord.

2) It is my intention to advance along two convergent lines: to outline, in brief fashion, the path which the religious reflection of Israel took towards an increasingly more exact perception of the identity of man — a path followed under the stimulus of constant intervention on the part of divine revelation — and to expound a careful reading of the special syntheses of that which is offered to us by the initial chapters of the Bible, where the presentation of man as the " image and likeness of God " (*Gn* 1: 26) illuminates everything that follows with regard to the subject of man.

The order of this exposition is based upon the obvious hypothesis that the synthesis in question points to the final outcome of centuries of human and religious experience which, within the people, contributed above all else its best and greatest representatives.

The Development of the Concept of Man

3) A study of the historical development of biblical thought has been a major concern of scholars in the last few centuries. The working hypothesis has a notable part in the conclusions reached, but, in general, such conclusions can be considered wellfounded, reinforced as they are by substantial agreement with the historical picture outlined in the biblical books.

Here it is not possible for me to enter into special areas which are too restricted. I will only observe that a consideration of the process of the formation of these texts is indispensable for a full appreciation of the direct and indirect facts which can be drawn from these texts. This is especially true with regard to the Pentateuch and for the arrangement of the traditional currents which enter it according to their chronological emergence — something which gives stereoscopic dimensions to the doctrinal panorama.

As I am obliged not to pursue this overly complicated and extensive line of investigation, I will devote myself, as I have already said, to the historical version presented by the Bible — a version which is demonstrating itself to be more and more reliable the more our historical knowledge of the Near East of antiquity advances and becomes more detailed.

4) Coming, therefore, to man, I would like to observe that he has a special place in the overall frame work of the great biblical themes, and this is because the texts tend to give prominence to the concrete form of individuals as opposed to a general and abstract consideration of the theme of man. Certainly, there is no absence of expressed doctrinal steps, but they are relatively rare. Furthermore, doctrine, which is a possession which is taken for granted, is presupposed in the fundamental comprehension of the human events which are directly presented. The texts, that is to say, concern individual personages or specific situations in which the people of Israel finds itself. As such they do not perform the role of doctrinal documents but rely, instead, upon well-known bases so as to throw light upon the meaning of the history of that people and the individuals who live and act within it.

Considerations of a universal character are mostly to be found in texts of recent creation; but even here the tendency towards the concrete and practical is clear. Indeed, even when speaking of man in the absolute the type of conceptualisa-

tion and of terminology used shows that the attention which is most favoured is directed to the single human being, and that even though the community is being considered it is the individuals constituting it who are primarily emphasised. This is revealed, among other things, by the use which is current in Hebrew of singular collective concrete names, beginning with "man," *Adam*, which indicates not man in the abstract and in general, but the concrete human group, with the explicit connotation of those who, one by one, are parts of it.

5) We encounter here a primary and fundamental aspect of the biblical conception of man, who is seen not as a universal idea but in his terrain and, what is more, in unstriking concrete form. At the outset, indeed, a statement is applied to men, each of whom is profoundly appreciated, found at the end of the Old Testament and deriving directly from creationist monotheism: God wants each of the beings that he has created; he admires them and cares for them, because he loves them: "For thou lovest all things that exist, and hast loathing for none of the things thou hast made, O Lord, who lovest the living" (Wis 11: 24-26).

This positive appreciation of beings, and in particular of human beings, is a kind of nuclear generator which is to be found throughout the Bible: something which demonstrates and enlarges the bipolarity described at the beginning of my paper — the sense of God and the sense of man, the two cardinal axes around which biblical religious doctrine grows in an ordered and vital organism.

6) This religion, according to what is suggested by the text and context, had its first origins in the vocation of Abraham (Gn 12: 1-9) — an absolute initiative of God after the distancing of humanity which is recorded in prehistory and which became total and definitive, something which is narrated with figurative and highly symbolic language in the episode of the city and tower of Babel (Gn 11: 1-9). God himself, therefore, to re-establish contact with man, begins with this concrete man — Abraham — and presents himself in the first place with a command, as the only God and lord. But at the same time He makes Abraham understand his identity as a man who is capable of cooperation with God; and he proposes blessing and a promise to him, showing to him, in a unique founding experience, the seed of the plan of salvation which will lead men back to full communication with one another through revealed contact with God. It amounts to the reconstruction of a peace which had been destroyed at Babel.

At this initial stage there is present, *in nuce*, the centre of the biblical doctrine on man — a personal being from whom God asks for a conscious reply so as to involve him in dialogue that is at the same time both a revelation of truth and a participation in real forms of good which is communion.

7) The vocation of Abraham does not only signal the beginning of the history of salvation. It also marks the beginning of that doctrinal path to which earlier reference has been made, and which, with regard to man, will continue that encounter between God and the man who will be called "the father of believers." It will always be God who takes the initiative, as happens with exact regularity with the great vocations, in which may be included the call of the people from Egypt.

This happens at two inseparable and different levels: that of the human group with its individual components — Israel — which, together with God, is the protagonist of biblical history, of religion, and of the doctrine that it expresses; and that of the great personages which accompany it with the mission of giving practical form to the encounter with God in that people, thus becoming for this very reason centres of propulsion and of illumination. Let the paradigmatic case of Moses be valid for all!

8) Their vicissitudes, which are described in the biblical books because of their exemplary value, are the special object of recollection and reflection. They are also an occasion for an increasing understanding of the value of the people and of every single member of that people in the light of God. This is because the great personages of Israel are not only human people voyaging along a path but more particularly "types" — in the technical sense of the term — who are the incarnation and model of a specific way of existing as human creatures engaged in a journey within the people and with regard to the people, and who are also the servants, friends and intimates of God. This is expressly stated of Abraham and by Moses, but it is even clearer in the case of Samuel and the prophets, that of David, and for at least some of his descendants who were kings.

An important element which links them all is that they are chosen and "taken" (as at times the texts put it). They are called by God to a more profound intimacy whence there is born a certain restructuring of their original life project — something which is brought about by this encounter with God. This, in turn, determines new directions and commitments which were hitherto unpredictable; and from here, however, there come into their lives "discussions" with God which are neither few in number nor light in character, as is to be found clearly marked in Moses and Jeremiah.

It is a painful experience which re-shapes people and consciousness and effectively illuminates what man — individual man — really is, and what value he has in the eyes of God — that is to say, in the most real reality. It does this not only for those who are most directly involved, but also for common comprehension.

9) It should be stressed that what materialises in these particular people is materialised in an analagous fashion in Israel as a whole, which God calls "my people" and which in turn addresses itself to God with the phrase "my God" and "our God." And it is an ascertained fact, as has already been pointed out, that the greatest personages of history — and in particular of remote ancient history — are felt not only to be initiators, the "fathers" of their descendants, but as true prototypes.

They personify, that is to say, the identity and the history of the groups from which they originate in those things that they do. This characteristic is very evident, in particular, in Jacob-Israel. He al-

ready lives out, in shortened form, the substance of the future life of the people which will be called Israel after him, or better still " Sons of Israel. "

It is therefore legitimate and instructive to read the history of the people in the light of its initiators.

10) The process of development of the doctrine on man which takes place within the people is more difficult to unravel. This is because it is more complicated, differentiated, and varied, and accompanied by contradictions and withdrawals. But difficult as it is to isolate and to read, it is no less real. Indeed, it becomes quite evident if one directs one's gaze more towards the whole picture — the great events of history — than towards the particular details.

In this way one starts with a period of preparation, the period of the Sons of Israel being present in Egypt, on which the texts maintain an almost total silence. It is a kind of long winter, which could be compared to death, but in which life is latent as in a secret gestation: on the chaos of captivity, in the same way as with the previous primordial chaos, there will, however, stir the Spirit of God.

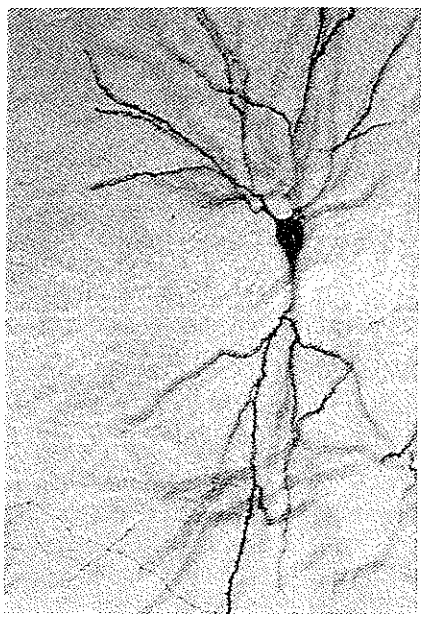
During the exodus and in the desert the people will live its birth and will begin to become conscious of itself and to become aware of its value before God. This growth will soon encounter the difficulties of the settlement in Palestine and the laborious and troublesome period of the judges, with their uncertainties and their epics.

Samuel will then come, and the monarchy will undergo an eventful instauration with Saul. The monarchy will flower with David when the two branches of the people, from the North and from the South, will form a single kingdom for a time, a time recorded as being full of glory. And even after the schism, as prophetism, above all else, foretells, the consciousness that the people is one and one only will not diminish. And for centuries, in the wake of the prophets, the writers will continue to repeat this idea.

When, later, the human framework of ancient Israel collapses with the deportations and with exile; the state disappears from geography and history; and the temple is destroyed and its worship is interrupted, it would seem that, as always happens in similar situations, this people, also, is about to disappear. But, instead, Israel overcomes this storm and emerges from it purified of many superstructures which were previously considered indispensable. Its community and personal consciousness has started off on other, unthought-of, paths, and every Israelite knows (or is placed in such a condition as know) how much value he holds in the eyes of the God of the fathers and of the promises.

11) For us, to this first paradox there is added another, when we discover that the value of the human person, an absolute which today we deem to be the common inheritance of our ideal culture, does not come to us from Hellenic individualism — which is strongly class conscious (Greeks against barbarians, freemen against slaves) — but from biblical thought and from its universal openness. This is always present in the Old Testament, even if it is not always prominent.

It is, however, true that not all the Israelites, over the long span of history, show themselves to be docile and disposed to allow themselves to be shaped, as we can observe from many prophetic interventions, starting with Moses, in constant struggle with the people whom he himself defines as " hard-necked. " But it is equally true that within the people a significant " residue " — according to a phrase introduced by Amos and especially emphasised by the first Isaiah — offers itself to God as propitious terrain, from whence there come authentic masterpieces of human persons. On this residue or these remains, according to the New Testament, there will grafted " the man Jesus Christ " (*1Tm* 2: 5). But this is another subject.



The Synthesis: Who Man Is

12) Hitherto I have proceeded along genetic lines so as to give an idea of the long process by which the concept of the human being, through the experience and reflection of Israel and in the light of an assiduous contact with God, came to be defined. From this there can arise an impression of a kind of magma, a cumulus of materials which are full of potentiality and not easy to extract and define. The isolation of precise doctrinal themes to be found within this cumulus — that is to say, the concept of man — could thereby appear an arduous task and undertaking.

But the relationship between the whole of the history of the people and the experience of the major personages which mark it is already a great factor of clarification. There is, however, something else. The same inexhaustible source which is constituted by the religious reflection of Israel — something which is illuminated by the interventions of God, guided by his chosen and first and foremost by members of the prophetic movement, and sustained by the charisms of inspiration — has furnished us with the key for a doctrinal reading of the history of the people.

13) It is to be found in the first eleven chapters of Genesis. In formal terms they contain the Israelite interpretation of the prehistory which was known to the shared culture of the Near East. It is a reading which filters and decants that cul-

ture through the light of the doctrine of creationist monotheism, and it uses it as a vehicle for an authentic *summa theologica*.

The basic and universal positions of the faith of Israel are there to be found, thoughtfully expounded. As I observed at the beginning of my paper, it is today thought that such an advanced and pure synthesis cannot have been carried through unless it was the outcome of long labour — of a process made up of listening to what God revealed, of contemplation of both the mystery of God and of man, prayer and reflection, and calling upon the collaboration of innumerable generations which had been religiously faithful and enlightened.

A singular and important aspect of this extraordinary synthesis comes from its position at the head of the entire Old Testament, which will directly deal with the origins and the history of Israel alone. However, in having the function of a general introduction, it gives a frame of absolutely universal reference to what follows — a frame which embraces the whole of humanity and its destiny. The value of this fact is enormous, as much from the doctrinal point of view as from the pedagogic point of view. It shows, in fact, that the Bible, even though it is primarily directed at the chosen people of God, has humanity in its entirety in view and, according to its connatural mode of proceeding, every individual member of humanity.

14) In this climate, which in terms of world literature is truly unique, we find an enunciation in almost technical terms of the foundations of the biblical message: that which concerns God, creator and lord, the creation as a whole, and, within the creation, man.

The human condition is described there first as it should be because of the creative fact, and then as it really is according to our daily experience. We also find indicated there the cause of the immense difference between the *de jure* and the *de facto* state of human kind, because it is precisely the experience of humanity as a whole which is taken into consideration. Only within this experience will the history of Israel then be described. For this reason this history will be outlined, in principle, within the universal frame work of the need for salvation, within which historical man struggles, and the corresponding divine plan, which comes to the aid of such a need.

All of us human beings, one by one, are thereby involved. With regard to the reality of man the Bible first of all poses a fundamental question. This question is not formulated in expressed fashion but it is clearly presupposed by the texts: " Who is man? " And the Bible itself, because of its unyielding tendency towards the concrete, obviously intends it in a concrete sense, indeed a personal sense. Thus each human being is authorised to apply it to himself, asking himself: " Who am I? " And he comes to realise, with surprise, that the reply given by the text is valid for him personally, and prepares the reply to all the other questions which have always been connected to that first question.

15) The first and principal answer is contained in the first three chapters of Genesis, in two texts of narrative form or stories, which are very dissimilar in vocabulary or style, but solidly in accord with regard to content: the story told of the creation (Gn 1: 1-2, 4a) and that told of the origins of man (Gn 2: 4b3, 24). The substance of the reply can be captured in three well-defined lines which summarize the essence of the identity of what we call " the nature of the human person, " and can be summarised in the following way: man is 1) the creature of God, 2) the image of God, 3) the interlocutor of God.

To these fundamental characteristics many others can be added, given that the initial Genesis stories are addressed to the entire human group and, within that group, to each individual human. The personal identity of man and its special dignity, which is unique in the cosmos, is not alone emphasised. Links between individuals, above all, the interpersonal relationships which give life to the nuclear family, are also clarified. Furthermore, the links of humanity with the subhuman world, and the inclusion of single individuals and humanity all enter into the development of history — whose prodromes are considered by the twelve chapters. The frame work is therefore particularly rich, and one can rightfully conclude that in these first and exceptional biblical texts there is contained, in addition to and alongside the *summa theologica*, also an authentic *summa anthropologica*.

At the centre of this last, as a support for the edifice, there are three structural lines of the identity of the individual human person indicated above. To this one should dedicate special attention and analysis.

16) Man, therefore, first of all is a creature of God, indeed " the " creature of God. A sign of this is to be found in the very special emphasis that the two tales give in their turn to the creation of man, both with regard to the divine determination which precedes it and also with regard to its execution; and also in the description, which is charged with symbolic implications, of the formation of man and woman. It is further confirmed by the continual attention paid to human beings and to their lives on the part of the creator.

In the story of the creation man is the last work of God. Man closes and crowns his creative activity and

for this reason is the end and the purpose of his previous creative work. Above man there is only the transcendence of God depicted in the divine Sabbath.

In the story of the origins God is represented as personally engaged in both the moulding of man and the formation of woman; and as attentive to their survival, but in particular to the development of their personal conscience. To this is directed the precept of the forbidden fruit (Gn 2: 16-17) and even more the formation of woman, who is the only creature amongst the living things who is worthy of being " a helper fit for man. " (Gn 2: 18, 23-4). The second story thus confirms the equality of man and woman affirmed in the first tale: " So God created man in his own image, in the image of God he created them; male and female he created them " (Gn 1: 27).

17) The creaturely state, which is the root for the human beings of their bond with God, their dependence on God, is expressed in a very special fashion in the second of the lines that we are considering: man is a creature who carries within himself the personal mark of God, he is an " image " made in " the likeness " of God (Gn 1: 26).

The texts as a whole suggest that being the image of God comes to man precisely because of his being a human creature, a free and intelligent person. What, therefore, makes man similar to God is God himself, as we read at the beginning of Genesis 5, who orders things so that amongst men a father begets sons who are in his own image. This is man as a being.

A true affinity between God and man is implied by this; and it is the reason why from prehistory onwards God appears as being profoundly and personally involved in human affairs. In such affairs he constantly intervenes so as to guide them, having at the same time total respect for the independent decisions of man. Here is inserted the totality of the relationship between God and men, something which is displayed even in the pedagogic dialectic which links crime to punishment in the context of salvation — as appears very clearly from the first sin and its condemnation, which contains that intonation which has led it to be described as the " protogospel. "

18) Creature of God, image in the very likeness of God, " thou hast made him little less than God " (*Ps* 8, 6) one Psalm will affirm — man, finally, is the only creature in the cosmos who, in being a person, is able to be an interlocutor of God: to listen to him and to respond to him, to call upon him and to wait for his reply.

And it is this which is the golden key to the most hidden of secrets regarding the true identity of man according to the Bible. All the history which is contained in it was thus summarised at the beginning of the letter to the Hebrews: " In old days, God spoke to our fathers in many ways and by many means, through the prophets; now at last in these times he has spoken to us, with a Son to speak for him " (Heb 1: 1-2). The whole Bible and its history is nothing else but God speaking to men, and waiting for their reply.

The summit of the summit for man, therefore, the diamond point of being in the image of God, is his dialogical structure of being a born creature made to enter into communication with God. And God not only does not distance himself from man, but actively searches for him. In the entire cosmos man is the only creature that, being conscious of himself, is able to put himself before the infinite I of God as another finite but authentic I and to say " You " to Him and then to hear Him reply " you. " Dialogue between persons, between God and man and between man and God: this is really the whole of man.

19) Creature of God, image of God, interlocutor of God: upon the string of this identity is developed in its entirety the melody of the Bible's message regarding man: this is the litmus paper by which to test the spiritual health of the human creature, and which also guarantees him a correct intercreatural relationship. The fact that biblical terminology which deals with madness is almost exclusively confined to pointing out a conscious refusal to engage in dialogue with God is not without profound significance. And this madness is, at the most, a refusal of the person of God: madness as impiety, self-negation and, let us put it thus — self-destruction of the human identity itself.

But even more relevant, with regard to what we are concerned with, is the positive line of the theme of dialogue with God. At the end of divine revelation the person of Jesus Christ, Word of God made man — made " flesh, " as the fourth evangelist expresses himself (*Jn* 1, 4) — presents himself, and is presented by the apostolic writings, as the final point of comunication between the divine and the human, as the sum fulfillment of the dialogical structure of man, but also as the complete realisation of the image of God in man. It is again the letter to the Hebrews which, in reusing a repeated Pauline statement regarding Christ as image of God (*Rom* 8, 29; 2 *Cor* 3, 18; 4,4; *Col* 1, 15) and conjoining it with a statement of the Old Testament concerning divine wisdom (*Wis* 7, 25-26), will assert that Christ is " the radiance of his Father's splendour, and the full expression of his being " (Heb 1, 3). He is not only true man but, precisely because of this, also true image or " icon, " to which every man is exhorted to conform so as to reply to the divine proposal regarding his own perfect self-fulfillment.

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JORDI FONT I RODON

The Human Mind and Religious Experience

Introduction

Our contribution is based on the elaboration of experiential and theoretical work carried out at the Vidal i Barraquer Foundation in Barcelona since 1964. The experience is based on the psychological-clinical study of over 6,000 cases; among them, some are people from religious or priestly life; others are lay, both believers and nonbelievers, but all are in personal situations (for example, of a vocational nature) or difficulties relating to the psychology of religious experience.

It is also based on my work in teaching Psychology and Religious Psychopathology and General Psychopathology at the Graduate School of the Vidal i Barraquer Foundation and at the Medical School of the University of Barcelona, along with the research carried out at the Foundation's Research Department.

The theoretical framework for our research perspective is that of current Psychoanalytic Psychology, particularly as represented by Melanie Klein, Hanna Segal, D. Meltzer, W. Bion, H. Rosenfeld, and others.

Given the nature of this paper, we have opted for a presentation which, though not offering experimental data, gives an account of our anthropological conception of human mental life — the psychological epistemiology we base ourselves on — in relation to religious psychological experience.

In connection with religious experience, we must note that our mode of understanding this study assumes the perspective of a believer who admits the possibility and reality of the existence of God, but only to suggest psychological clues to attempt to elucidate the path the human mind follows in the experience which may lead to God. We also presuppose faith in one who experiences God — faith understood as a theological gift, which is not the subject of this paper.

1. The Psychology of the Human Mind in Religious Experience

We must specify what we mean by " human mind " and " religious experience. "

In our language, " human mind " means ' the set of all the psychic functions, both those possessing conscious perception and operativeness and those which are unconcious '. We thus use colloquially expressions such as " They are of one mind "; " He has a healthy mentality "; " He has a feverish brain. "

" Religious experience, " or, more simply, the term " religion, " has been the object of lengthy and long-standing speculations.[1] It is a phrase which, though widely used, lacks a precise meaning, as can be seen by observing the plurality of words which are used simultaneously. Thus: experience of God, of the sacred, of the numinous, of mystery, of the spirit, of grace; or mystical, oceanic experience. These phrases, while belonging to a single sphere of reality, may be differentiated, some quite clearly, so as to be dealt with specifically.

We shall here pay attention to what is common to all religious experience: a reference to the superior part of man and what is superior to man (what in some sense is supernatural), which we perceive with our human mind.

Our analysis will focus on the human mind and the desiring and believing subject. We shall describe the phenomenon from a psychological standpoint — the one corresponding specifically to the human mind — without going into other points of view: sociological, historical, philosophical, or theological. And within the domain of psychology, we base ourselves on psychoanalytic hermeneutics, which strikes us as most suitable for the anthropological understanding of religious experience.

Religious experience, which is also human experience, is all expressed psychologically, and only by means of our psychology. There is no religious experience, however sublime and profound it may be, which does not have a correlate in our mind, either conscious or unconscious.

2. Evolution of the Confrontation between Psychology and Religion

About a century ago psychology came to be a science, separating itself from philosophy and theology. In the course of much study and research, psychology has progressively been applied to the religious event, taken as an experience proper to the human mind.

Freud published his first papers on religion and was quite critical of it, with radical assertions which he himself later corrected. He considered *belief in God* as if it were merely *a projection* of internal objects — parental images — due to the fact that parents are felt to be so necessary that one cannot easily renounce them even as an adult.

The quasi-illusion of a God would thus be forged and it would be believed that this God truly exists outside oneself. Those assertions produced great confusion and disturbance when they did not lead to outright indignation. I think that even now a feeling of rejection towards those early assertions may endure among believers who do not realize that they were corrected by Freud himself years later and, even more, do not take into account the benefits which psychoanalytic interpretation has provided and can still provide to religious experience and faith. Today those early Freudian conceptions on religion have been broadly superseded by the scientific world of psychoanalysis.

The following stage involved defending oneself in the face of the supposition of an infantile religion, and there was an attempt to show that *adult faith* was possible only by purifying faith of primitive religiosity, as if the human being might have to dispense with the most vital part of his being, his pulsions and desires, to encounter God " in a mature way. " As if to free oneself from infantile psychopathologies in religious experience one had to negate the whole evolutionary psychological process, instead of differentiating between what is infantile and adult religious experience and knowing what is needed to lead to authentic inner liberation. Authors such as Erich Fromm have recognized this.

A further phase, which can by called " homology, " to use L. Beirnaert's term, involves reconciliation and virtual identification, from a psychological standpoint, of the process of faith and that of psychoanalysis.[2] This is contributing beneficial results and deeper knowledge of the limits and likenesses of the two psychological processes, religious and psychoanalytic, with the danger that the discourse of both theology and psychology may come to be distorted, however.

Recently some, like Thierry de Saussure, wonder whether the confrontation between theology and psychoanalysis is not superfluous. He considers that in both theology and psychoanalysis a real connection between the subject and what the subject expresses may be found — the subject is, respectively, God Himself and the human subject, and what the subject expresses in words is, respectively, the Word of God and the reality of the human unconscious. Both the truth of God and that of the human unconscious, speaking analogically, are truths which may be limited and betrayed by the discourse of " truth, " since the subject they start from — the Divine Verbum or the human being — can express himself in statements but never exhaust himself in them. Both the Gospel parables and the symbols of communication of the unconscious are communciable " truth " to the extent that the subject is capable of receiving them: " Anyone who has ears should listen! " (Mt 13:43).[3]

This historical course of evolution and the supposed confrontation between religion and psychology (or theology and psychoanalysis) suggests possible parallels with what occurs in the personal evolutionary process of religious experience on a psychological level.

3. Psychogenesis of the Mental Experience of God. The Relation to the " Mental Object " God

According to the " homology " we previously noted — which we might well term " analogy " — a correlation may be established between the original, evolutionary process of psychic life and that of religious experience.

Given the object of this communication, we shall limit ourselves to setting forth just some of the moments in the human being's psychic development — those which strike us as most significant in terms of religious experience.

The human being, as viewed psychologically, is not only the result of his genetic programing or his own constitutional capacities for reaction, but, rather, from birth itself on there exists in him a peculiar organizational capacity, his *selfhood*, which is gradually shaped on the basis of the relations established with his external and internal (that of his own fantasies) worlds under the impulse of desires, of obtaining gratifying satisfactions, and under the threat of destructive fears — all of this in continuous interaction. Life and death. In this way he will gradually come by relations which take on meaning and structure his psychic life on the way to maturation. Let us examine this process.

It begins with a *first stage* (called the schizoparanoid position, in Melanie Klein's terminology), which is characterized by unconscious defense mechanisms with a splitting of mental reality and negation of reality itself, with the child's fantasy, to defend oneself from the confusion generated on having to face a fearful reality; it is also characterized by unconscious mechanisms of projection consisting of placing outside oneself (projecting) one's unbearable feelings for the purpose of depositing them in another, different object.

In effect, in the early moments of life, when the child, a prey to anxieties, bursts forth into a microcosm that is unknown and disturbing — even more than sidereal space is for an astronaut — the baby, helped by sensations which are not conscious, but decisive, seeks security and dependence which will allow him to subsist. He alternates between feelings of anguish and wrath, feeling abandoned or attacked and the satisfaction provided to him by secure confidence in another. He wavers between a feeling of chaos, annihilation, and impotence and an ideal-

LXI.

Der Schneider. Sartor.

Der Schneider zerschneidet das Tuch mit der Scheer; und nehet es zusammen mit der Nadel / und Zwirnfaden.

Darnach bügelt er die Nahten mit dem Bügeleisen.

ized sensation of omnipotence. These are the first catastrophic moments in life.[4]

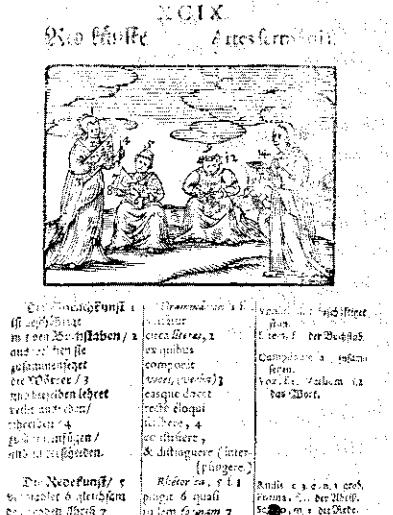
In those early periods the child experiences pulsional charges — desires and catastrophic fears — but also with a reference to something which will allow him to structure himself and not succumb.[5,6]

To defend himself from his fears the baby in his mental fantasy splits both inner and outer reality for the purpose of protecting himself from bad and destructive objects, isolating them, and identifying himself with the good ones. It is a partial type of object relation. As the child attempts a relation to the object, he starts to be confused by the ambivalence he perceives when he still cannot gather together in a single object both good and damaged parts. If the process follows a positive course, it will come to form the total object and the type of relation in the next phase. Only in the event that this period cannot be overcome with a favorable balance sheet will there be structured a kind of relation which further on in the life of the adult may take on psychopathological nuances.[7]

Up to this point we have seen that in the first stage (schizoparanoid position) the child prematurely initiates an organization of the self, since at birth there is sufficient weight to the self to feel anxiety, defend oneself against it, and establish primitive object relations, in both fantasy and surrounding reality. The primitive self, at first quite disorganized, tends to integrate itself; on the one hand, under the impact of the "death instinct" — an unbearable anxiety turning into fear of a persecutor, projection of one's fantasies, and aggression against those persecutors; on the other, moved by the "life instinct," which establishes a relation with an ideal object: projection of the pulsion to conserve life.

Religious/psychological correlate. In the adult, primitive psychic experience revives. Religious experience on a psychological level adopts tonalities in accordance with the feelings described in the initial psychological process, a process which, if evolving normally, will not harm further religious experience. But if this situation has not been overcome successfully, it may bring the relationship with God to be experienced as persecutional, or it may be taken as an ideal or idealized object capable of protecting him from every adverse reality by means of a magical, omnipotent negation. An idealization and omnipotent negation of the fear of persecution which may lead to an attitude similar to that of the "perfect babies," who never protest or cry, as if every experience were good for them. In the adult, such defensive mechanisms might lead to a lack of discrimination between the good and the bad.

Second stage. After that early stage, which is characterized by partial relations to objects, splitting and negation of reality, and confusion, there follows a phase also made of tests so as to recognize gradually that inner and outer reality is not split between bad (persecutional) and good (ideal) objects, but that one and the same object may be ambivalent — at once partially good and partially bad, i.e., a "total object" because he feels he has been loved by it in spite of its frustrating him. This position is called the "depressive position." The baby learns that he can motivate another's obtaining satisfaction or insatisfaction. He learns that he can renounce his most instinctive pulsions, with the consequent affliction or suffering that entails, and that, thanks to it, he obtains higher satisfactions, something more valuable for him, such as, in the baby's case, his mother's smile and thankful recognition. He learns that when he has experienced a feeling of affliction or perhaps guilt, he himself can make reparations. In this situation there awakens in the child a capacity to symbolize, which is stimulated by the baby's renunciation of his instinctive pulsions. The capacity to symbolize is due to the fact that the object renounced may be assimilated by the self, thanks to the process of affliction and reparation, and that object then becomes a symbol within the self. The self distinguishes between the symbols it has created and the objects renounced from which they have originated. Such does not occur in psychotic disturbances, where the original object is made equal to the symbol and does not differ from it. It is the so-called "symbolic equation," which provokes the psychotic's concrete thought. Symbol-formation is basic to the baby's growth; it is creative work which involves pain and affliction over what is renounced. The symbolizing capacity opens up the possibility of establishing bonds among objects and of abstracting, which is the basis for mature, creative thought.



Religious correlate in psychology. This analysis comes upon the analogy of the above-described psychoanalytic process with the theological expression of sin, death, and resurrection, and the resemblances in some terms employed, such as affliction, guilt, and reparation. For instance, renunciation of sin, or simply of what is most instinctive, what impedes a higher value of love in the relationship with God or one's being able to reach mature relations, with the "total" object, God, who loves and can frustrate, who is ambivalent, before whom the subject may feel guilty and repent and give up what prevents access to a higher value, the love of thankfulness. The confidence which arises from having felt oneself to be loved first by the other, by God — without this relationship the religious process would encounter serious difficulties.[8]

An Intermediate Stage: Borderline

We have described the transition from a dissociative stage — on account of primitive fears in fantasy — to an integrative one. In the area where this passage takes place, or "limit zone," obstacles may present themselves to the psychological-emotional maturation process and give rise to a situation where the structure of the corresponding personality does not crystallize in any way. This state is called "borderline" and is alluded to frequently by personal and social psychopathology and for religious experience as well. The possible genesis of the borderline situation is attributed to primitive fantasies of fear which are not overcome, in the face of which strong psychological defenses are established which do not allow the relationship with the object to progress in a positive direction. In its place there appears the kind of narcissistic mental organization that is characterized by unconscious fantasies of self-sufficiency, with very slight perception of one's own mental reality. In the adult it is manifested in a massive identification replacing the external object: "I am the object."

Religiosity in the borderline stage. Religious experience may encounter difficulty in finding in the relationship with God Someone who is outside oneself, with whom one can establish a differentiated relationship; instead of that, the relationship with God may become a confused projection of one's own desires and feelings, a pseudorelationship, taking this contact with God as if it were oneself, even if unconsciously, and not allowing oneself to be affected by any mediation of God that proves frustating.[9]

4. Mystical Experience as a Process of Psychological Maturation

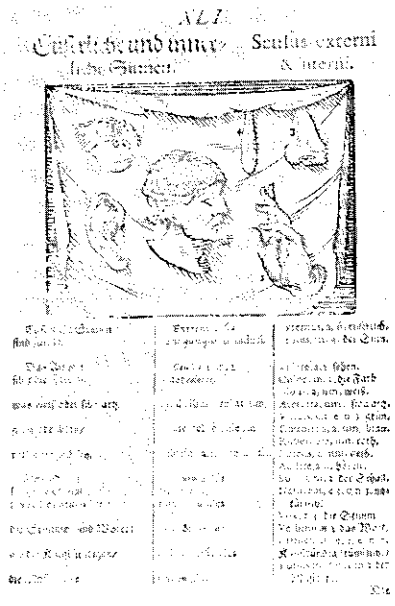
4.1 The process of psychological maturation

In continuing our discussion of the psychological process in religion, I want to stress the following.

• In the measure in which the "object relation" progresses, one comes to differentiate and recognize identity — the identity of the self and that of the object, i.e., otherness. One comes to experience the object and personal reality not as something partial and incomplete, but as a whole, just as it really is.

• Experience of the object is not exclusively or predominantly intellectual or conceptual, but vital, made up of different pulsions and desires, affections and fears interacting with images of the outer and inner worlds and gradually making possible intellectual knowledge through renunciations and symbolizations. All of this, organized by the self, will take on meaning and structure psychic life, unique to each person. It is the beautiful story whereby, once having been born to life, one attempts to be born to oneself and grow, as a being, in relation to others. A growth which will end in the death previously announced in the limits appearing every time one discovers what one cannot be or no longer is in relation to what one wishes to be.

• The inner object, although equivalence to outer reality is incomplete, is not for this reason necessarily just the result of the self's mental projections, as if it were a creation or invention of the subject himself. The inner mental object shares in external reality and the projections of the subject.



Now, all we have just stated also refers to the religious mental object: God.

This object, psychologically, gradually evolves and takes on historical, personal, conceptual, and emotional content, ever capable of being led by the Spirit of God from the standpoint of the believer's faith.

There are various possibilities.

• It may happen that the process remains slowed down or halted or that it follows different routes from the one leading to a personal relationship of dialogue. In this last case we are dealing with the "religiosities" which so abound today, in which there is manifested a plurality of psychological feelers — fertile soil for confused experiences, a fact which explains why some of these "feelers" may drift towards situations of sectarian or even perverse dependence.

• It may happen that the subject is not in an attitude of belief in his relationship with that mental object God; in that case he has no "experience" referring to God, but intellectual knowledge.

• Or it may happen that the subject believes in God; he then has an experience which may encompass a whole range of variations — acts of discourse, intelligence, and will; emotional experiences; consolations and desolations, etc. In this last instance, can there be something more?

4.2 Mystical experience

According to our way of seeing, in mystical experience the innermost realm of existence is reached, but in a way utterly different from what happens in childhood. We think one can arrive at mystical experience when there is a maturing relationship, even when the subject is not aware of it. That situation offers the substrate upon which belief and the gift of faith are established. In mystical experience there is a transformation, not by regression to undifferentiated childhood situations. By itself a regression does not

transform, but rather brings with it pathology. In mystical experience there is a unitive experience of love which we might compare to the intimate amorous union in the human couple, which, when it is produced in a mature relationship, obtains a "vital orgasmic" apogee, with satisfaction not only from primary pleasure, but from the enjoyment of integrating personal union shared by the couple. Such a maturing union offers certain psychological possibilities which the primitive infantile relations do not yet allow. We thus understand the analogy to the mystical process. An analogy which reminds us of the account in the Song of Songs.

In mystical experience the mental object God is a "total" object and, in addition, an "absolute" one which utterly surpasses any other immanent object. The subject's relationship to that "object" is produced with a characteristic similar to but not the same as that presented in the initial childhood object relation, in which there is a disproportion in magnitude between the subject and the object. In mystical experience that disporportion becomes overwhelming — a disproportion between the capacities of the receptor subject, even if now adult, and the mental object, transcendent and infinite God, the object with which the person wishes to unite himself and which is psychologically "real" in the human mind for one who believes. An object under the control of the absolute, transcendent God. Quite different from that of childhood fantasy.

Mystical experience is forged in a long and sometimes hidden process — renunciation, affliction, reparation — whereby one gradually acquires an exclusive desire to find and love God completely. A process of the "dark night of the soul." The psychological expression of the subject's total trust in the object God, who, on the assumption of faith, is the origin and end of the object relation itself.

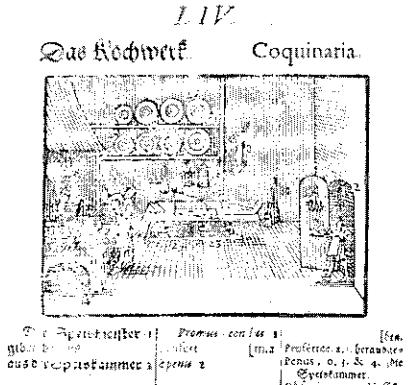
On arriving at an object relation, which involves loving union with God, the experience undergone of an "active passivity" overflows every limit, ceases to be conceptual, proves ineffable, and guarantees a certainty which cannot be doubted. One speaks of the "immediate experience of God." And it may appear suddenly, without being preceded by any conscious motivation.[10]

In summary, in our view, mystical experience is the psychological expression of the process of human maturation in relation to God. The object of the mystic's relation is God. The primitive self-perception of existence is recovered, but now with a mature personal identity which enters into relationship with the other, in an integrating and unitive fashion. Other relations have been renounced, and to some extent there has been an intuition and desire to establish oneself in the fundamental relation to God. The subject has stripped himself, or been stripped, now dead to other relations through successive renunciations, with joyful sorrow. And a symbolizing function has thus been recreated which is overwhelmed by the limitlessness of the object symbolized: God.

5. Influences of the Psychopathological State and Related Functioning on the Psychological Experience of God

In the evolutionary process of maturation we have described under the third point we saw that if inner and outer conditions favor development, as normally occurs, difficulties are overcome and a mental structure is acquired capable of facing the eventualities and frustrations which life presents. It is quite different when this maturing process has not been carried out during the childhood stages described; then, in the face of a failure or a conflict situation a pathological response appears corresponding to the type of structure which has previously been forged.

Given the character and length of this paper, we can only indicate in generic terms here and by way of example some kinds of psychological difficulties among those particularly common in psychopathological manifestations of religious experience.



5.1. *Deeply depressive religious experiences and hyperphoric exaltations*

These correspond, respectively, to the melancholic and maniacal type in clinical terms and, psychogenetically, to the first evolutionary stage we have described, when it has not been favorably resolved. There are feelings of being irremissibly lost, before a God who is felt to be an implacable persecutor, with no chance to make up for one's guilt (persecutional guilt alone is felt), total darkness without a future. One reaches mental death and perhaps physical death (suicide?). One feels not only abandoned, but persecuted by God.[11]

The reaction contrary to melancholy is the unconcious negation of melancholic terrors. It is the experience of false religious euphoria wherein the person cannot deal with situations producing suffering — unconcious psychological defense mechanisms situate the person in the opposite extreme of depression, with feelings of triumph and perhaps disdain for what holds no interest. This can shift from an emotional level to an intellectual one and give rise to irrefutable personal religious convictions of whatever coloring.

5.2. Obsessive distressing religious experience

It appears merely as an occasional symptomatic phase or may take root as a stable personality structure. We cannot go into an analysis of the psychogenesis or psychopathology here. We shall only point out some forms of conditioning which affect — sometimes very intensely — the religious or pseudoreligious expression.

The scrupulous person in religious content shows a relation to God marked by feelings of exigency towards oneself imposed not out of love, but fear; an autoexigency from which he does not free himself either by means of a childish, tranquillizing mental submission or by ritual acts of conjuration for the purpose of appeasing his magical fears. His feeling of psychological guilt, which he confuses with moral guilt, relates to reviviscences of primitive object relations dominated by the severe, punitive control of the superego. Authentic desires for religious perfection, disguised by the disturbing exigency of scruples, are thereby spoiled.

5.3. Affectivity and fluctuant religious behavior

This relates to the narcissistic mental organization of the borderline situation.

There is difficulty in tolerating contradictions or frustrations in life and in religious experience, along with emotional malaise on not finding at once the satisfaction sought. There is a need to obtain approval and gratification constantly in attempting to fulfill affective avidity, with resistance to facing reality in order to avoid suffering. The person thereby appears voluble and wavering, with difficulty in experiencing authentic feelings of healthy guilt — it would be too terrible to bear them. Guilt must remain in others. If the person recognizes himself to be guilty, it is only intellectually. Feeling guilty would mean being deprived of all affection. The opposite of what happens in guilt arising from love, in the good depressive situation. One does not move out of esteem for another, but seeks only to acquit oneself well so as not to lose esteem. One's own well-being is sought. If the well-being of another seems to be sought, this may be because one projectively identifies with the other: " I am the other. "

The person can deceive himself in the relation to God — deceits which are not easy to detect, sometimes not even for spiritual counselors, above all if the person lacks very marked traits and is endowed with good intellectual and even personal capacities, which is not uncommon.

Final Note by Way of Conclusion

Throughout the present paper on the relation between the human mind and religious experience we have wished to show:

1) the difference between *faith as a gift* of God, which is not the object of our reflection, and religious experience, which is the *psychological process* by means of which the experience of God may be had;

2) that in the process of the psychological maturation of religious experience the key to growth in maturity is found in the *interpersonal relationship*, a relationship at once *sufficient and necessary* in order for *positive religious experience* to take place — acceptance of frustration, renunciation, and feelings of affliction, which give rise to real acts of reparation which are creative and satisfactory in a healthy way;

3) finally, that the process of psychological maturation of religious experience never ceases in any period of life, but may continue at all times, even if we have stressed the *importance* of development of psychoaffective life from the *very first moments of existence*.

ALB. Quid credis ipsum sibi velle per hoc aenigma? BORISTA. Dicam vt potium. Habeas ab inuicem fepofita fubiecta quamnor & vigini, quæ vniuerfa non abiecant, non inhærent, non contingant. Sed liberos, & foluta vel fimentes vel fecutes intelligamus.

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[1] To cite as a sample one single researcher on this topic of religion and the sacred, Vergote, stands out. The experience of the " sacred " represents a real existential experience, profound and long-lasting, of what transcends the individual and gives him plenitude. According to this author, these are quite human qualities but do not refer to the religious sphere. It is like an immanent transcendence. This sacredness belongs to God but does not qualify God. It is not specifically the religious. For the religious, Vergote admits three dimensions, three types of relation appearing at the same time: 1) an experience of the sacred (God is also immanent, forming part of existence at its depth); 2) the relationship with God, who is known by the dimension of celebration, God in the third person; 3) a relationship of dialogue for the Christian within the order of Revelation. God is the one who addresses man by means of words in dialogue. It is not a relationship of experience, but of words: I-thou. Vergote does not accept grounding all religious relations exclusively upon the experience of the sacred.

This sociopsychological analysis is of use to us to take it up again later when setting forth the psychogenesis of the psychological bases permitting the mental experience of God. We shall see therein, unlike Vergote, that a continuity exists between the sacred and the religious in a metapsychological sense and understand religious experience in more unitary fashion, from the most primary psychological elements to the psychological basis for mystical experience itself, which we regard as an expression of maturation in the process of the relationship with God.

[2] L. NEIRNAERT, *Aux frontières de l'acte analytique*, Ed. due Seuil, Paris, 1987.

[3] T. SAUSSURE. " Psychanalise et Christianisme aujourd'hui, " in *Simposio sobre Inconsciente, Religion y Culpabilidad*, Ed. Fundacio Vidal i Barraquer, Barcelona, 1989.

[4] This would correspond to the so-called " O point " of Bion. The early catastrophic moments. The self is born and either evolves or dissolves into the psychotic in the midst of the sensation of catastrophe. For Bion the sensation of catastrophe serves as a bond among different aspects of the personality

The baby perceives that there is something more ineffable than just the tension of survival or rupture, something impregnating all: " both the birth of himself and the close bond forming a part of himself, of which the self is also a part, contains something frightful. "

For Bion, faith is the true primordial response developed in the face of catastrophe There is something more fundamental than knowledge — it is faith (in the psychological meaning Bion attaches to it involving basic confidence). " Faith undermines and transcends our need to control and allows us to experience the impact of emotional reality in such a way that it develops authentically. " The " OI " sign is for Bion the essential reality of the human being as such — this reality is in itself unknowable (M. Eigen, " Entorno al punto de partida de Bion: De la catastrofe a la fe, " *Int. J. Psycho-Anal.*, 1985, 66, 321.

[5] In the *Spiritual Exercises* of Ignatius of Loyola, before beginning the process leading us to the way of Life, we encounter the so-called " Principle and Foundation, " which in this sense amounts to an indication on the need to have desires for God, to let life " pulsions " crop up in consciousness making possible the process of transformation and growth in love. " It is of much advantage to go / into the Spiritual Exercises / with great attention and liberality towards one's Creator and Lord, offering Him all one's willing and freedom " (Annotation, 5a).

[6] Further on we shall see that in mystical experience there is a recovery of those primitive experiences which are ineffable, aconceptual, and fundamental. But in mystical experience they are re-experienced in another way. A whole dialectical process of maturtion, of death/life, mediates, opening up new psychological-affective possibilities which serve as a substrate for the gift of the Spirit to be received — unitive experience, union, not confusion, in a deep faith experience: theological faith, not just psychological faith, which Bion postulates as basic confidence.

[7] Those early moments of human psychological life are discussed in the framework of the theory of " object relations, " according to the conception of Melanie Klein, a theory which the above-mentioned Bion continues (H Segal, " Introducción a la obra de Melanie Klein, " Ed. Paidos, Buenos Aires, 1975

[8] We should specify a point here: when we speak of the mental object God, we are speaking of an inner mental object which does not correspond to an outer physical reality, as may occur with other inner mental objects; but it does not cease to be a psychological reality for this reason.

We are not referring to a " sensory " image of God, but to an " experience " only to some extent expressible of the subject-object relation, in a positive process of identification with the mediations of God — Word, persons — may come to be a dialogue relation, I-thou, which is gradually shaped on the basis of the two identities: the subject's self and the mental object God That personal mental object, God, has been formed through successive experiences of great complexity, not only with external objects — social, pedagogical, cultural, family, and other elements — but also with the internal mental objects by means of reiterated introjections and projections, which recreate the object perceived on the basis of one's inner world, peculiar to each person. We repeat our presupposition: the " mental object God, " whose psychological genesis we are seeking to trace out, is experienced in another order or reality, that of faith, which is a gift of the Spirit; its concomitance in the process we are elucidating cannot be obviated.

[9] J. Bea, A Bobe, J. Font, A. Gomis, " Foi, symbole, et interprétation comme accès à la connaissance de l'invisible, " *IX Congreso de la Asociación Internacional de Estudios Médico-Psicológicos y Religiosos* (ALEMPR), Ed. Secr. Rembrandstraat, 35 B, 2018 Anvers, 1990

[10] J. Font i Rodon, *Discernimiento de espiritus*, Manresa, vol 59 (1987), pp. 127-147.

[11] Utterly different is the experience of the " dark night " of the senses and understanding, an ascetical path on which one actively and passively suffers complete dispossession (nothingness) to encounter the full relationship with the All. In the dark night one never loses hope in the One who is sought. There is no mental death, but maximum growth in maturity, which is also painful.

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EDOUARD BONÉ

Culture as a Creative Project and Biological Emergence

1. Nature and Culture

I am sincerely honoured to have been invited to take part in this study on the human mind and to make my contribution to it through the testimony of a special discipline. I will locate my talk at the level of the anthropological and paleontological sciences. Without distancing myself from the methodological rigor required by the field of neurosciences, I would like nonetheless to develop my reflection upon what is most profound in the idea of man as being permeable to inspiration. This idea subtends the subject of this meeting: *in our image and likeness, the human mind*. I will speak, therefore, as a Christian paleontologist.

" Culture as a creative project and biological emergence. " My title probably requires some explanation. To counterpose nature and culture is classic and probably too comfortable: the first is dominated by determinism, the second — on the other hand — is characterised by its rival, freedom. This, in fact, is a Cartesian vision, denied both by modern scientific anthropology and by Christian faith. We would like to show how in man biology is somewhat coated by a cultural patina, and that it is the creative intention to use the emergent role of secondary causes to the benefit of an autopoiesis of the human being.

A recognition of *the mind* as an essential element in man is to say that man by nature is endowed with reason. This is to do as Aristotle did and to affirm that man is innately capable of living according to reason: all this means an immediate designation of the specificity of this primate, that is " different from the others, " his innate originality, the " new kingdom " inaugurated by him in the evolutionary process, the " new species of life " created in the heart of biology. Furthermore, an evocation of his creation *in our image and likeness* means to declare, as Thomas Aquinas declared, that the specificity of this human nature is, moreover, fundamental receptivity towards grace.

Virtuality of consciousness or rational life, and its specifically Christian appropriation, in the ability offered to him to establish a relationship with God, creator and saviour: this, therefore, is *the initial gift, that is to say, nature, what is innate in man*; this is what in the human species is universally present, valid, beyond and independent of every individual condition due to upbringing or genome. What is more, it is the outcome of what has been prepared over a long period of time in the evolutionary process relating to the creative act. It was this very creative act which called into play those factors of *hominization* which have been progressively recognised by biological science.

" From biology to culture. " Jacques Ruffie's book well demonstrates the manifestation (one would like to say, the " revelation ") of this special character of man. *Culture*, then, is beyond the innate, is exactly that which is acquired, the initiative, always variable and contingent. Beyond the already achieved homination, and under the action of this repeated preference of just, moderate, thought-through acts which create habit, it is progressive " *humanisation*, " the gradual abundant growth of the virtualities written in at the outset, and their patient journey towards the maturity of adult and satisfied man. In the Christian appropriation and in the vocabulary of St. Thomas, through the innate receptivity to grace, this humanisation is identified with the *divinization* of the human creature, who is progressively incorporated into the total stature of Christ in growth.[1]

2. Scientific Anthropology

This perhaps overly rapid incursion into the field of Aristotelian thought and trespassing into St. Thomas of Aquinas, has been of some use in a profound interpretation of the facts of the most rigorous forms of scientific anthropology. One cannot but be struck by the fact that modern science attributes a unique position in nature to man.

Comparative anatomy, embryology, biochemistry, and psychology have greatly increased hypotheses regarding a strict link between man and the animals, even to the point of affirming the certainty of a descent or, if it is preferred, of an organic path from one to the other. For about one hundred and fifty years palenteology has provided the essential signs of this process. Today, no scientist rejects the schema of a generalised evolution to explain the appearance of man. Even so, it must be recognised that evident disagreements exist regarding the details of phylogenesis and on the specific mechanisms used to explain it. It should also be said that from the point of view of the biological facts alone the " human mutant " is not at all far distant from

the largest and most evolved primates. In the field of morphology and physiology, or at a molecular level, no qualitative difference exists between them. One can, nevertheless, observe a greater complexity in certain systems and internal organs or groups of organs. This suggests a process of evolutionary stages which can also be observed in the discoveries of paleontology.

But this fundamental conviction about a generalised transformism which involves man is in accordance with an equally general recognition of the exceptional situation of the human primate — *die Sonderstellung des Menschen*. Soviet anthropologists have created an especially meaningful vocabulary to describe the human epoch. In drawing upon a classical geological terminology (paleozoic, neogene, etc.) they have created the terms anthropozoic, neogene, and anthropogene. What else can one say but that the spark of mind, consciousness, and rational capacity that was born between three or four million years ago in the heart of the purely biological was something essentially new and fundamentally heterogeneous in relation to everything that had preceded it in this long baggage train called life. The human being has an irreducible relationship to the rest of the biological world and this is despite the fact that he is composed of the same atoms as the rest of the universe, can discover his own origins in the animal terrain, and has tissues which have ninety-five per cent of the same aminoacids as his cousin the chimpanzee. He also displays a surprising physiological, hemotypological, and even immunological continuity with the other primates. This " new species of life " is characterised by a surprising originality: it is unique in being able to think, create symbols, utilise mathematics, create dreams of love. It is unique in being able to give life to projects, to make predictions, and to consider things with a certain objectivity. It is the only species which says " I and You, " to feel itself at times alive within another, to be convinced deep within itself that another person is, in the real sense of the term, a part of its most profound intimacy, a piece of its own life.

The interpretation of such a blessed and indisputable experience (and here for a moment I recognise that I go beyond the horizons of rigorous anthropological science) is as follows: in nature man and woman are the only creatures that bear within themselves the breath of God and his blessing. Both are created in his " image and likeness. " They are something more than mere creatures, they are partners of God. He, together with them, gives rise to a life, an adventure. The human being answers to a special appeal, a vocation: he is the repository of a programme which must be carried out in the name of God. The creator project is precisely the fulfilment of the programme: beginning with nature, with that innate rational capacity and receptivity towards the grace that calls them, the progressive humanisation and true divinization of this exceptional flesh inhabited by the spirit.

3. Hominization

Nature and culture: what is innate and what is acquired; basic virtuality and their blooming through freedom and initiative . . . In the history of the human species it is probably easier to discover the emergence of humanisation — that is to say, the stages of his own coming about in space and in time — than to penetrate the mystery of his gradual divinization. This is something which does not reveal itself to scientific observation but which belongs to the realm of the mystery of man before God. Now, in this regard, in man as in the animals, this secret culture of the brain gives us more information on the genesis of the human being and on his uniqueness than the whole of anatomophysiology. Now, it is difficult to reject paleontological and prehistoric evidence: every biological stage which hominids go through is translated into " cultural progress. "

By now, biological emergence has been largely deciphered and the reading of the gradual derivation of cephalization through the whole animal world — and, above all, in the category of primates — is becoming less uncertain. If it is true that over the last three-to-five million years the neocortex and the neoencephalon have undergone that impressive process of growth we know about to reach their present state of development, this does not mean that they have an exclusive possession of knowledge, of consciousness and culture. They certainly play an essential role in this field, but they are not alone in being allocated such a role: they function in continuity with the rest of the brain, the limbic lobe, and the basic grey structures.[2] The limbic system itself represents an inheritance of the primitive mammals: it is no longer considered an essentially olfactory brain (what at one time would have equipped it for the name rhinencephalon) but it is known that is supplies information in terms of emotional sensations, acting as a guide for behaviour necessary to self-conservation and conservation of the species. Clinical observations emphasise the role it plays in emotional behaviour. This same limbic structure, through the paleomammalian brain, is linked to the rudimentary cortex of the anterior brain of the reptiles. This is not the place to dwell upon the implications of this cerebral development — a development that has lasted for nearly twohundred million years. We must at least recognise that it is no longer possible to isolate man in artificial fashion from the other species of primates, but that in nature it is possible to detect a gradual biological emergence of man — here I am referring to culture.

An electroencephalographic approach to man and the other species of infra-hominid primates is rich in common traits and significant differences. Gastut and Bert, among other neurophysiologists, have explored the abundant presence of the alpha rhythm in the human species: in a total vigil state it corresponds to the focalisation of thought and attention on a specific activity, to the effort of abstraction of sensorial realities or cogitation. The electroencephalogramme of sleep and dreams, of new balances in psychic and affective life, together with the potential richness that they imply, is an important demonstration of this emergence. However, it is not the example of this phenomenon.

If culture is characterised by the surpassing, or indeed by the substitution, of the innate by what is acquired, it is clear that we see it take the form of fundamental virtuality

in the retardation of the characteristic ontogenetic development of the child. It is well known that in the human species cerebral maturity, as expressed by its bioelectrical activity, is acquired with a speed which is five times less than in the chimpanzee. This relative infirmity of the human infant, his organic " dependence " should not be seen as a form of " poverty. " It probably requires a corresponding protection, but it also amounts to a possibility of an upbringing, and at the same time to an open possibility of a prodigious development of life-apprenticeship, of what is acquired, of experience, and, to put it succinctly, of access to culture. In the human species the phase of growth occupies a temporal space of about twenty years: during this long period the capacity to acquire and to memorise information reaches its zenith. The human being is the only primate that has such a considerable period of time available for learning — something which can be influenced by compulsory schooling — and which benefits, within the group, from the collectivity of all present and past experiences, at first through oral tradition and subsequently through written tradition.

Amongst the factors which are traditionally recognised as being present in hominization the acquisition of the ability to walk on two legs takes first place. From this follow all the rest. The upright position, the freeing of the hands and the maxillofacial bloc, the opening up of the frontal region: the multiplication of the most complex activities requires an increase in the neuron circuits and the development of the telencephalon. The cortical surface of Homo Sapiens is more than twenty-two thousand square centimetres large (two-thirds of which are buried in the depths of the sulci). For this reason it is four times larger than that of the gorilla, even though the gorilla remains the largest of the living anthropoids. It should be emphasised that in man the cortical increase involves those areas which are able to record and receive information, to give precise orders, to ensure the storing of memories, and the reusing of past experiences. It helps the extremely complicated centres of association and thus allows logical reflection.

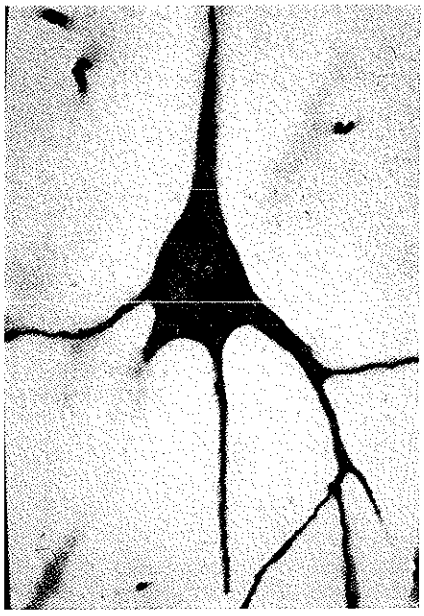
" What achieves utmost development in Homo Sapiens and guarantees him praxis, memory, language, gnosy, his faculty for precision, and the homotypical isocortex. "[3]

Individual rational consciousness and shortly afterwards collective rational consciousness through logical oral communication (that is to say, an elementary language), to the point of giving rise to that new psychosocial " environment " which promotes the intense impact and role of selective forces which hitherto had been unknown: thus is the concatenation conceived of An appropriate verification of the determining factors present in the process has not yet been achieved.

4. The Signs

However, at the level of the use of words and of working with tools, observations allow us to find in this field, as well, certain valuable signs which indicate the progressive emergence of culture.

Language and its logical construction have long been objects of study. Gardner and Premack are two scholars on this subject. It is undoubted that one can objectively identify certain forms of activity linked to language in the chimpanzee. It would not be appropriate to discuss the interpretations of this phenomenon which have been advanced — ideas which have been of a very varied character. We could, nonetheless, find ourselves in agreement in stating that the primates differ from men not in their possessing internal representations but in their not having a system which allows them to objectify these internal representations. This is a radical barrier which perhaps is sufficient to render the relationship which is subjected to the pseudo-verbal behaviour of the primate, and the subjecting process of the verbal behaviour of man, fundamentally mutually heterogeneous.



Jacques Monod invests language with a selective value of great importance. In being a quick means of communication it is an unsurpassed agent for the diffusion of culture and makes a collective consciousness possible — something that nowadays, through the rapid means of communication, involves almost the whole of humanity. This vast common society of knowledge, experiences, and of possibilities itself determines a permanent exponential acceleration of culture and thus sets the " endless cycle " of knowledge in motion.

With regard also to tools — which have always been considered as being characteristic of man — recent decades have increased the number of valuable signs available to us, and this we owe to excavations carried out in Eastern Africa and Ethiopia. For their part, ethological research and the study of animal behaviour have taught us a great deal, and in particular, through the biological world, have helped us to recognise the distant analogies and differences within this category. Leroi-Gourhan has taught us to go beyond the systematic morphology of the question and, instead, to place the tool in an operative cycle. There is not enough time available here for a detailed consideration of the conclusions of this research. Furthermore, it would not come within the concerns of this conference on the human mind. However, I would like to observe that here also there is a progressive emergence over many millions of years of that Pleistocene

period which corresponds to the appearance of man.

Nature and technical capacities: the set of virtualities present at the outset, his conditions of organic precariousness and possible flowering, his walking on two legs, the freeing of his hands, the cortical function — all these elements together allow and suggest the tool-using act. The rational nature of man — as understood by Aristotle and St. Thomas Aquinas — takes a distancing attitude towards the Cartesian concept of nature, that " material reality, living or not living, offered to the calculation and thus to the influence of men " Man is by now that " animal without nature " of Vercours. The tool ends up by making him a " tool-user. " The task of humanisation which he has in his heart makes him responsible for taking possession of the world, uncovering its laws, taking the future and the completion of this world, if not indeed the universe, into his hands. Starting with the first pebble gathered from a river and then roughly hewn, down to highly sophisticated computers and that artificial intelligence which appears on the horizons of the next century, the function of the tool is married to the duty of man.

5. Conclusions

Gestalt psychology gave some indications as to the boundary between man and the animals. Pavlov[4] wanted to explain to us that it was not a question of knowing where to locate this boundary but of simply abolishing it. More recently, Skinner has demonstrated a strict intellectual kinship with a similar associationist concept: " human behaviour [he writes] distinguishes itself from other kinds of behaviour through its complexity, its diversity and its greatest achievements; however, the fundamental processes are not necessarily different. "[5] This conception seems to be considerably superseded by present-day anthropology. This discipline, indeed, pays much more attention to the original nature of the " human phenomenon. " From my personal point of view, these concepts and conceptions are abusively reductionist and scientifically unacceptable.

J. Ruffie states in a very relevant way that " it is the development of the psychic component of man that creates the human environment. This development is allowed by a new biological organisation. This it does not have within itself but it allows its realisation. "[6] In other words, cultural evolution is not a product of biology but it is favoured by it. " Starting from a certain stage — he goes on — it is the evolution of cultures and civilisations which the history of man presents, and not biological changes (which diminish and end up by disappearing). Man, from a biological point of view, will no longer change: by means of his culture he has escaped the rule of evolution, a rule which leads to an ever greater specialisation and which is a road of no return trod by all species. "

In this way every cultural work, every tool-using or artistic invention, every technological initiative, every arrangement of society will be finally judged according to their ability to humanise — the *humanitude* to which Albert Jacquard refers. Does the man who utilises them draw benefit from them or become their slave? But " the option in favour of reason, the development of nature in a humanising culture, is placed in the perspective of the history of salvation, upheld by God the creator, the giver of grace, the redeemer. " Thus does our colleague Jacques Etienne, professor of moral theology at the Catholic University of Louvain, express himself.[7] The work of culture, therefore, will finally be judged in ethical terms in relation to its conformity to the divine plan, according to its readiness to allow itself to be infused with grace, and not according to its capacity for artifice or nearness to the world of inert matter or biology.

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[1] This is a reference to the note of Jacques Etienne — *L'avenemente de la moralitè et le rapport à la nature*. Louvain Theological Review, XII, 1981, 3, pp. 316-323 and its development in a conference of the Groupe Synthese at Louvain-la-Neuve, on " nature et culture selon la theologie. "

[2] HENRI GASTAUT in *L'unitè de l'homme... l ... le primate et l'homme* Seuill, Paris, Coll. Points, 1974, p. 211.

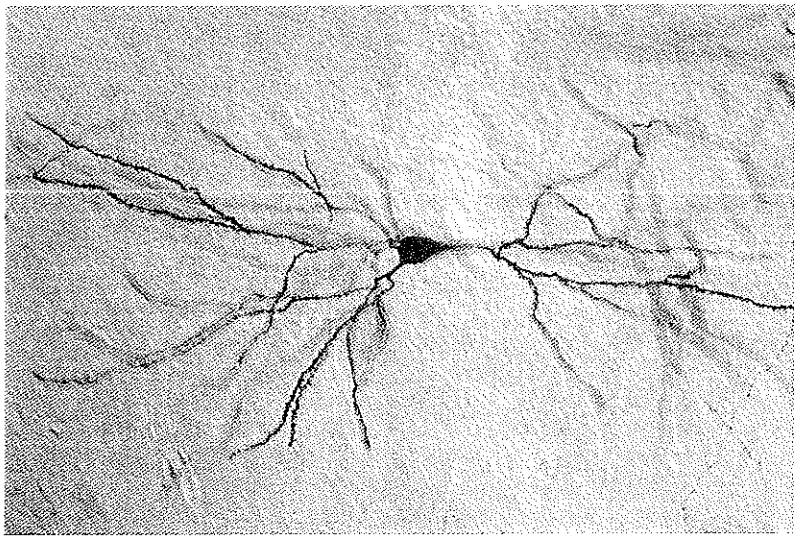
[3] JACQUES RUFFIE, " Le mutant humain, " p. 126, in *L'unitè de l'homme, op. cit*

[4] SREDY PAVLOVKIE Moscow-Leningrad, Izdatel'stco Akademil Navk CCCP, 1949, Vol. 1, III.

[5] B.F. SKINNER, *Science and Human Behavior*, New York, the Free Press, 1965, p. 39.

[6] JACQUES RUFFIE, *loc. cit*, p. 130.

[7] *Loc. cit.*



BONIFACIO HONINGS

The Capacity of the Human Mind to Perceive Good and Evil

The assembly of the Fathers of Vatican II was not afraid to say with a certain solemnity that man " does not err in recognising himself as superior to corporeal things and in considering himself more than just a particle of nature or an anonymous element of the human city. "[1]

Man does not commit the sin of pride when, in the frame of spatial immensity and chronological incalculability, he seeks to occupy the first and principle post in the divine creation. " Unity of soul and of body. Man unites in himself — because of his very corporeal condition — the elements of the material world, so that these, through him, touch their zenith and gain a voice so as to praise the creator in freedom. "[2]

It is, therefore, the ontological composition of man himself which fully justifies his superiority in the creative plan of God: man, every man, and all men are, by virtue of being men, superior to all things, to the whole of nature, and eclipse the anonymity of the great metropolitan centres. However, if we wish to grasp the deepest reason for both this primacy and this dominion, we must look for it in the relational intimacy which exists between God and man — the creature made in his image and likeness. Man transcends the whole universe, inasmuch as in encapsulating it at the highest existential level he discovers in his own interiority an abyss-like depth. When, in fact, man turns to his heart — when, that is to say, he reenters the most intimate part of himself — he meets God. Or better still, his vision in search of truth and morality encounters the veracity and the holiness of God's vision.

The prophet Jeremiah said of this vision that it searches hearts, explores the loins, and knows how much the heart of man, more than anything else, is deceitful (*cf. Jr* 17:9-10). By being present in the heart of man, only God can look into his behaviour and weigh the positive and negative values of his intentions, actions and omissions. God, and only God, has the task of remunerating man's good behaviour and rewarding the various fruits of the good which is achieved by his religious and promotional commitment. This is why there exists, or rather there must exist, between God and every man, a relationship between the one who commits himself and *the One who* measures the positive and negative values, the good and the bad, of this commitment.

From such a relationship of human commitment and divine evaluation comes the need for divine normative criteria by which to look into and to weigh — axiologically — the multiform commitments of men. For moral theology this means that the alpha and the omega consist of a careful and contextual consideration of whether, and up to what point, there exists or does not exist a conformity of the wishes, intentions, actions, and omissions of men to the holy and truthful vision of God.

Moral theology expresses its own conviction that the human mind is able to distinguish good from moral evil, or rather conformity from nonconformity. In order to clarify — somewhat — this capacity of the human mind within the moral order I will consider three points: moral norms, universal and founding perception, and personal and situational perception.

1. Moral Norms: Divine Light for the Human Mind

According to the Council Fathers, one of the reasons why man can and must consider himself superior to the entire created universe lies in his intelligence — precisely because this last is a participation in the light of God's mind. Intelligence enables man to conquer intelligible realities with true certainty; without having a shadow of doubt he can go to the very heart of the truth of things themselves. Furthermore, and this is a point I am very keen to emphasise, the human person, precisely as a result of his intellectual nature, can reach the highest level of his dignity as a person. Indeed, from " his birth man is invited to a dialogue with God: he does not exist ... if not because created from the love of God, and by Him always maintained by love, *nor does he live fully according to truth* (BH) if he does not recognise him freely and if he does not trust in his creator. "[3] In this dialogical call to God we can understand the capacity of the human mind to distinguish good from evil, and evil from good. Indeed, this call to dialogue is practised in the most intimate part of man's being, where God, looking into his heart, waits for man to decide his destiny under the divine vision.[4] It is here and then that man demonstrates whether he has, or does not have, an evaluational moral capacity in his actions and omissions. In this dialogical intimacy regarding the good to be done and the evil to be avoided man shows if he has allowed himself to be attracted by divine wisdom, with great gentleness, so that his

mind can search for true good in order to love it.[5]

I observe that wisdom is to be understood as a virtue which makes the human vision able to direct its acts, rightfully, to the final Goal — God.

This is why wisdom embraces the whole complex of moral and human virtues, not to mention discipline, science, prudence, reflection, and advice. It is wisdom that the Proverbs tell us about in the following verses: " To you, O men, I call, and my cry is to the sons of men.... Hear, for I will speak noble things, and from my lips will come what is right, for my mouth will utter truth; wickedness is an abomination to my lips. All the words of my mouth are righteous; there is nothing twisted or crooked in them. They are all straight to him that understands and right to those who find knowledge. Take my instruction instead of my silver and knowledge rather than choice of gold; for wisdom is worth more than pearls and all treasures desire cannot compare with her. I, Wisdom...find knowledge and reflection.... I have counsel and sound wisdom, I have insight, I have strength "(*Pr* 8:4-14).

Now in these moments of sapiential verification the searching and evaluational vision of God is softened when he sees his own vision reflected in the sapiential and enlightened vision of man. On the other hand, the same searching and evaluational vision of God becomes harder and more severe when he sees his own vision lost in shadow in the unreasonable, foolish, and darkened vision of man.

In the first case the two visions are united in one light: the light of truth and good. The light of the human mind truly participates in the light of the divine mind. In the other case the two visions — that of God and of man — clash like light and dark, life and death, good and evil, truth and falsehood. Because God, but man as well, reads there pride, arrogance, and perversity: to put it succinctly — not good, but evil (cf. *Pr* 8: 13).

However, to go even deeper it is necessary, at this point, to make clear that the Jewish wisdom which is presented in the Proverbs does not draw its precepts and advice from positive divine law but from reason and experience. One is dealing, therefore, with sapiential norms of distinctly philosophical origine — precisely because they are conclusions made from deductive and inductive reasoning which are confirmed and illuminated by experience of daily life.

In considering these sapiential norms philosophical ethics and moral theology have recognised that in them there is present the value of universal law — that is to say, value which is binding always and everywhere, and also for everyone.

With the intention of discovering its source, there emerged the idea of human nature as being common to all men and, therefore, there emerged the idea of natural norms or laws. From this point of view, it becomes especially evident how the human mind, when it perceives good and evil, really participates in the light of the divine mind.

Nobody is more able to make these ideas clear to us than the Apostle of the Gentiles. He writes to the Romans: " He will award to every man what his acts have deserved; eternal life to those who have striven for glory, and honour, and immortality, by perseverance in doing good; the retribution of his anger to those who are contumacious, rebelling against truth and paying homage to wickedness " (*Rm* 2:5-8).

As can easily be affirmed, Saint Paul clearly distinguishes between those who do good unceasingly and those who adhere to evil rather than submitting to truth. What interests us here is the opposition between truth and injustice. The Apostle, with reference to the moral order — or rather good and evil — sees those who practise truth as people who adhere to justice; whereas those who do not submit to truth — those, therefore, who do not practise it — he sees as people who adhere to injustice. Consequently, the searching and evaluational vision of God directs its judgment to those who do good because they practise truth-justice and to those who do evil because they resist truth-justice. This is why " there will be affliction then and distress for every human soul that has practised wickedness, the Jew in the first instance, but the Gentile too; there will be glory and honour and peace for everyone who has done good, the Jew in the first instance, but the Gentile too " (*Rm* 2:9-10).

No one will have failed to notice that Paul puts the Jew first, both with regard to the punitive judgement and the remunerative judgement. Nevertheless, and this is what must be emphasised: " There are no human preferences with God " (*Rm* 2:11). This attitude towards the Jews and Gentiles allows us to emphasise how in being distant from the divine law we are all equal — precisely *because God himself* has inscribed the reality of his law in the hearts of men. As the Apostle makes clear: " As for the Gentiles, though they have no law to guide them, there are times when they carry out the precepts of the law unbidden, finding in their own natures a rule to guide them, in default of any other rule; and this shows that the obligations of the law are written in their hearts; their conscience utters its own testimony, and when they dispute with one another they find themselves condemning this, approving that " (*Rm* 2:14-16).

By now it is clear that in the hearts of men — of every man and all men — there is a law written by God which bestows divine light on the human mind so as to allow it to perceive good and evil. Now we must see how God has, so to speak, divided but not separated this law-light between founding and very universal law-light and personal and very particular law-light. To speak technically: there is a law-light which is called synderesis and a law-light which is called *suneidesis*, or conscience.

2. Founding and Universal Perception: Synderesis

A great contemporary philosopher, Cornelio Fabro, writes: " the *ens* is the *primum cognitum* not only in a real sense, as the first object the conscience meets with, but the transcendental *primum*, or rather that which is the illuminating and founding beginning of every other form of knowledge, in every order, according to the characteristics and the diversity of different intentional levels "[6] With Father Fabro I have thus summarised the profound analysis which the work of Aquinas offers us with regard to the question of perceiving good and evil at

the most universal level — that is to say, at the level of *Bonum est faciendum* and of *malum est vitandum*.

The common scholar asks himself whether the natural law embraces many precepts or only one.[7] Following his method, Saint Thomas asserts, at the outset, that it *seems* that there must be only one precept of natural law, and this is because that law is an emanation of human reason — something which is unique to man.[8]

However, in his reply we come across reasoning which does not stop at a " sic et simpliciter " but which leads us to a certain encumbent " distinction. "

The law is without doubt a dictate of practical reason, but because this dictate emanates from reason one should bear in mind that a certain mental procedure is required. Reason must start from certain principles so as, then, to be able to reach certain precise conclusions. For this reason, just as in the speculative field one can deduce certain conclusions in the various sciences from first principles which are naturally known, so also in the practical field one can deduce binding dictates, which concern human action or inaction, from first principles.

With regard to these dictates, which have the force or value of law, the first thing that one must know is: what are the first principles which by their very nature are known to all men?

Now the first thing that presents itself to our consciousness is being, precisely because it is included, as an idea, in everything that we understand. From here it follows that the first indemonstrable — but at the same time indisputable — principle is the statement: " realisation and negation are incompatible, because such an assertion is based upon the idea of being and non-being. "[9] Here is the founding principle of all other principles, which is, therefore, the most universal. Being is thereby, in absolute terms, the first thing in human consciousness, or to put it better — in the consciousness of every man. Whoever comes across being in the consciousness cannot but immediately understand that an *identity* exists " between being and being " and a *contradiction* exists " between being and nonbeing ": one cannot say — at the same time and from the same point of view — of something which is, that it is not. Other things which are universally observed, that is to say, known by all men by intuitive means, are, for example: " things equal to a third party are equal "; " a whole is always larger than its parts. "[10]

What has already been propounded at the level of speculative reason is also valid — in analogous fashion — at the level of practical reason. *Just as being* is presented to the human mind as something which is absolutely first in the speculative consciousness, *so being* is presented as absolutely the first thing in the consciousness of practical reason — in the reason, that is to say, which by its nature is destined for human operation. Indeed, good is the *primum cognitum* of all men in the order of acting, because all men want what conforms to it and do not want that which does not conform to it. In ethical terms this means that the law — good is to be done and sought for, evil is to be avoided — is valid for every man as the first principle in the operative-practical order.[11]

Taking this founding and universal principle as a basis, we can give an answer to the question regarding the preceptive unicity and plurality of natural law. Practical reason in man, and of man, is undoubtedly unique. But, because it is the ordering principle of everything that concerns the operation or non-operation of man, this reason has the task of dictating if this operation or non-operation conforms or does not conform to the good of man *qua* man.[12] And it is in this sense that it is for practical reason to evaluate as good that operation which conforms to human nature and as bad that which does not conform. In such a way does practical reason apply, in the less universal, the founding principle of all morality — good must be done and evil must be avoided.

There remains, however, the question as to whether natural law is a habit or not. The thought of Saint Thomas Aquinas replies by dealing with the question, on the one hand, with an essential approach and in a true sense, and, on the other, with a habitual approach. From the essential point of view and in the true sense, natural law is not a habit — and this is precisely because, insomuch as it is a law, it emanates from human reason. It is practical reason which dictates that conforms to man. And it does this notwithstanding the fact that natural law can be considered a habit inasmuch as its precepts or dictates can be an object of the same practical reason. Dictates and precepts can be, and in fact are, an object of further reflection of a moral order. But, and this is what I am trying to demonstrate, the first principle of natural law and, therefore, of practical reason is a habit in the true sense of the term. In the moral doctrine of scholasticists this habit came to be called *synderesis* and by this term they meant: " the rational habit of first practical principles, the natural, habitual, and practical property of the human spirit to know immediately, with full obviousness, the first principles of the moral order. "[13]

Synderesis is the net which founds and guides the moral consciousness because it points to the founding and very universal perception, and this because every man is bound to do good and to avoid evil.

Here is the capacity of the hu-

man mind to distinguish good from evil. However, this capacity does not suffice for man, because his moral action takes place in special and very personal situations.

What capacities does man have in these cases?

3. Situational and Personal Perception: the Conscience

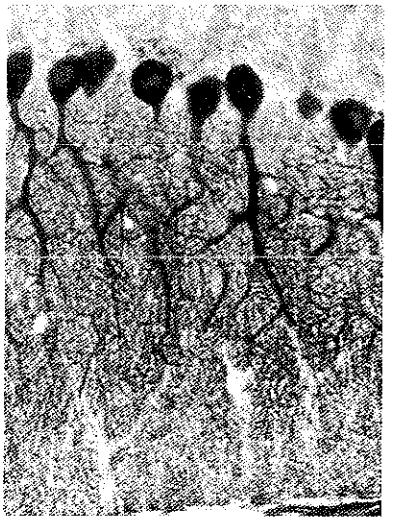
The Apostle Paul deals with this subject in a profound fashion when, in admonishing the Corinthians, he instructs them as to what an individual's behaviour should be during the Lord's supper. Whoever eats the bread and drinks from the chalice heralds the death of the Lord, until he comes. Therefore anyone who eats the bread or drinks from the chalice of the Lord *unworthily* will be held to account for the Lord's body and blood. Everybody, therefore, must examine himself first, and only then eat of that bread and drink of that wine. This is because the man who drinks and eats *without recognising* the body of the Lord for what it is eats and drinks his own damnation (cf. 1 *Co* 11:26-29).

The present case clearly refers to the perception that the individual person must make in a well-defined situation. For each person to achieve a correct perception Saint Paul stresses, first, the normative value which must be recognised: the heralding, through the symbolic-real gesture, of the redemption effected by Christ. Thus, if a person wishes to evaluate his own behaviour so as to know if he is worthy or not to come to the table of the Lord, the evaluational norm is the salvific heralding of the sacrificial gesture of Christ. In the divine light of this normative value, each individual can and must examine himself as to whether it is right or not right to participate in the Lord's supper. Each person is obliged, therefore, to form a detailed and personal judgement before communing with the Lord — who is really present in the form of bread and wine.

I wish to observe, with very strong emphasis, that the exam is personal and particular, but the norm is objective and universal. It is not, therefore, the personal judgement of each individual which determines the legitimacy or illegitimacy of coming to the Eucharistic table and eating the bread and drinking from the chalice " an und fur sich " — that is to say, considered in itself. However, the judgement of each individual person constitutes, in certain conditions, a valid moral perception of the legitimacy or illegitimacy of the Eucharistic encounter with Christ.

In the same way as the Apostle, therefore, we must affirm that each individual human person is able to formulate a moral judgement concerning his own action and inaction. This capacity of the human mind, with regard to the question of good and evil, the Apostle of Peoples calls *suneidesis*, or conscience. If we consider that the term appears as many as fourteen times in the letters of the Apostle, it does not seem in the least hazardous to state that the word conscience and the sense of conscience came to be used by the Christian church because of Paul.[14]

The perception of the conscience can be described as the capacity of the human mind to evaluate, through distinguishing, the morality of a situation different from another situation in the same way as one or the other exist *de facto*.



However, this autonomous and evaluational decision cannot — indeed, must not — depart from bonds which are heteronomically established by God himself. For this reason the personal and situational capacity of the human mind, in matters relating to good and evil, involves responsibility and, therefore, the authentic freedom of the person who acts or does not act according to his own moral perception.

But this does not exclude — on the contrary, it implies — the fact that the person perceives on the basis of evaluational norms which God has inscribed on the heart of every man. The conscience thus becomes the capacity of the human mind of every individual person not only to perceive good and evil in his own existential " hic et hunc, " but also to effect this perception before the vision of God in order to adjudge its conformity or nonconformity to corresponding objective moral values.

The conscience thus finds its foundation in God and makes the choice about the good to be done " personally in its own situation, " and about the evil to be avoided " personally in its own situation, " with reference to the normative divine will. When the individual then perceives the good to be done and the evil to be avoided, his conscience is secure because it is sure and straight, even if at a hypothetical level it might not be true but invincibly erroneous.

I now want to point out the great dignity of the human mind, which is bestowed upon it precisely because of the conscience's capacity for personal and particular perception. God gives each human person the dignity of replying in full exterior liberty to the divine call to effect his own situational good and not to effect his own situational evil. In this sense can we understand the relevant thought of the Council Fathers: " man has a law written by God, inside his heart: to obey this law is the dignity itself of man..... "[15]

The conscience is, therefore, the capacity of the human mind to listen and to receive the voice of the law of love of God and of one's neighbour. The conscience is the most secret nucleus that exists, the sacrarium of man where every man

finds himself alone with God, and in front of God, to listen and to receive His voice — a voice which sounds in the truest intimacy of each one of us. For this reason, when I state that every human person has the mental capacity to perceive the good and evil of his own behaviour I mean to say, first and foremost, that every individual finds an interior law in himself, a law which comes from God and that then, precisely through this law, there takes place the encounter with God, towards God, and towards his neighbour. In this dialogical encounter, which is completely personal and circumstantial, every person realises himself perceiving and choosing how to live, in practical and concrete fashion, the threefold existential connection of his own personal identity: towards God, towards his neighbour, and towards the world.

This existential perception is, in conclusion, an autonomous decision in the sense that no other man can assume the responsibility of perception with regard to the situational good to be done and the situational evil to be avoided.

The conscience is an application of the capacity of prudential practical reason by which every person answers, in full freedom, to God for his own response towards God. For this reason, recognising that man possesses the consciential capacity to perceive good and evil is equivalent to recognising that and how the moral level of his life depends on the capacity to make the encounter of his own vision with the vision of God as true, as certain, and as straight as possible. As true, in the sense that the perception of good and evil corresponds to the objective light of the divine mind, expressed by His will through interior law. As certain, in the sense that the perception is not compromised by positive doubts or well-rooted hesitations. As straight, in the sense that the perception is the result of a sincere search for the true good to be done and the real evil to be avoided.

It is clear — and thus do I conclude — that these qualities of conscience's discerning good and evil express how deeply man is capable of *entering into himself to encounter himself with God*; and the measure in which he has educated his mind so that it can truly and uprightly reach conformity with the will of God in the perception of good and evil. For this reason, blessed is the man who is always committed to educating himself and has undertaken from an early age to search for *truth* with loyalty and for *good* with rectitude!

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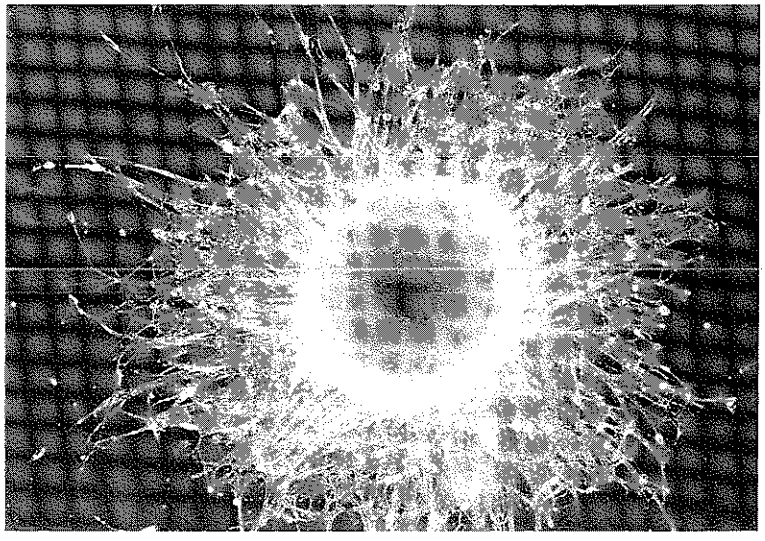
[1] Pastoral Constitution, *Gaudium et Spes*, n. 14.
[2] *Ibidem*
[3] Pastoral Constitution, *Gaudium et Spes.*, n. 19.
[4] Cf Pastoral Constitution, *Gaudium et Spes*, n. 14.
[5] Cf Pastoral Constitution, *Gaudium et Spes.*, n. 15.
[6] Quoted by Caffarra without further information.
[7] *Summa Teologica*, I-II, 94, 2.
[8] Cf *Summa Teologica*, I-II, 94, 2 *sembra* 3.
[9] *Summa Teologica*, I-II, 94, 2 *in corpore*
[10] *Ibidem.*
[11] Cf *Summa Teologica*, I-II, 94, 2 in *corpore*.
[12] Cf *Summa Teologica*, I-II, 94, 2 to 3
[13] Cf C. FERRO, *Enciclopedia Filosofica*, 5 *sub voce*, p. 1390.
[14] Cf C. MAURER, *Grande Lessico del Nuovo Testamento*, vol XIII, *sub voce*, p. 312.
[15] Pastoral Constitution *Gaudium et Spes*, n. 16.



MORTIMER MISHKIN

Cerebral Memory Circuits

Introduction

Evidence from neuropsychological studies of animal learning indicates that the mammalian forebrain contains at least two major neural systems concerned with laying down the traces of experience (30, 31, 39, 59). One system is centered on the forebrain's limbic structures and is responsible for the formation of stimulus memories. The other system appears to be centered on the basal ganglia and is responsible instead for habit acquisition and other types of response adaptation. Both systems are placed in operation largely, though not exclusively, by inputs from the cerebral cortex, and, within the cortex, stimulus activation of the sensory areas commonly serves as the initial trigger. Therefore, before considering how different forms of learning may be mediated by the two major cerebral learning systems, it is useful to consider first how the cortical sensory areas are organized to mediate perception.

We now know, in the nonhuman primate particularly, the cortical tissue essential for perception extends far beyond the primary projection area for each sense modality (20, 34, 45, 48, 57). In addition to the primary area, the essential tissue includes a large number of modality-specific, reciprocally connected, secondary, tertiary, and even higher-order areas organized into multisynaptic sensory processing pathways or streams (15, 16, 23, 40). In fact, the primary projection area in each modality seems to be the source of at least two such streams (56).

One is directed dorsally toward the frontal lobe components of the motor system, and the other ventrally toward the frontal temporal lobe components of the limbic system. The dorsally directed streams from the several sensory modalities appear to be critical for spatial perception and orientation as well as for the spatial guidance of motor responses. The ventrally directed streams, by contrast, are critical instead for the preception of objects or of stimulus qualities, and, ultimately, for the triggering of motor responses. In the successive areas, or stations, of each of these multisynaptic sensory pathways, single neurons carry messages from progressively wider receptive fields and progressively more dimensions or features of a given stimulus configuration. Consequently, in the final stations of each pathway, individual neurons synthesize relatively complete representations of that configuration (13, 17, 43). At the same time, it is likely that the representations giving rise to a perception comprise neurons in all the stations.

Whereas perception presumably depends on both the feedforward and feedback projections in the cortical sensory processing pathways, the feedback projections may have a special role in stimulus attention (26), and, as proposed below, in stimulus memory. Selective attention and attentional effort, reflecting central influences on sensory processing, can markedly alter the stimulus messages sent by individual sensory neurons. These attentional processes exert their effects by dynamically constricting or expanding the neurons' receptive fields, and by narrowing or broadening their stimulus filters (14, 32, 51). Such effects appear to be mediated in part by interaction between the cortical sensory processing streams and subcortical structures, such as portions of the pulvinar nucleus of the thalamus and of the superior colliculus (14). But to see how attentionally filtered stimulus processing triggers various types of learning, it is necessary to look at interaction between the sensory processing pathways and the forebrain regions referred to earlier, namely, the limbic system and the basal ganglia.

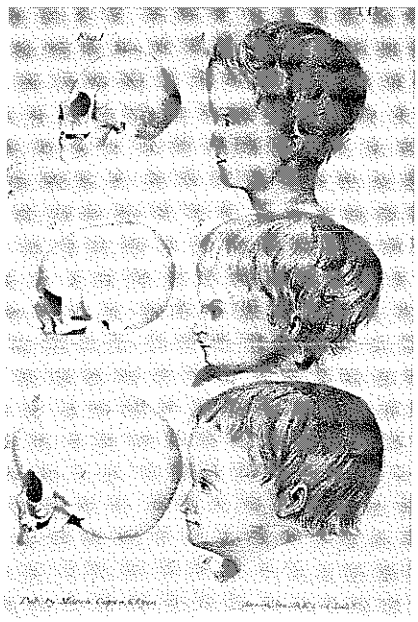
Stimulus recognition

To begin, consider how recognition of a visual stimulus could be mediated by interaction between the occipitotemporal processing stream and the limbic system. The final stations of the occipitotemporal pathway, located in cytoarchitectonic area TE, are reciprocally connected either directly, indirectly through a single relay, or both, with the temporal lobe components of the limbic system (9, 19, 21, 25, 52, 55, 58). The major components include perirhinal and antorhinal cortices, amygdaloid complex, hippocampal formation, and parahippocampal gyrus. These medial temporal limbic structures send direct projections — as well as indirect ones through such relays as the bed nucleus of the stria terminalis and mammillary body — to the medial thalamus, including portions of the magnocellular division of the medial dorsal nucleus and of the anterior nuclei (1, 3, 37). The medial thalamic nuclei then send projections, in turn, to the ventromedial aspect of the frontal lobe, including orbital frontal, medial

prefrontal, and cingulate cortices (11, 38, 46, 47, 54). Each of these three divisions of the limbic system — medial temporal, medial thalamic, and ventromedial frontal — is a critical component of the circuit for recognition memory. This is indicated by the finding that sufficiently extensive damage to each component reduces the perfomance of monkeys to chance levels on tests requiring recognition of stimuli presented for the first time just a minute or two earlier (2, 10, 29, 61).

Each of the three limbic system divisions just referred to also serves as a gateway to the basal forebrain cholinergic system (4), still another structure with a demonstrated role in recognition memory (5, 6). Further, the cholinergic system reciprocates those connections and, in addition, sends widespread projections throughout the occitotemporal visual stream, and, indeed, the entire cortical mantle (28).

The proposal is that visual perceptions are transformed into visual memories by activation of this long and complex feedback circuit, operating in the following way. A stimulus falling on the retina fires large numbers of neurons in each area of the occipitotemporal processing stream, the particular neurons activated depending not only on the physical characteristics of the stimulus but also on the attentional state of the animal. The resulting collection of activated neurons, which will be called a " neuronal ensemble, " constitutes the concurrent central representation of the visual stimulus. The neuronal ensemble, then, is presumed to be the entity that gives rise to perception. Ensemble neurons located in the final station of the pathway activate, in turn, the sequentially connected components of the limbic system — temporal, thalamic, and frontal. The outputs of these limbic system components to the basal forebrain then combine to excite the cholinergic cells, which release acetylcholine at their terminals within the limbic system and occipitotemporal cortex. The binding of acetylcholine to muscarinic receptors at those sites triggers a cascade of intracellular events leading to phosphorylation and synthesis of proteins at certain synapses. These presumably include both limbo-cortical and, importantly, feedback cortico-cortical synapses on some of the ensemble neurons, as well as cortico-limbic synapses on some of the coactivated limbic system neurons. The strength of many of the affected synapses is thereby increased, bringing some small proportion of the ensemble and limbic neurons into a more or less enduring, latticelike network. This network, which will be called a " cell assembly, " after Hebb (18), constitutes the stored central representation of the stimulus. The cell assembly is presumed to be responsible for recognition. According to this proposal, visual recognition occurs whenever the neuronal ensemble activated by a retinal stimulus reactivates a previously formed cell assembly consisting of a small but critical subset of the neuronal ensemble. Unlike the neuronal ensemble, however, which is triggered by feedforward activation from the retina, the cell assembly, at least early in its life history, is presumed to be triggered by feedback activation from limbic structures. But as it ages, the cell assembly must become accessible to triggering from the neuronal ensemble directly, i.e. without the mediation of the limbic system, to account for the preservation of remote recognition memory known to follow limbic system damage.



Although the foregoing proposal focuses on the role of the cholinergic system in the formation of cell assemblies, it is likely that other chemical neuromodulatory systems, such as the noradrenergic and serotonergic, also participate in the process. These two brain stem systems are activated by limbic structures less directly than is the basal forebrain cholinergic system, but like the latter they innervate the entire telencephalon. Their feedback role could thus be similar to that of the cholinergic system, serving to increase synaptic efficacy and thereby help form cell assemblies.

The proposal that has been outlined here regarding the circuit mediating visual recognition is applicable as well to recognition circuits in other modalities. As already indicated, the cortical areas serving other senses are hierarchically organized, like those for vision, into sensory processing streams or pathways, the ones concerned with stimulus quality all having final stations within the anterior temporo-insular region. Also like those for vision, these final stations are reciprocally connected with the temporal lobe components of the limbic system. The sensory-limbic interaction mediated by these connections could then lead, by the same neural mechanisms as the ones just described, to the formation of cell assemblies in the other cortical sensory processing pathways, and so mediate stimulus recognition in those modalities (35).

Stimulus recall

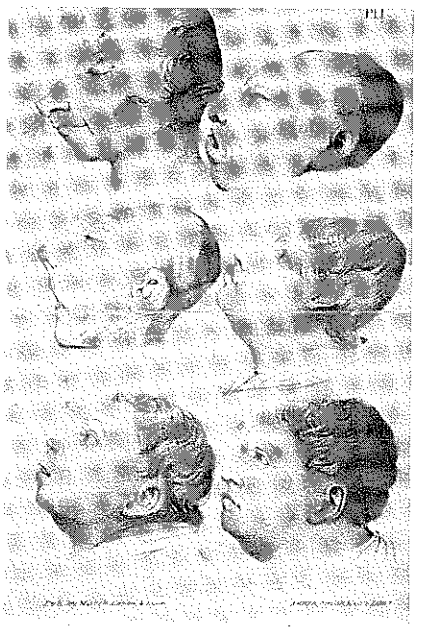
Once a cell assembly has been formed, it can enter into association with other cell assemblies, thereby allowing for the recall of one stimulus following the recognition of another with which it was previously associated. Cell assemblies appear to be linked not directly, however, but only indirectly via limbic structures, at least initially. This linkage will be called a " phase sequence, " again after Hebb (18), and it is assumed to result from operation of the same feedback circuit as the one postulated above for constructing cell assemblies.

Evidence that the phase se-

quence, like the cell assembly itself, depends on limbic structurers comes from studies demonstrating profound loss of the ability to perform stimulus recall tasks following lesions of the medial temporal lobe (MTL). This loss cannot be due simply to failure of the cell-assembly process, because partial lesions of MTL can produce severe impairments in recall while leaving recognition largely unaffected. For example, rostral MTL lesions that include the amygdala abolish a monkey's ability to identify an object visually that it has just explored tactilely in the dark, though the monkey shows good recognition of the object through either sense modality (36). Similiarly, caudal MTL lesions that include the hippocampus abolish a monkey's ability to identify the location in which an object has just appeared, though again the monkey shows good recognition of the object itself (42). Recognition too can be abolished, but only if the partial lesions are combined (29). The implication of this set of findings is that whereas both rostral and caudal MTL can separately and independently mediate the formation and reactivation of most if not all types of cell assemblies, particular types of cell assemblies can be linked in phase sequences only by a particular region, e.g., tacto-visual sequences only by rostral MTL, and object-place sequences only by caudal MTL.

The role of the limbic system in recall differs from its role in recognition in yet another important way. Combined MTL lesions have been found to reduce recognition to chance levels only when the retention interval between acquisition and test is extended to a minute or two. By contrast, even the partial MTL lesions precluded recall in the tasks described above, where retention intervals were just 5-10 seconds. Further, combined MTL lesions have been found to preclude recall on another type of stimulus memory task, this one involving the learning of visual paired associates, in which retention intervals were under one second (33). Apparently, whereas limbic-mediated formation and reactivation of cell assemblies are essential for long-term but not for short-term recognition memory, no such distinction is applicable in the case of recall memory. Rather, the limbic-mediated phase sequence is essential for any recall, i.e. for the associative process itself, irrespective of retention interval. This conclusion must be qualified in one respect: With sufficient age, phase sequences, like cell assemblies, must become independent of limbic mediation, in order to account for the preservation of remote associative memories that is known to follow limbic system damage.

Two other aspects of the present proposal merit comment. First, although the formation and reactivation of a cell assembly, consisting of a critical subset of the cells of a neuronal ensemble, may not offer the most parsimonious explanation of stimulus recognition, just such a notion seems essential if one is to account for the retrieval of specific stimulus memories that occur in recall. Second, the notion that cell assemblies are linked through limbic structures, at least early in the life history of a given phase sequence, helps account for the fact that the stimulus-association process underlying stimulus recall is highly flexible. If two cell assemblies were initially linked directly, particularly two assemblies within the same cortical sensory processing stream, they could well merge into a super assembly and thereby obligate a particular stimulus association, during both recognition and recall. Linkage through limbic structure could help preserve the autonomy of individual cell assemblies and also provide the mechanism for associative flexibility. That is, each limbic structure could operate as a multiselector switch, triggering any of a potentially large number of associated cell assemblies, the one selected depending on the particular instructions (i.e., other inputs) the limbic structure is receiving concurrently.



S-R learning

Whereas the two classes of stimulus memory described above clearly depend on cortico-limbic interaction, recent evidence suggests that habit formation is largely dependent instead on interaction between the cortex and basal ganglia (39, 44). Because stimulus memory and habit formation ordinarily combine during learning, it is difficult to arrange a study of the habit formation process in isolation. However, one pure test of habit formation appears to be provided by a multiple visual discrimination learning task in which successive trials with a given pair of stimuli are separated by such long intertrial intervals (viz. 24-hour ITIs; 27) that the subject can be shown to have forgotten from one trial to the next which stimulus had been associated with the reward and which had not (7). Despite this failure of stimulus recall, monkey subjects learn to perform the multiple visual discriminations correctly within a few sessions (27); and they do so, according to the present interpretation, by forming discrimination habits based on stimulus-response (S-R) bonds (31).

Support for this interpretation is provided by two complementary sets of findings. In one set (27), extensive damage to the limbic system, while essentially abolishing stimulus memory, caused no discernible effect on the rate of learning the task with 24-hour ITIs. Apparently, under these special learning conditions, in which ITIs are extremely long, possession of intact stimulus memory confers no advantage in learning. In the other set of

findings (59), damage to the caudal neostriatal portion of the basal ganglia was found to yield nearly the opposite result — impaired mastery of the 24-hour-ITI task with no discernible effect on stimulus memory.

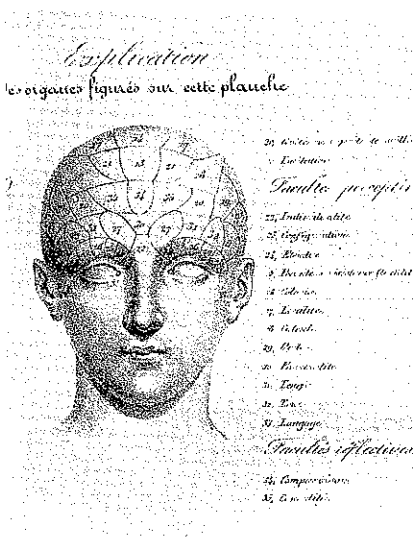
Consider how learning discriminations despite the imposition of 24-hour ITIs might be mediated by interaction between the cortical visual processing stream and the basal ganglia. Projections from the occipitotemporal pathway reach both the tail of the caudate nucleus and the ventrocaudal putame (49), which also receive projections, in common with the rest of the neostriatum, from the dopaminergic cells of the substantia nigra pars compacta (41, 53). The caudal neostriatum then sends projections to the globus pallidus and substantia nigra pars reticulata (41), which project, in turn, through relays in the ventral thalamic nuclei, to the premotor and supplementary motor cortices of the frontal lobe (8).

This extrapyramidal circuit could yield S-R bands in the following way. A stimulus-elicited neuronal ensemble in the occipitotemporal pathway would activate an array of synapses in the caudal neostriatum, at the same time that the neostriatal-to-premotor circuit was weakly assisting the pyramidal motor system in evoking a previously learned response. On each occasion that a particular S-R conjunction was followed by reward-elicted activation of the dopaminergic system (i.e. reinforcement), the currently active array of visuo-neostriatal synapses would be strenghthened incrementally, by cellular mechanisms analogous to those described earlier for the formation of cell assemblies. Conversely, each time a particular S-R conjunction failed to be followed by dopaminergic activation, due to the absence of reward (i.e. extinction), the currently active array of synapses would be gradually weakened, reflecting the operation of an automatic habituation process (12) and leading to inhibition of the pyramidal by the extrapyramidal circuit. In time, as a consequence of the repeated reinforcement or extinction of particular S-R conjunctions, the learned motor response would be consistently evoked in the presence of certain stimuli and consistently suppressed in the presence of others.

The efficacy of visuo-neostriatal synaptic arrays is apparently remarkably stable over time. That is, unlike synapses of the cortical cell assembly, neostriatal synapses would appear to undergo neither gradual decay (" forgetting ") nor gradual consolidation (" remote memory ") with the passage of time alone. This must be why incremental strengthening occurs despite extended inter-reinforcement intervals, and gradual weakening results only from the application of an extinction procedure.

Like stimulus memory circuits, the circuit for S-R learning described here for vision is generalizable to the other sense modalities. As indicated earlier, all the cortical sensory processing streams send heavy projections not only to the limbic structures in the temporal lobe but also to different portions of the neostriatum (22, 24, 50, 60), and the latter projections could thus mediate the formation of discrimination habits through all the sensory channels. There are major differences in the organization of sensory-limbic and sensory-basal ganglia interactions, however, and these are reflected in their widely different end products. For one, direct inputs to temporal lobe limbic structures arise only from the final stations of the cortical sensory processing pathways, whereas direct inputs to the basal ganglia originate in all the cortical sensory stations, early and late, with the exception of some primary projection areas. As a result, the limbic system receives only highly processed sensory messages, whereas the basal ganglia receives messages from nearly all levels of sensory processing. The implication for learning is that stimulus memory deals mainly, if not exclusively, with stimulus configurations with which other stimulus configurations become associated. The inputs to stimulus-response bonds, by contrast, comprise stimulus elements or components as well as configurations, and, consequently, the stimulus elements may be as effective as the configurations in eliciting the learned response.

But the difference in organization of the two forebrain learning systems that has the greatest implications for learning is the difference in their outputs. Not only are the cortical sensory pathways and limbic system reciprocally connected, but the medial temporal limbic structures innervate a far wider sensory territory than innervates them. The basal ganglia, on the other hand, send no return projections to the cortical sensory pathways, their ultimate cortical target being confined to frontal lobe tissue rostral to the motor strip. As a result of its cortical sensory outputs, the sensory-limbic system's primary products of learning are stimulus memories, which provide the organism with a rich and flexible store of information, or knowledge, about its environment. By contrast, because of its cortical premotor outputs, the sensory-basal ganglia system's main learned products are stimulus-response bonds, and these provide the organism instead with a ready store of adaptive and reliable habits for efficiently negotiating its environment.



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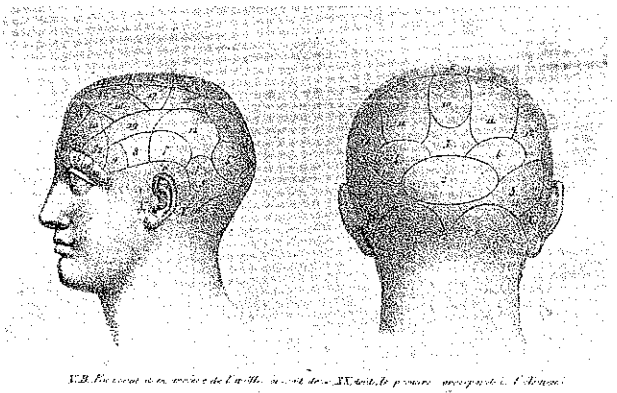


CATHERINE LALUMIERE

The European Dimension of Studies on the Human Mind

Your Eminences, Your Excellencies, Ladies and Gentlemen:

You have been so kind as to invite me during my stay in Rome to attend part of your sessions, and I am grateful to you for this invitation. I hope to be able to hear the papers presented for your exchange, which are certainly quite interesting. For my part, since you invite me to do so, I would like to tell you with great simplicity what the role is which the Council of Europe seeks to play in Europe and in the world today. The Council of Europe was created at the end of the second world war to try to establish peace on the European Continent. And to re-establish peace among the countries that had been engaged in mortal combat, the founders of the Council of Europe wanted this organization to be built on values. And it was not a question of just any values, but of humanistic values — respect for law, respect for human rights. I believe those founders were right. For peace cannot be built if it is not built on specific values. The values bringing with them respect for others, tolerance and openness to others: this is what facilitates keeping the peace. However, for forty-five years the Council of Europe has been able to gather together only the countries of Western Europe, since those of Eastern Europe did not share the above-mentioned values. Today, with the fall of the iron curtain, the Council of Europe can finally open itself to the countries of Central and Eastern Europe. And today we find ourselves before a magnificent task to be carried out. I do not know if we shall reach the objective, but I do know we shall try to do so with all our strength.

On November 6, precisely in Rome, on the occasion of the meeting of our Ministers' Committee, the Council of Europe was joined by Hungary, the first eastern European country to be united to us. For next year we hope to see Poland and Czechoslovakia join; and in what I hope will be the near future, Yugoslavia, Bulgaria, Romania, and — why not — the Soviet Union. The Council of Europe open itself to the East as the democratization of those countries goes forward. It is a new page in the construction of Europe.

And this construction of the new Europe, which will have consequences for the whole world, must be carried out on the basis of human values. It is an extraordinary opportunity to see the Hungarians, Czechs, Poles, and others recognize our concept of human rights today. A real revolution. And since this revolution exists in minds, we can reconstruct a Europe of peace. There still remain many obstacles to be surmounted, many difficulties, much lack of understanding. But I confess my emotion when I hear Bulgarian leaders, Soviet leaders, and the others who tell us they are initiating reforms for the purpose of introducing this concept of human rights into their law. That is why we today seek to be aware, I repeat, of the difficulties, but with all the energy of which we are capable we wish to construct this Europe.

And this is because we are interested in all the efforts, all the reflections involving the major social problems. Now, to embrace all these large-scale social problems we take an interest in all the philosophical and religious reflections affecting the major problems of society. The Council of Europe has always worked on the large problems involving the family, health, human rights, and, as I stated previously, culture. We recently initiated reflections and very precise efforts concerning bioethics and the attitudes which should be taken towards all the progress of science, which is progress, but can also represent the drama of humanity.

On a European scale, and increasingly on the scale of the larger Europe, we seek to find satisfying responses to these major social problems. At this exchange of views you are reflecting together on the human mind, an immense topic containing numberless questions. This morning, I believe, you are devoting your work to illnesses of the human mind, mental illnesses, and to the consequences of these illnesses in the sick person's environment. You ask yourselves about the place of these patients, of these sick minds, in our society. It is a subject not foreign to the concerns of the Council of Europe. And I will state, personally, that it is a topic which touches me deeply.

It is true that every person — including the one whose mind is ill, whose intelligence is obscured — every person has a right to dignity and to respect from others. But it is not always easy to put this into practice. First of all, many people experience a kind of vexation, of malaise, to the point of repugnance, in the face of a patient whose mind is obscured. It is an honor to humanity to overcome that vexation, that malaise, that sense of refusal to give the sick person the respect and the love to which he has a right. I believe we

can meet in this way of seeing, whatever our religion or adherence to a philosophical tendency may be. Here we find ourselves in the heart of humanism.

Our societies, which are so often cruel to the weak, must manage to open themselves with sufficient intelligence — but, above all, with sufficient heart — to every human being, including the one who is different from others, so that he will have a place in our societies. Only on this conditions can we speak of humanism.

Humanism is not reserved only to a part of humanity, that which is made up of so-called " normal " people or which has excellent living conditions. Humanism concerns the entire world, and, I believe, especially the weakest. These are the conceptions we seek to put into practice in this international organization, which is not at all like the other international organizations. We are not just a structure uniting interests or grouping together States. The Council of Europe is also the bearer of these values. You have given me the chance to recall this task of the Council of Europe; for my part, I have striven to do so and am very grateful to you.

CATHERINE LALUMIERE
Secretary General of the Council of Europe

GUY MCKHANN

The Neurobiology of Language: The Basis of Human Communication*

If we ask what gives us our *humanness*, we have an upright posture and very dextrous use of our hands and we have developed language and communication as a basis for learning and memory, our transgenerational culture and much of our creativity.

Language is very much a human phenomenon. If you ask how many verbal sounds a nonhuman primate has, it is about a hundred, but we humans have an enormous vocabulary. Most of the people have a vocabulary that approaches 170,000 words. The dictionary has 415,000: to understand how the brain processes this kind of information is the challenge. Much of what we know about how the brain handles language has come from the damaged human brain, the person who has had a stroke or some other kind of brain injury.

So we have ideas that there are regions of the brain that are involved with the expression of language and regions of the brain involved with the reception of language.

In many textbooks you will find depictions of what we think happens with various phenomena in terms of expression or reception. But if you use the modern imaging techniques of the brain and you take people who have this kind of a problem, the reception of language, you find that the human lesions are markedly varied. They are larger than we expect, sometimes in very unusual places. Many patients don't *fit*, the anatomy doesn't make any sense, and this doesn't explain how speech is produced, how the brain does this.

I would like to turn our attention now to approaches to asking that question: how does the brain process language?

I'd like to allude to some of the studies done using PET (Positron Emission Tomography) scanning. Using this radiological technique, we can see that the red areas are areas of the brain that are active, as we listen, as we speak, as we prepare answers. Some people use this technology to try to understand and get at the process of languaging.

But I would like to turn to a different approach that I and my colleagues have been using, primarily Drs. Barry Gordon and Ron Lesser.

The background of this goes back 50 years when Dr. Wilder Penfield in Montreal stimulated the human cortex to find out where various motor acts were located. We have taken this technique and used it in a somewhat different way.

It is important to understand the problem we are addressing. We are addressing two types of patients. One type are patients who have epilepsy, and they may have a very specific focus. By that I mean a group of neurons from which the seizures arrive. Some of these patients are not cured by medications, so if you can find that focus and remove it, you can perhaps cure the epilepsy.

The second group are patients with brain tumors, and the question whether you can remove that tumor without damaging vital functions.

In an attempt to clarify the issue we can superimpose on the brain, of a patient some electrodes they are placed over the entire surface of the patient's brain there can be 80 or 100 of them and each electrode can both stimulate and record. This allows us to ask the question: what's happening in some specific regions of the brain, and sometimes the temporal sequence between one region and another.

What one can do, then, has very discrete effects, they're very transient; we *leave* these rays of electrodes *in* for a week, ten days, the patients go back to their room, they watch television, they read the newspaper, they do their homework if they are children, but it also gives us the opportunity to study language and to control one group versus another.

I will now show you two examples coming from patients. We ask a person just to name what he or she says. We call this confrontional naming.

Furthermore, we look at many other functions: spontaneous speech, naming something we describe, reading single words, reading paragraphs. Now, these are normal functions; yet, when we stimulate certain points over the cortex, we interrupt that function.

We can interrupt a function in a specific place as these people are seeing an object, processing it, and bringing it forward into their temporal lobe, particularly the inferior temporal lobe, as they attach a verbal signal and name to what they have seen.

Sometimes this process can be amazingly selective.

Sometimes we ask people to make a verbal comparison of how large things are; we ask, for instance, is a tree bigger than an ant? When that region of the brain is not

* This lecture was transcribed from a tape recording without having been reviewed by the authour.

stimulated, they are always correct. When that region of the brain is being stimulated, they are random; half the time they are correct, half the time they are incorrect, and then they don't know. If we ask is a bee smaller than a house, with no stimulation, they're always correct. With stimulation, again, about half the time they either don't know or are incorrect.

In contrast, if we just ask them to look at an object, they're always correct whether we stimulate or not.

What we have done I think is to selectively block in both of these examples the connections or communications between what we see and our verbal access to what we see.

So we can look at the modules of the brain, these smaller building blocks of language function, and we can look at very discrete anatomy, which is quite different from what we would have predicted from studying the larger lesions in patients, but most importantly, we find a great deal of individual variation, as if the brain started perhaps with some hard wiring and our individual experiences then gave us this degree of variation.

There is another aspect of language over which I would like to pause for a moment.

That's the temporal sequence if we look at something and say how long does it take for us to see it, to process it, to interpret it, to utilize it and formulate an answer. This time scale is six-tenths of a second, six hundred milliseconds; 600 milliseconds for a computer is very, very slow. The brain is a very slow computer. For those of us who are trying to study the temporal sequencing, this is the real challenge: how to be able to *be on line* with this time frame. What we are able to do now is look at snapshots, at particular points in time, and try and synthesize them into a whole.

If you are reading along in English and you suddenly see a Latin word, now many of you in this room would not have problems with that. I would have a lot of problems with that. And my brain would suddenly act in a different way, and it would generate a different kind of electrical activity.

We can record from that activity; and using these kinds of grids, we can pick up this low voltage activity, see where it comes from and how it moves forward for various parts of the brain, try to get at this temporal sequence of the processing of language.

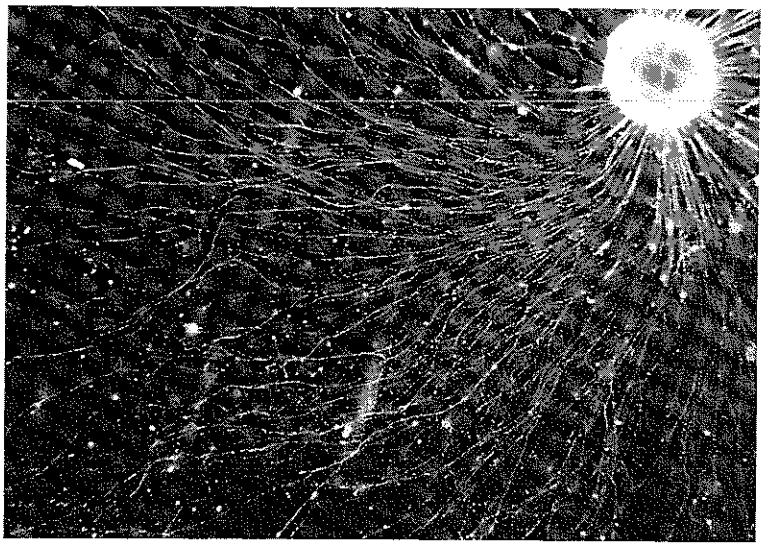
We can try to make a model of how this happens. I won't go into detail, but if you read the word "car," you have to recognize it as written material, you then have to process it and you have to identify it, and then there are various steps that we go through. We think we can interrupt these various steps at certain points and ask questions where they occur in the brain and perhaps how they occur in the brain.

So we are trying to bring together three different approaches to language. The cognitive neural psychologist looks at language processing and develops the kinds of models I just spoke about. We in the neural sciences are asking the question What's the neural substrate? How does the brain do this? A third group is saying can we model this, can we use the types of techniques that Prof. Edelman used, the same type of approach that is being used for motor function, the model for *what* happens in human language?

The implications of this are not just the normal. We can ask questions about the abnormal. What about the person with abnormal language development, the little boy who can't read, the little boy with dyslexia? What is it that he does differently, and can we do anything to either correct that or reinforce what we think may be the proper way to do it?

Secondly, what about the person recovering? When someone has had a stroke and lost language function, how does he get better? What are the mechanisms? These are very approachable and answerable questions, and I think may have implications not only for language but as a strategy we can then use to get the more complex cognitive processes, things we cannot approach yet, but would like to.

Prof. GUY MCKHANN
Professor of Neurology at the Johns Hopkins Hospital, Baltimore, USA



ANATOLY EFIMOVIC ROMANENKO

The Influence of Ionizing Radiation on Psychic and Neurological Activity

The explosion of the nuclear power centre at Chernobyl proved a very difficult experience not only for those who were professionally engaged in containing the accident and its consequences but also for the local population which was evacuated and the local inhabitants who were exposed to radioactive contamination. The disaster was of such proportions that it involved hundreds of thousands of people. As is the case with every catastrophe and cataclysm, the population which is affected undoubtedly deserves our entire understanding and compassion, and should receive foremost concern with regard to social and economic help. Furthermore, there is a pressing need to understand clearly how the accident actually influenced, and in the future will influence, the health of the affected population; what the real danger of the situation is; what the real sources of contamination are; and the extent of damage to health itself.

The release of ionising radition is the first harmful result of a large-scale radioactive explosion. There is thus also a need to examine the damaging consequences that this has for humans. The need to change places of residence for tens of thousands of evacuated people, and the conditions of existence for hundreds of thousands of people who must live on territory which is contaminated by radionuclides for many decades, have radically changed the daily lives of the people involved. This, naturally enough, could not but affect their state of health. Unfortunately, these subjects give rise to many rumours and assumptions on the part of public opinion. Useless anxieties and exaggerated emotions emerge which hide and powerfully obscure the facts as they really are, and can cause a much more harmful effect on health than the radiation itself.

This is why in assessing the consequences of the explosion from a medical point of view we must be aware not only of the radioactive effects but also of the so-called consecutive effects which follow the accident and are associated with it. We are compelled to observe that despite the relatively favourable facts and previsons relating to the consequences of radiation, the socio-phychological tension associated with the medical consequences of the explosion continues to grow and threatens to become a principal cause of damage to the health of the population, affecting ever more wider sections of the groups exposed to the worry and anxiety caused by Chernobyl. These emotional troubles particularly affect the inhabitants of the areas polluted by radionuclides or those who were involved in containing the disaster at Chernobyl itself or in its immediate surroundings. As things currently stand, psychological investigations and examination of the functional state of the nervous system take on an especial importance.

Three principal elements emerge if we wish to list the mechanisms by which ionising radiation affects the nervous system and its functional state:

— the direct effect

— the indirect effect through other parts and mechanisms of the human body which have undergone pathological change as a result of radiation

— the effect of the whole complex of factors caused by radioactive explosion.

As is well known in radiobiology, the nervous system is not very sensitive to ionising radiation. However, there are cases of very large doses of radiation where the nervous system is much affected — often with results which do not permit continued life. The indirect result of radioactive damage to the other organs and systems of the body also occurs in significantly high doses of radiation (for example in the case of leukemia). This kind of damage, after the explosion at Chernobyl, has been observed in relatively few cases if we consider all the people involved in the disaster. For this reason, this paper will devote most of its attention to the functional damage caused to the central nervous system — something which, as our researches show, has been observed in many of those who were exposed to radiation.

In carrying out our inquiry we began with the hypothesis that a man's state of mind is based upon three principal factors — social, psychic, and physical well-being. These elements are interconnected and interacting. From the medical point of view, therefore, the radiogenic and psychogenic effects deserve equal treatment and attention.

One of the most important aspects of Chernobyl lies in the fact that it was accompanied by the spread of a stress-inducing situation which one may define as " massive collective stress ", to use the phrase of the specialists. This condition is influenced by a large variety of social and medico-psychological fac-

tors. The problems of a psychological nature which occur in extreme situations have principally been studied with regard to catastrophes and cataclysms. The general picture gained from the experience of the psychological and psychiatric teams who worked in Armenia after the earthquake and after the Ufa disaster offers an opportunity of grasping a number of important facts. All the victims of the Ufa accident displayed changes in their psychic state. Amongst these were to be found astheno-anxiety (in 56% of the cases), nervous stupor (in 23% of the cases), psychomotorial excitement (in 11% of the cases), and so forth. The nervous consequences of Chernobyl have not been sufficiently illuminated and examined.

The specialists of our research centre carried out a sociological study on a sample of the adult population belonging to the so-called " strict control " zone, a zone which was contaminated by caesium radionuclides within the range of 0.5 to 11.7 (an averge of about 3) curies per square kilometre. The people who were subjected to analysis were those who had lived in the zone for ten or more years and had not left the area for a period longer than a month after the explosion took place. In order to achieve a more satisfactory outcome to this statistical survey we made use of both a typological approach and a serialised approach, this last consisting of three stages. Information was gathered using lists of questions written out on different sheets of suitable paper. In investigating the preventive measures taken by the population we paid attention to whether suggestions regarding correct health, hygiene, and dietary policy had been followed. This last is of primary importance in preventing the entry of radionuclides into the human body. We also explored the elimination of dangerous habits, the use that was made of doctors in order to prevent illness, and the way in which individuals thought it was best to live in relation to their state of health. In order to examine the effectiveness of knowledge on preventive activity, research was also carried out into the quality of the population's information about matters relating to the impact of radioactivity on health. The data which were received were subjected to logical and qualitative analysis.

The results of these analyses showed that during the second part of 1986 59% of the inhabitants who had been subjected to investigation had not in any way altered their dietary habits in response to the dangers; 25.6% gave up milk; 8.6% gave up vegetables; 8.8% gave up green vegetables; 12% gave up berries; 3.8% gave up meat; and 4.2% gave up fish. It should be emphasised that 57.8% of the population ate food from collective farms (within whose ranks were farms suffering from very high radioactive contamination).

After three years in the same zone the majority of the people (81.5%) who were questioned were found not to exclude any kind of food from their diet; 8.8% excluded milk; 2.8% left out berries; 1.6% did not eat green vegetables; and very few people (0.6 to 1.0%) left out meat, fish, and fruit. 11.6% of those questioned said that their dietary lives were reasonable.

After the explosion suggestions as to proper health and hygienic conduct were respected by 20.4% of the people interviewed. 72.6% followed these suggestions in part. 9.9% of the inhabitants did not respect these guidelines, and of these, 7.2% did so because of ignorance and 1.8% did so knowing they were going against what was recommended.

31% of those questioned smoked. 94.4% of these had not changed their smoking habits after April 1986; 5% stopped smoking or cut down; and 0.6% increased their consumption of tobacco.

5.4% of the population reduced or eliminated their consumption of alchohol; 45.2% remained the same; and 1.6% increased their drink intake. 44.1% experienced changes in their daily lifestyles. During the second part of 1986 only 21.1% of those questioned voluntarily subjected themselves to medical check-ups.

An analysis of the data relating to preventive action enabled us to understand the appropriateness of the behaviour of the inhabitants of the control territory. In this analysis the criterion which was used consisted of improvements in the individual's state of health. The results showed that 13.4% of those questioned considered themselves healthy; 63.5% believed themselves to have an average state of health; 21.7% saw themselves as ill; and 1.1% retained that they were seriously ill. The majority of the inhabitants (85.7%) began to complain about their health after the Chernobyl explosion. The people interviewed stated that they had begun to suffer more often from heavy colds.

The opinion of the people is of special significance as far as regards the influence of radioactivity on the health of the inhabitants of the territory examined. The majority (68.1%) believes that the situation is dangerous to health and only 1.9% is not alarmed and assumes that there is no danger to health. One person in five is alarmed, even if that person does not know whether there is a real threat to health. This demonstrates the low level of information on the matter, even one year after the accident. A distinct correlation has been observed: the higher the level of worry experienced by an individual the worse the assessment of his own health.

In discussing the subjective perception of the post-explosion situation it is necessary to understand the importance of the social character of the question as represented by decisions regarding new births. Almost one third of those interviewed who belonged to the fertile section of the population stated that they had experienced a reduced desire to have children after the explosion, or indeed no desire at all. One can say with certainty that 22.8% (a majority of whom were women) responded in this way to the radioactive situation.

In analysing how radioactive conditions are perceived, the question of the attitude of the population towards nuclear energy cannot be avoided. The majority of those asked (81.8%) expressed themselves against the use of nuclear energy; 10.3% were in favour of later development; and only 6.3% had not thought about the problem. A person's opinion about nuclear energy was related to gender, family position, and the number of children in the family. The " optimists " prevailed in number amongst the men. We found that the number of proponents of nuclear energy amongst

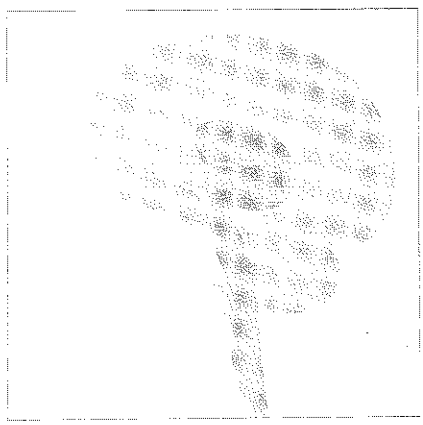
the unmarried was double that amongst the married. In addition, the greater the number of children the lower the level of support for nuclear energy amongst the parents.

The research carried out demonstrates that preventive antiradioactive measures which could have been carried out by the local inhabitants in those areas subjected to careful radioactive monitoring were few in number. This, in conjunction with a low assessment of personal health and anxiety about health because of those conditions mentioned above, reveals the inadequate and inappropriate behaviour of those people living in areas subject to careful radioactive monitoring. The rather undeveloped level of information regarding matters relating to the impact of radioactivity on health and an unsatisfactory level of health awareness and culture are some of the causes which diminish the level of implementation of health norms suggested for a conscious approach towards the maintanence and reinforcement of personal health. All this contributes to the pression upon socio-psychological tension and lowers the effectiveness of all the measures taken in the above mentioned areas, and in the future this could have an influence upon the success of the envisaged programmes. It is necessary to emphasise that socio-psychological tension exists amongst the inhabitants even in cases where the level of radioactive influence is minimal.

When a radioactive accident takes place the principal factor it involves is a threat to life and health: from a psychosocial point of view "radioactive contamination" constitutes an "unknown factor," because it cannot be monitored directly by means of the senses but only by using special instruments and machines and by information received about the situation. For this reason it can be identified as a special isolation from the event. On the eve of the Chernobyl catastrophe information about radioactivity amongst the population was conditioned by a subjective picture about the nuclear threat which had arisen from age-old anti-military propaganda. Such information, at times, involved a total lack of knowledge about the question. This fact had a very important predetermined effect on the level of expression of the psichological-emotional tension which followed. The same may be said of the ways by which stress arose from this extreme situation.

As is well-known, the emotional strategy of man in extreme situations can be recognised from mental and socio-psychological functions. A model of behaviour linked to the situation arises in the human mind. Adaption to the actual situation depends upon the fullness of the individual's knowledge of the problem or of the serious of the threat to personal values and above all else to life and health. If the individual's knowledge is sufficient the model of behaviour is adequate to the situation at hand. But if no such knowledge is present there will not even be a model. Radiation will not disturb this person any more than the spots upon the sun until the influence of information will create in him another kind of model.

A lack of knowledge and a scarcity of necessary information are the chief factors in creating the socio-psychological tension we have observed. From the first moments of the Chernobyl disaster the lack and shortage of information issued by official bodies led to a distrust of official information and then a total distrust. The vacuum which thus arose was regularly filled in alternative fashion with substitute information and the widespread diffusion of assumptions and news items whose source was often the opinions of representatives of the scientific, technical and cultural world.



The situation of stress is characterised by a psychological contagion of the people concerned, a lowering of interests and attention, a diminution in the ability to reason and to be responsible in the oral expression of assumption. "Situation models" were basedd upon these realities. They involved social stereotypes which are near to biologial stereotypes because of their stability. In this case all alarming information is perceived positively, like the declaration of fact that appropriare defence measures will be taken. At the same time all information which is "satisfying," objective and scientifically proven which does not correspond to the stereotypes which had previously been formed is perceivedd negatively and seen as an evident lie, as irresponsible information which underestimates the real danger. Some people listen to it with scepticism and mistrust, others react with active opposition, protest and indignation. A dependence is created — the worse the evaluations the truer and more valid they seem to those who have already created a model of a situation which is imaginary.

Here we may be discover the psychological mechanism which allows us to understand why anxiety and discontent can so easily be proviked at the same time as popularity and general esteem can be obtained. This also explains why one can find in very differing conditions people who try to obtain information which is true and scientific and who irresponsibly continue to cover up the situation, even if they do it while hiding behind the declaration of noble ideals. The choice of scientists and other "experts of the Chernobyl problem" begins to be clear, people for whom society creates a very favourable state of affairs.

The chief characteristics of

stress, which influence its development into illness, are: the level of control of the stressing situation, the possibilities of overcoming this stress and of getting out of a state of stress, the life-experiences involved, and the personal qualities of the individual. If a human being is able to control the situation and manage it (positive situation), the reactions linked to stress, as a rule, do not express negative manifestations. If the control is limited (uncertain situation) or is completely lacking (negative situation) the state of the individual is characterised by fear, worry, depression and lack of calm. In this way can one explain the intensity of radiophobic stress and its stability within conditions of massive and unprecedented contact of the population with radiation, a lack of previous such experiences, and scant information.

In assessing the psychological effects of the radioactive factor, one section of the experts emphasises that uncertainty and the lack of any opportunity to take any kind of action give rise to exaggerated imaginings with regard to the danger which is present and oppress the mind with the idea that the radioactive impact is posion which is hidden from public awareness and of an insidious nature.

As long as phobic stress affects only a few people, it is of a personal and emotional dimension and does not become a social problem. It becomes something very different when the principal source of the phobia, the cause of the stress, attacks a majority of the population and becomes the centre of worried and tormented attention, and constitutes something of common concern. Radiophobia was known before the Chernobyl explosion, but for the first time it appeared on a macroscopic scale. Various psychosomatic disturbances which became epidemic here began to take shape.

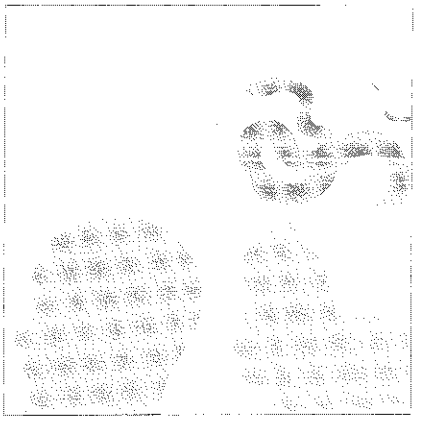
The forms of stress which modern man experiences are of a radically different nature from those he experienced in prehistoric times. In those times they served as mechanisms to enable man to adapt to conditions which were changing human existence and thus enabled him to survive physically. The effective disappearance of the need to struggle for survival has not cancelled the mechanisms of reaction which were formed in the course of evolution. This is why the frequent manifestation of stress reactions with a serious reconstruction of the organism and with the mobilisation of all energy and plastic resources is excessive, unrequired, and leads to a consequential imbalance in psychic and physical activity and to the development of stress pathology.

The theory of hypokinetic illnesses holds that the activation of stress leads to psychosomatic illnesses because of the suppression of physical activity. From this arises a predisposition to the malfunction or the pathology of any " final target-organ " if this organ is subjected to the influence of stereotypical stimulation which is psychophysiological and probably conditioned by particularities which are not only genetic but also acquired (like the result of pathology existent from the beginning). From this there arises a possible principle of the great variety to be found in the clinical manifestations of the pathology of stress. In considering our data we can observe that these symptoms of stress express themselves most often in changes in the cardiovascular system and the digestive apparatus.

Our observations have revealed that amongst those involved in containing the accident, the evacuated population, and the inhabitants of the control areas, there has been an increase in somatic and neuropsychic phenomena attributable to stress. The results of examinations carried out by our centre on those people involved in containing and controlling the catastrophe which took place at Chernobyl are of relevance here. The clinical-psychological symptoms of " distress " can be divided into three chief categories: somatic, emotive, and behavioural. The somatic symptoms which prevailed amongst the patients were complaints about headaches, memory impairment and maladjustment to work, pains in the neck, the spine, the feet and hands, and the heart — with the presence of palpitations, giddiness, fainting, decrease in sexual potence, malfunctions in the digestive apparatus and in other body systems.

In the emotive sphere there prevailed excesive anxiety (dependent upon the actual or personal situation), depression, apathy, psychic tiredness and discomfort, hypochondria, and other complaints. Behavioural reactions were characterised by aggression, hostility, increased use of alcohol, tobacco and sleeping-pills, by unjustified risk, by slow healing processes, by sleep disturbance, and so forth. Vegetative alterations (like the stress integral symptom) occurred more often in those who had been exposed to larger doses of radiation. Such phenomena were present in 15-16% of those who had been exposed to levels of radiation up to 0.15 Grej, in 48% of those with doses from 0.15 to 0.24 Grej, and in 57% of those who received doses of radiation from 0.25 to 0.40 Grej.

During the study of the time necessary for the principal forms of vegetative alterations (vegetal-vascular dystonia, neuro-circulatory dystonia and astheno-neurotic states) it was established that these were observed not only during work in the area of the nuclear centre but also after a period of time. As was expected, vegetative alterations in their various forms occurred more often during the stressing work carried out in the centre but afterwards were to be found occurring with lesser frequency. The frequency in the manifestation of



vegetal-vascular dystonia clearly diminished over time. This tendency, in lesser fashion, was also evident in the case of neuro-vascular dystonia. With regard to astheno-neurotic states, six months after working at the nuclear centre they were more present during the first month than after three. Assessment of the pathogenetic mechanisms of the consequences of stress in those taking part in containing and controlling the disaster is complicated, many-sided, and has hitherto been interpreted in different ways. Dynamic observations of the sick show that various factors led to the onset of somatic-neurological alterations. Amongst these factors which have a stressing effect we must include not only alterations in physical and chemical diet (ionising radiation) but also of psychic input (insecurity with regard to information, disturbance of individual way of life, a sensation of isolation and danger, psychosocial tension, and so forth). Prolonged stress led to somatic and affective asthenisation in this group. Asthenisation acted as a base upon which arose a variety of pathophysiological stable reactions which took the form of a vegetative dystonia of the various phenomena. The basis of the clinical manifestation of the vegetative dystonia took the form of stable deregulation of the systems of neuroimmune, neuroendocrine, and neurovegetative operation and supply. The exhaustion of the activity of these integral systems contributed to the development of many neurodystrophic changes in various organs, tissues, and apparati. In the dynamic of the development of vegetative dystonia in 90% of the cases there arose new latent-somatic illnesses or those which previously existed were made worse and aggravated.

Our research in this whole area continues. Many problems remain unsolved or must be tackled in a new way. But today we have good reason to attribute an important role to psychosocial factors and neurological functional alterations in the medical consequences resulting from the explosion at the Chernobyl nuclear centre. These factors must not only be considered by medical men but also by all those who are dedicating themselves with great efforts to saving humanity from the Chernobyl disaster.

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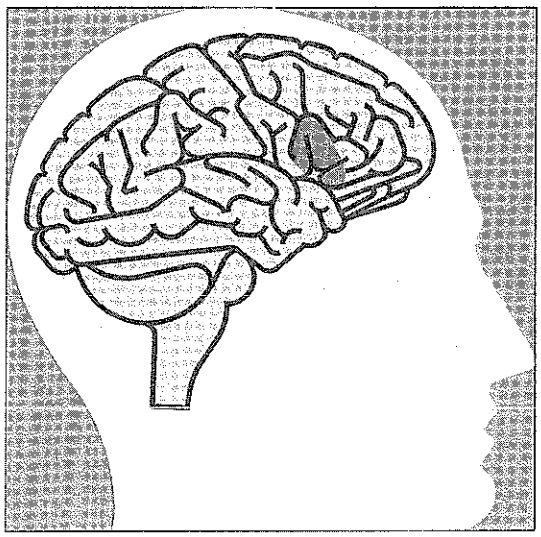
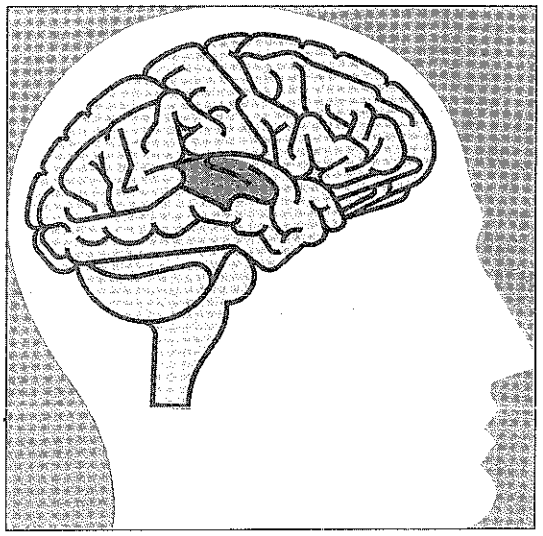




CARLO RUBBIA

Science and the Mind

1. Science and Mind, What Are They?

Whilst scientists are relatively at ease speaking about their own science, they consider science at large as a rather philosophical entity. Indeed, our human scientific knowledge still has a very fragmented structure. There are different sciences and each one of them has its own focus, method, and style. Yet, all sciences share something in common. They all chafe to find some order and unity in a world which strikes us with its vast complexity and diversity. Even within each science, the various approaches which are followed may seem limited in scope and quite different from one another, each scientist usually concentrating on a rather narrow domain. This fragmentation is, however, not a limitation. Indeed, the great success of scientific research is closely associated with the very specific nature of the questions under study. The results obtained, and the insight thus gained, often extend much further than the limited scope first set for research. This is the great reward in scientific research. The appearance of these successes is, however, all the more unpredictable since they spring out of the rather limited importance of the questions first addressed. As one example among many, the whole body of thermodynamics originated from the initial rather modest study of heated and compressed gases!

Despite appearances, what we deal with in physics — and more generally with what we call " natural philosophy, " namely physics, chemistry, astronomy, and so on — are the very simplest questions. We simplify situations to the limit in the hope of finding that the laws of simple things can be built up into the laws of complicated things. We work with the belief that this is the way to knowledge and understanding when dealing with the material world. Past successes fuel the enthusiasm to continue. Scientific knowledge, thus achieved, can be deemed objective insofar as it corresponds to a body of facts and of logical propositions which is supported by experiment, but also because the spelling used in presenting them and the procedures followed in reaching and justifying them involve the agreement of all those able to understand these facts and propositions and to test them. This is the great strength of the natural sciences and the basis for their universal value. It is through this fragmented, but logical and uncompromising study of Nature that one may tentatively define " science " in some global way. Science is thus an approach to the Truth, carried out with humility and specific rules, by many seemingly narrow ways and small steps which some of the time take us to immense vistas. In the words of Piaget " science is only science when it restrains itself. "

Science is a product of the human mind, but it excludes the mind, together with any human feelings or values, from its formulation. It responds successfully to many specific questions raised by the observation of the world around us, and which challenge relentlessly our inborn curiosity, but it is silent about ethical and eschatological questions, which are also continuously addressed by the human mind. It rather successfully brings to mankind what it is expected to deliver. However, despite false hopes raised by a once widespread philosophical attitude among scientists, it cannot provide any direct answers in response to other more important concerns about which it is substantially silent. Each separate science is hard to enter. Understanding and practicing it requires a long and thorough training. It sadly remains a " closed book " for many. The restricted scope of the sciences is often not well understood. Their technical nature scares away outsiders. This is at the core of all the problems presently met by scientific research, despite all its prominent successes, in our contemporary human society.

Coming back to the tentative definition given, one may stress once again that, whilst the sciences, and, in particular, the natural ones, are relatively easy to define through their respective domains of endeavour, and their methods of approach, science as a whole is an entity which is far more difficult to refer to. It is somehow a global envelope which is of a different nature than its far better defined parts: the sciences. Considering science globally, one should, then, speak rather about the scientific method. It is an approach to the properties and apparent mysteries of the world which is based on logic and experiment and on the assurance of the reproducible character of phenomena, once their comprehension allows one to specify correctly their characteristic conditions.

So much about science. What about the mind?

The mind is the seat of our understanding and of our emotions and feelings. It involves our con-

scious and unconscious experiences. It operates on orders from the human brain, but in a way which we cannot precisely formulate. The mind, as we attempt to grasp it as an entity, cannot be dissociated from life, but life itself presently lies beyond the more limited concepts with which we deal in our present sciences.

Are there indeed metaphysical entities behind our words " mind " and " life "? Our present scientific approach can but acknowledge the question mark. In that context, the famous biologist François Jacob says:

" *The power to combine, to produce structures of increasing complexity, and even for those structures to reproduce themselves, belongs to the elements which are the constituents of matter. Life is the outcome of the organisation of molecules in much the same way as the mind is the outcome of the organisation of brains.* "

He, however, adds:

" *Yet it is not certain that we should ever know how, out of an unorganized universe, living beings could originate and where the critical evolution of brains started and the appearance of this ensemble of properties so difficult to define which we call the mind.* "

It is, therefore, an impossible task to address the question of " science and the mind " from a purely scientific point of view. Indeed, each term corresponds to a whole, whereas the sciences address only the very specific! Science and mind are, rather, to be approached as we approach beliefs and dogmas, which are parts of the Truth, to be lived with and to see mature within oneself, through a whole lifetime. They are not simple scientific entities with which one can work in a step by step and rational way. They are, rather, parts of the global human experience.

Despite these paramount difficulties, one may still attempt a scientific discussion, if only to assess present powers and limitations.

In a second part, the nature of the mind will be addressed in a scientific manner, in order to quickly realize the shortness of the path which can be presently followed. In a third part, the point already stressed in this introduction, namely that the sciences, though a product of the human mind, draw their strength from the elimination of all human characters from their formulation, will be further developed. An attempt will be made to separate what could be produced by artificial intelligence from what seems specific to the human mind. This will lead us to an elementary analysis of the process of scientific creation, trying to spell out some of the hints which this provides on how the mind works.

It is clear and evident that physics, and all the other sciences, have not yet progressed far enough to link up with psychology and the questions addressed in theology. Scientists still deal with far too simple entities. They are finding lots of exciting new things, but, to use Newton's words " *the great ocean of the unknown still lies in front of us.* "

2. Is There a " Physics " of the Mind?

The seat of the mind is the brain and we may try to approach the functioning of the mind through the study of the mechanisms at work in the brain. The brain is a very complex system. As all other organisms or organs, it is basically an assembly of cells, in this case, neurons. The complexity of the human brain cannot be approached without awe. There are about ten trillion neurons interconnected among themselves. Most of the neurons have very many connections with other neurons, through synapses. For some neurons, the number of synapses reaches well above ten thousand. This is the complex structure which controls our actions and evokes our awareness of the world around us. The neurons are of different kinds, but, at the level of such basic constituents, nothing seems to be specific to the human brain. Only its size and complexity distinguish it in the animal kingdom. Yet, it is the seat of our consciousness and the material basis for our emotions, feelings, and thoughts.

ALB. Quid credis ipsum sibi velle per hoc ænigma? BOR. ISTA. Dicam vt possum. Habeas ab inuicem sepulta subiecta quatuor & viginti, quæ vniuersa non adiaceant, non inhæreant, non contingant. Sed libera, & solitaria vel sitiuntur vel situata intelligantur

One may speak at length about the different parts of the brain and their respective functions. This discussion is, however, the short and biased one of a particle physicist, with a resulting emphasis on the basic constituents of the brain and on their interactions. One may address scientifically the functioning of each piece of this globally highly complex system. The mode of operation of a neuron can but fill us with admiration on how Nature works. The transmission of the nervous impulse along the axons, which are the often long fibers through which neurons communicate, implies subtle changes in the concentrations of sodium, potassium, and chloride ions. This results in charge imbalances which propagate along the axon, whilst very little material actually moves. The signal thus carried is transmitted to another neuron through the production and absorption of complex biochemical substances at the synapses. A neuron thus excited may or may not change its rate of firing new signals, depending on the global stimulus received. The neuron integrates all the transmitted pulses which it receives, thus providing a local response. Firing conditions also depend on the local concentration of chemicals produced in other parts of the brain or body.

Isn't it wonderful that this highly complicated but very efficient system is used throughout the animal

kingdom? The physicist here wonders at the great unity found among a wide diversity of species! The speed at which the signal propagates from neuron to neuron exceeds one hundred metres per second. This allows us to acknowledge external stimulation and to respond to it in a fraction of a second.

Even when observed carefully, the brain is basically an assembly of a very large number of interconnected neurons. There are as many neurons as stars in a big cluster of galaxies, such as the near-by Virgo cluster, towards which our own galaxy is presently falling at 200 Km / s. All neurons are interconnected in an extremely involved way. We cannot grasp the organization of the design of this intricate wiring, but we know already, at least partly, how such a system can transmit and sort out information, processing it to a high degree, through algorithms suited to the network. The recognized properties of the parts, and the presence of the many interconnections, are indeed enough to understand how relatively simple but already subtle mental operations may work.

Indeed, despite its very special mode of chemical operation, the brain appears to work, in some cases, like one of our present computers. One may abstract away the mechanism from the substratum. This is a natural attitude for the physicist. As an example, one may say that the motion of a car on a bumpy road, the blowing of sound out of a wind instrument, and the oscillation of a radio circuit all operate in the same way, following the very same equations, even though the nature of the variables is very different in the three cases! A computer can process, sort out, and assess information and it can respond to it with appropriate answers, much as the brain does. One may remark that, whilst computers are extremely fast at mimicking specific mental operations, they fall short of reproducing many deeper aspects of human thought. One may, however, argue that the number of components now used in the most powerful computers reaches only a tenth of a thousandth of the number of neurons in the human brain and that their interconnection falls very short of the complexity found among neurons, and that much

progress should be anticipated in their design. Machines which can perform a trillion operations per second are indeed presently considered for the next generation of computers. Such computers, called parallel computers, can process a large number of operations at the same time, much as the brains does. For instance, the APE parallel computer, recently developed in Rome, for the understanding of how quarks, which are our present basic constituents, bind themselves into the particles which are directly observed, is an already powerful precursor of such even more elaborate machines, which we can now design and will soon build. Powerful algorithms (which are parts of the software) swiftly process the information through the structure (the hardware). One may then wonder whether such computers could be eventually developed into artificial brains. One may even wonder whether the mind could be eventually reduced to the operation of highly complex but still recognizable algorithms, proceeding through a highly intricate network.

Such questions cannot, of course, be addressed within the present realm of the natural sciences. Nevertheless, one may still consider scientifically whether some specific functions of the brains can be understood by following a computer model. This indeed seems to be the case for many of them, which can be reduced to the mere processing of algorithms. While this sheds light on the functioning of the brain, it also brings out better those functions which stand out as very specific to the human mind, in particular those which relate to our consciousness, emotions, and feelings.

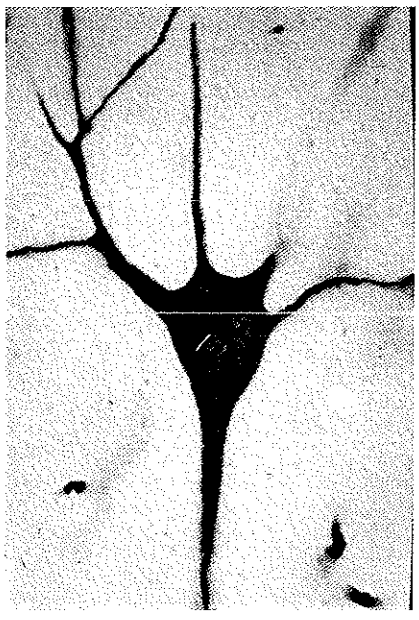
Many of our actions are really carried out in an almost unconscious way, even though they involve intricate operations in the brain. The cerebellum, in particular, with its ten billion neurons, can process, assess, and respond without our being conscious of it. To take a trivial example, when we ride a bicycle, it is better not to think about all that we do and to merely focus on the steering. When thinking too much in a conscious way about each of our actions, we are almost certain to fall! This example

brings up, however, the question of learning. Finding out the proper actions to take in order to first ensure balance and motion does require some active thinking, in a way which is clearly associated with our full awareness and consciousness. However, once this is mastered, our brain reacts and controls our muscles as if it were merely following algorithms.

We begin to learn how the brain may learn, analyse, and respond in such cases. Part of it has to do with its plasticity. This refers to the way the connections between neurons, the synapses, may develop or recede, may become more or less sensitive and active, through the process of learning. This can be mimicked with computers, modifying connections between elements, such that, for instance, specific patterns can be recognized, even in the midst of a noisy signal. Such computers are indeed referred to as " neural networks. " They are rather special in their design. A standard computer has a central processing unit. It follows one by one the steps of a programme based on specific algorithms. The outputs of the operations are stored in memories which are to be separately addressed whenever needed. The brain is certainly not built that way. It is a full network where many processing units are simultaneously receiving signals and reacting to them. Information is distributed throughout the network and not processed in a step by step manner. Whilst the higher functions of the brain are outside of the scope of the neural networks which can be constructed, many functions can be mimicked and scientifically addressed that way. The strength of the connections within the network can be modified so that proper responses can be obtained to specific external stimulations, through a learning process. Algorithms can even be developed so that the system modifies itself through learning, optimizing its reception. Such brain models can easily recognize patterns inasmuch as the mechanical analogs of the many synapses adjust the global response to presented examples. The network not only learns the material which is presented but can generalize and respond well to situations hitherto unknown to it. One can, for instance, thus construct systems which can detect defects through listening to the rattle of an engine. There is intelligence in a machine!

One then finds that patterns to be memorised, and recognized, are not stored in specific memories as in a standard computer, but distributed throughout the network. Each synapse, or the equivalent thereof, seems to know something about all the stored information. Such systems certainly bring us closer to the working of the brain. Recognition through memory access requires only a partial input. Information is enhanced as noise is suppressed. For instance, recognizing a letter of the alphabet, even within a fuzzy image, is safe and quick. Neural networks are fantastic toys to learn more about how the brain works.

At first sight, a neural network seems to imply a redundancy which cost limitation usually eliminates from the construction of standard computers, but which Nature appears to use as a rule. This redundancy is actually found to be needed to achieve a quick and safe response to a noisy signal, which is a terrible challenge to a standard computer. It also provides much stability, the system still responding rather well even if parts of it are randomly destroyed. There are more elements than absolutely necessary, but one cannot tell which since they are all interconnected.



Are we thus reproducing, or at least mimicking, the human brain? We are actually reproducing some parts of its functions, thus sorting out, through various steps what is relatively simple from what is deeper and still quite mysterious. The physicist working with such neural networks may help the biologist and the neurophysiologist in providing them with means of operation which mimic some simple functions of the brain. Conversely, the biologist and the neurophysiologist first brought some interesting findings to the attention of the physicist. This is the way science works! One also sees its step by step approach in the fact that the actual functioning of the brain is not the main present goal for neural network study. Indeed, what interests the physicist studying them most is the similarity between the dynamics of such systems and other processes met with in other corners of physics. This is in particular the case for disordered magnetic materials which can freeze into complex magnetic structures, as magnetic interactions among the very many elements may lead the global system to fall into one among a very large number of a priori equally possible disordered structures. These materials are called " spin glasses, " and they offer a paradigm for systems with a huge number of accessible stable configurations. The key interest of the physicist is the statistical mechanics of such systems, deriving general rules and properties based on mathematical models. The a priori random patterns stored in a neural network are indeed equivalent to the disordered magnetic patterns offered by a spin glass. This is, again, one example of the great unity of physics, which appears as a reward, but only after different paths have been separately explored. It is a further bonus that such systems also shed light on how the brain may work by mimicking at least some modes of rather rudimentary learning.

Clear limitations notwithstanding, it remains a fact that machines can perform many actions, and even make many judgements which

are usually associated with intelligence. However, this merely separates what is relatively simple about intelligence to bring out even more what is more specific to the mind, namely those aspects associated with consciousness, the realization of the oneself, and the essence of free will. The computer can proceed rapidly using algorithms. It can learn and respond. It can do better and quicker many mental operations which are performed by the brain. Yet, it cannot invent the algorithms which it uses, nor can it choose what to learn. In his recent book *The Emperor's New Mind*, the well known mathematical physicist Roger Penrose takes the attitude that there is something about our consciousness and feelings which computers cannot by essence reproduce. Many scientists side with this idea.

The most noble part of the mind is indeed not the one which responds properly through learning to specific external stimulations. Our cerebellum is already good at that and evolution could have stopped there, with a system working as a highly efficient neural network. The noble part of the mind involves our realizing our personality and asking questions about the world around us, about our relation with the world and its Creator. It is the interplay between the conscious and unconscious parts of our mind which generates ideas and induces emotions and feelings. Our consciousness leads us to judgements about what is right or wrong beyond any clear foreseen advantages, which is the way a computer, or a very short-sighted individual, would proceed. It leads us to subjective artistic appraisal beyond standard taste. It leads us to strive in the search for Truth in a way where belief and understanding fall at long last into full harmony, as was so well expressed by Saint Augustine.

This relentless research motivated by the desire to attain the great pre-existing harmony of the world in the sense of Leibnitz, which faith leads us to extend to the whole of God's creation, is an intrinsic element of the human mind. All these deep facets of the mind are absent from any computer which one can conceive of, despite the clever and intelligent way in which it could proceed following algorithms in a very efficient and powerful manner. While in search of Truth, human judgement cannot proceed through algorithms alone. Even when dealing with " true " and " false " statements in mathematics, where the proper use of algorithms within a formal mathematical system should a priori be enough, and is enough in many cases, a famous theorem due to Gödel states (when forced into a nutshell!) that there are necessarily " true " propositions which have no proof within the system. This theorem is very deep since it shows that a formalist's notion of truth must be necessarily incomplete. More generally, the mathematician may consider the problem solved once the proper algorithm has been selected or invented. This is where the computer can take over.

The conscious mind which produces the algorithm in the first place does not appear to work as a computer, even though much of what is usually associated with mental activity might be successfully mimicked that way. There is, however, definitely a physics, or rather a natural science, of the mind. Much progress has been made and much more progress can be foreseen in understanding the functioning of many cerebral operations even if, as it seems, consciousness remains untouched by such attempts. Their clear successes underline, indeed, even more what is specific to our consciousness of being.

3. Physics as a Product of the Mind

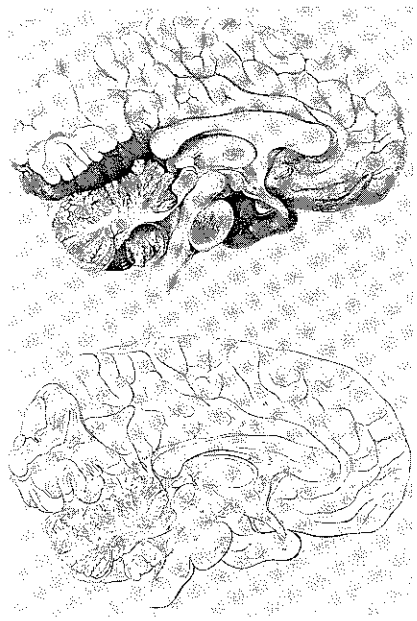
Physics is here taken as one example among the natural sciences. This is done in order to avoid a direct reference to " science, " with its special philosophical connotation. What is physics?

Physics is a statement of *facts*, whose value lies in the repetitive or reproducible nature of the scientific experiment. More than that, physics is a set of *concepts,* starting from which our knowledge of the material world is organized and becomes clearer, to the point of being predictive. Beyond concepts, physics is an understanding of the dynamics of the world based on *principles*. Concepts are formulated in the framework of principles. So are the laws of physics, which use these concepts in their formulations. Principles thus appear as the " constitution " of the material world. Concepts have to be freely invented, even if they take on value only when confronted successfully with experiment. Principles are the great giudelines. Yet their validity is also relentlessly confronted with new findings.

One may illustrate these statements with a few specific examples. A physical fact is, for instance, the statement that the energy which can be released by the fall to the ground of a body is proportional to the height at which it has been raised. Stating this fact uses the concept of " energy. " The concept of energy is extremely useful for describing the dynamics of the world around us. Energy can take many different forms out of which it has to be abstracted. Some of them are obvious, like the potential energy of a raised body. Some are more subtle, like the energy associated with the mass, following the famous Einstein equation. The principle of " time translation invariance " stands for the assumed everlasting value of physics. The laws of phys-

ics indeed involve only time intervals but nothing like any absolute time. An absolute time has thus no meaning in physics. One may then logically derive from this principle that there must be a quantity, called "energy," which is always conserved in a global way, whatever happens. Coming back to our previous example, a falling body looses potential energy but gains an equal amount of kinetic energy. If it splashes on the ground, the kinetic energy disappears, but the energy remains in the permanent deformation of the fallen body and that of the ground at impact, which both require work, and also in the heat conducted or radiated away. Energy through its many various forms is always globally conserved. This invariance principle, and the conservation of energy which it implies, were never found to be at odds with experiment, despite many direct and indirect tests. Pauli used this principle to "invent" a new particle, the neutrino, which had to exist, despite its lack of charge and mass, to "save" the principle from the apparent contradiction first brought up by experiments with ß decay. He was right! The neutrino was discovered and we now make great use of neutrino beams produced on our present accelerators. This is also through neutrino emission that a supernova releases most of the tremendous energy associated with the collapse of the giant star.

Modern physics is actually based on invariance principles. One also says "symmetries," since invariance under a particular transformation implies a symmetry. Some symmetries refer to familiar quantities such as invariance under global shifts in space and time. Others involve quite abstract operations, applied to properties which specify the nature of the fundamental particles. This is indeed our great reward when probing the deep structure of matter. One finds that the basic forces which appear among the fundamental particles, the quarks and the leptons, all result from our imposing the invariance of physical laws under specific transformations, or, what amounts to the same, their obeying certain symmetries. Dynamics as a whole is a result of symmetries! It is physics at its best.



This is at the core of our present "Standard Model" of basic particles and basic interactions. One is tempted to stop for a while in admiration of nature with a feeling so well expressed by the psalmist:

"*Truth shall spring out of the earth; and righteousness shall look down from heaven*"(85-11).

Yet we already feel the urge to search for still larger symmetries, probing the structure of matter with increasing resolution, as is possible with still more powerful colliders.

Indeed, beside this tentative definition of physics in terms of facts, concepts, and principles, there is the open mind attitude, the open eye observation of the world which offers never-ending discoveries, which should also be stressed. This attitude was beautifully expressed long ago by Saint Bernard of Clairvaux, who said:

"*One learns more in the woods than in the books; trees and rocks will teach you things which are mentioned nowhere else, and you will see by yourself the great joy which can descend from the heights.*"

Of course, exploring the woods today calls for powerful instruments which greatly extend the power of our senses. The open eye and open mind spirit of discovery remains untouched!

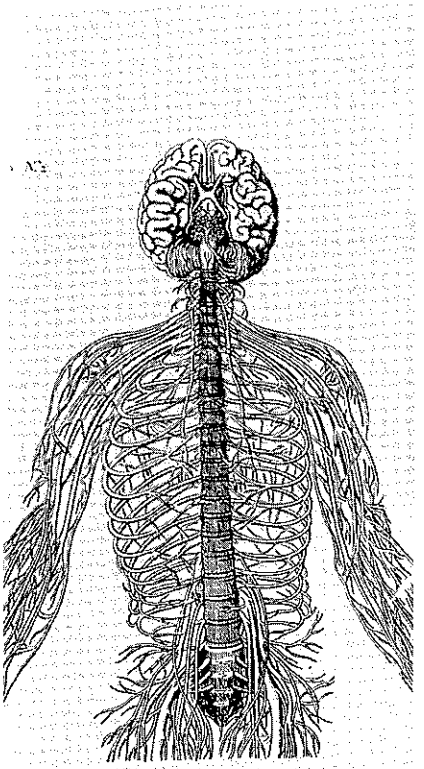
The deep understanding of physical phenomena indeed brings a great joy as it strikes an aesthetical chord in our mind. Isn't it wonderful to thus feel oneself in deep harmony with nature! This feeling that what is right is also beautiful takes us very far from the clever application of algorithms and a computer model of the brains. The power of algorithms should, of course, not be undermined since they have a crucial role in guiding the physicist to the proper results among a host of sometimes a priori conflicting pieces of evidence. Yet the free invention of the proper concepts, in the framework of which only the exquisite beauty of physics appears, is the key contribution of something very special to the human mind.

The quest for beauty in the scientific approach is actually the most fascinating connection between the sciences and the human mind. It associates deeply with science an im-

portant human element which we cannot deal with scientifically. One can, of course, easily fully eliminate any aesthetic consideration from the formulation of physics, but one cannot deny that this is what makes physicists love physics in the first place and gives them delight in knowing about the laws of physics. This has been expressed in an unequivocal way by Poincaré, who said:

" *The scientist does not study nature because it is useful to do so. He studies it because he takes pleasure in it because it is beautiful. If nature were not beautiful, it would not be worth knowing and life would not be worth living. I mean the intimate beauty which comes from the harmonious order of its parts and which a pure intelligence can grasp.* "

Coming back to the three stages defined for the formulation of physics, one may concede that collecting facts, assessing them, and sorting them out, organizing them according to pre-set patterns, are operations which a computer may eventually be able to do very well and already does rather well in some specific cases. This is a facet of science where the human mind essentially proceeds following algorithms and where it applies only part of its potential. Large bodies of new knowledge could be obtained that way through mental processes which could be mimicked very efficiently by machines. Indeed, when considering space exploration, there is a very strong case, at fixed cost, for preferring robots to humans. However, when it comes to the invention of new concepts, whether of a theoretical nature, as an abstract quantity which gives sense to a whole set of experimental facts, or of an experimental nature, as the principle of a new piece of equipment which allows one to perform hitherto impossible observations, the unique power of the mind imposes itself. It is even more so when abstracting new principles, a process in which aesthetic feelings seem to be almost as important as cold, deductive logic. Logical construction, on the one hand, and uncompromising agreement with experiment, on the other, should eventually prevail in the formulation of physics. This is actually why physics can be deemed



objective. Yet, the primordial " flash, " which sets the mind on the right track, seems to have nothing to do with either of them. Einstein said " *Truth is in verification,* " but Weyl, speaking of Einstein, says,

" *When one follows Einstein's thoughts leading to the formulation of general relativity, it is as if a wall hiding the truth crumbles away before one's eyes.* "

There is even there a fascinating interplay between the conscious and the subconscious, as if the mind had within itself a harmony not yet suggested by any experiment. Kepler expressed it in his " Harmony of the World, " writing:

" *It might be asked how this faculty of the soul, which does not engage in conceptual thinking and can therefore have no prior knowledge of harmonic relations, should be capable of recognizing what is given in the outward world..... All pure ideas, or archetypal patterns of harmony, such as we are speaking of, are inherently present in those who are capable of apprehending them. But they are not first received into the mind by a conceptual process, being the product, rather, of a sort of instinctive intuition innate in those individuals.* "

More recently, the great physicist Wolfgang Pauli, developed such views, saying:

" *The bridge leading from the initially disordered data of experience to the ideas consists of certain primeval images pre-existing in the soul (the archetypes of Kepler). These primeval images should not be located in consciousness or related to specific rationally formulizable ideas. It is a question, rather, of forms belonging to the unconscious region of the human soul. Images of powerful emotional content, which are not thoughts, but beheld, as it were pictorially. The delight one feels, on becoming aware of the new pieces of knowledge, arises from the way such pre-existing images fall into congruence with the behaviour of the external objects.* "

At the start, one siezes upon a furtive truth which exists at the deepest level of one's being. Poincaré indeed said in that connection: " Thought is merely a flash in the midst of a long night, but it is this flash which is everything. " It is seized at a glance, making even a

mockery of the " real time, " which, in computer vernacular, would be needed to merely formulate the idea in our own words. The long night is actually also very necessary to turn the idea into science, through a close logical confrontation and through an uncompromising comparison with experimental facts. This is, as stressed by Pauli, when delight eventually comes to the full. It also comes earlier, as an aesthetic feeling, when the idea is first grasped in a flash and provides to the mind the near certainty that it stands for Truth. The process of musical creation, followed by often long and formal compositions, seems to be very similar. Mozart indeed said of his music:

" *It does not come to me successively, with various parts worked out in detail, as they will later on, but it is in its entirety that my imagination lets me hear it.* "

Physics, and the natural sciences, can reduce many involved mental operations to the mechanical processing of algorithms and they already allow us to mimick many functions of our brains. The creative scientific processes are, however, there to stress what appears to be so special to the human mind. Its conceptualisation of science is but one way to admire with awe the deep harmony of the Lord's Creation.

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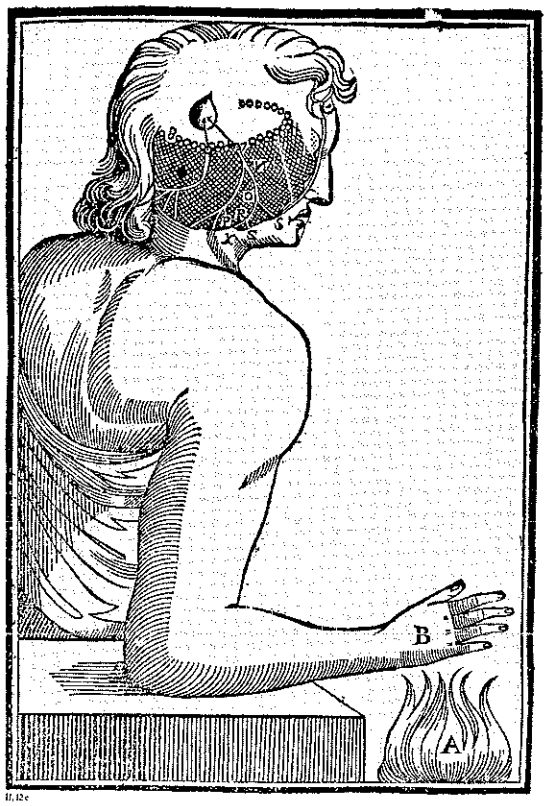


JAMES P. GRANT

Children and Intelligence*

The theme of this conference, recalled from Genesis, that humans are made in the image and likeness of God, is a most appropriate *subscript* to the title "The Human Mind" for is the mind, conscious, free intelligence, not the most precious of those features that distinguish us among all creatures that share in this gift of life? Would you not say that this is the greatest potential of the human being, that it is this capacity to love and to care and to be open to the radical *otherness* of God which is the foundation of human dignity? Taken to another level, is not our human culture, our civilization itself, dependent upon human beings reaching their full potential?

My topic deals with children, for the light is snuffed out all too soon and unnecessarily *for far too great a proportion of the human family*. Not long ago there was little we could do really about the stunting of child development among those who survive in a world in which 40,000 young children still die each day, stunting which is a result primarily of the worst effects of poverty and ignorance, *nor* were we aware of the extent of the indignities which young children suffer. Today we are aware of the problems and of many of the solutions.

I will argue that for children to continue to be deprived of the full opportunities of life is not only tragic, it is today a moral outrage. A child is born with extraordinary capacities which favour survival and healthy development. A newborn can see, hear, smell, touch, and taste; a baby can move and interact, can cry and make sounds. He arrives with a desire to learn, related to a growing sense of inner competence and with a desire to form social attachments.

Our world would be a far different place if all children could simply activate these innate capacities as they advance in age. But something more is needed. Families and communities and societies must provide conditions that will allow these capacities to be used and to be enhanced. They must meet some very basic developmental needs.

Too often, however, these needs are not met, with the tragic result that capacities are allowed to deteriorate, *pointing* the child *toward* a lethargic and dependent life, preventing him, her, from reaching fullest potential. They will never actualize that potential in society nor before God.

It is widely recognized that the first years of life are by far the most vital for the normal development of a person and especially for the development of his or her intelligence. The brain attains 90 percent of its adult volume by the time the child is six years of age, whereas the rest of the six-year-old body represents only 40 percent of adult volume. The most rapid period of development of brain cells is completed by the time the child is two and a half years old. A child whose needs are not met in the early years has slim chances of compensating for it later in life, thus setting the wheels in motion to perpetuate the cycle of poverty that is so pervasively the major cause of deprivation in the first place.

What children need to develop fully is not unknown. We know today what children need and we have found that it is remarkably low cost when real needs are addressed *as opposed* to funding approaches that miss their target.

Decades of scientific research have confirmed that for a child to develop in a healthy and normal way, it is necessary to meet not only the basic needs of protection, food and health care but also to meet the basic needs for affection, interaction and stimulation, security in the sense of being associated with *experience of consistency* and predictability and learning for exploration and discovery. Where children's developmental needs are not being met, intervention programs either for children themselves or for primary care givers can be very successful and are not costly.

The interaction among the influences of health, nutrition and stimulation is such that a malnourished infant is commonly unable to elicit the response it needs for its physical, emotional and social development from already overstressed, depleted care givers, parents. These children expect to fail and even by five, nine months of age, the babies who show signs that they expect to fail for the rest of their lives can be identified.

Conversely, the synergy among these same influences is evident, as considerable research has shown, in the fact that children who have experienced *consistent*, caring relationships will be better nourished even if the same quantity and quality of food is taken in *and less apt to be sick than those who have been neglected*.

Malnourishment, the insidious threat to children's development at several levels, is rooted in a myriad

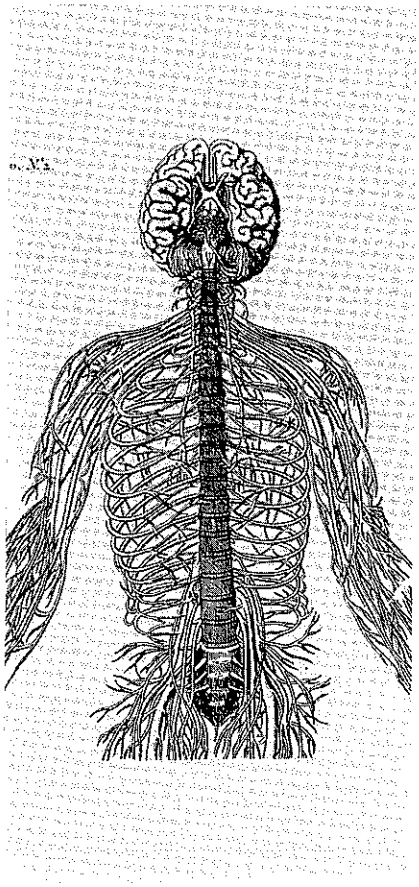
* This lecture was transcribed from a tape recording without having been reviewed by the author

of causes, many of them far beyond the capacity of individual parents to combat: causes such as drought or famine or the enormous constellation of economic issues that keep poverty's tight grip on whole countries as well as on large pockets of population within the richest countries of the world. Are these children doomed to bear for life the debilitating effect of social ills, never to grow to their full potential? It is clear today that there is light long before the end of this dark tunnel. There is much more room to maneuver than we have often realized, more possibility for improvement within difficult existing conditions.

For example, we have learned that two-thirds to three-quarters of malnutrition is not the result simply of the lack of food and of family income. It is what parents do with available resources that makes the vital difference. A child may be fed starchy foods that stop its cries of hunger but do not satisfy its nutritional needs, even though green vegetables and other sources of nutrition are readily available. Far too many parents are unaware that a small amount of iodine is essential to the young child's brain development or that vitamin A will protect their child's vision and possibly its life, nor do they know which foods provide these common nutrients that are so much needed.

Similarly, for decades we saw and still unfortunately we see families turn from the overwhelming benefits of breast feeding to the far more expensive and child health-threatening use of breast milk substitutes. The nutritive, immunologic and *family-bonding* benefits of breast feeding with proper weaning practices that guard the nutritional needs of the child rather than just satisfying hunger hold the potential to singularly make a significant impact in the fight against child malnutrition.

We estimate, for example, that more than a million and a half children died last year because their mothers did not adequately breast-feed them. Health and nutrition information such as this has been known for decades. It is information capable of not only saving children's lives in massive numbers, but also contributing to the normal development of children who do live. Knowledge alone in the right hands can return to children the gift of life, *full of the promise to develop their full intelligence*.



In fact, never before in our human history has there been such a gap between relevant available knowledge and its use by those who need to know. This raises a most serious question: whose responsibility is it for this knowledge to reach those who currently remain untouched by its benefits? Given the role that child development plays in the maturation of mental capacities, we can equally ask: whose responsibility is it to see that all humans made in His image and likeness have the opportunity to realize their full potential before God, to search for the full truth open to the human, to strive, in the language of religion, to know God?

When we as societies have the capacity to provide at really very low cost what is needed for the natural unfolding of the human potential of children to those who are the most vulnerable group among us and yet our greatest hope for the future, can we *in good conscience* turn away from meeting their needs? Morality must march with our new capacity. Societies have a role to fulfill in seeing that families know what to do and that they receive the necessary support to adapt their behavior accordingly. Ethically, this is undeniably clear. In practise, however, as we all know, there is a very tragic lag.

Two months ago, a most provative *look* at this question was published in The New York Times Magazine in a *cover article* by Prof. Barry Brasleton, a pediatrician of the Harvard Medical School and the founder of the Children's Hospital Medical Center in Boston. Dr. Brasleton documented that in the context of the United States: "Needy children are in double jeopardy. They have the most health problems and the least access to care. Poor women do not receive pre-natal care or adequate preventive care for their infants. Only for the group of desperate families willing to label themselves hopeless, *unwed*, unemployed, homeless, do we have handouts, like aid to families with dependent children. To qualify for help in the United States, a family must first identify itself as a failure. The labels stick. Treated as such, people will feel

and act like failures. Despite the huge amounts spent on welfare, the amounts are generally counterproductive, offering money without real support. Programs like *Head Start* and a supplementary program for women, infants and children, have often succeeded because they reached out to parents.

Families are educated together. As children succeed, their parents begin to feel successful. This progress has a lasting result.

The United States example shows far too weak a mechanism for *reaching out* to parents to protect at risk children during stages when low cost interventions could still help before the situation is so desperate that costly remedial care is needed, care which is often too late and then ineffective. It is not the only way for society to respond. In France, for example, *by stark contrast*, from the time a woman is identified as pregnant, the state ensures that a very high level of care is provided to mother and child. *In the area of ensuring* that children have adequate opportunity to interact with adults, that their needs for stimulation and affection are met, society also has a major responsibility.

What happens to children who have no parent or primary care giver or to the child whose parents are already overstressed, addicted to drugs, or who do not know how to care for their children? Their chances for normal development are slim indeed. Yet we know now that early childhood development programs can meet a child's basic development needs, serving as a catalyst for social as well as individual change. Besides fostering proper development of a person's intelligence, early-intervention programs have positive long-term effects, research has established, on school progress, on the development of personality, on social behavior and later on, on economic productivity.

The difference between the state of the *art* in early childhood development and the state of the practise constitutes another of those great unconscionable gaps. Our knowledge about human intelligence and how to *nurture* it has made tremendous strides in recent years. Yet our actions in meeting the developmental needs of our young operate out of a level of awareness which was transcended decades ago.

But has not the Church recognized the divine nature of our responsibility toward all human beings? "What you do unto the least of these you do unto Me, and what you do unto Me, you do not unto Me but to the One who sent Me," Jesus told us. He also rebuked his overly protective disciples and gathered the little children to Him, insisting that "the Kingdom of God belongs to such as these."

Meeting the developmental needs of children is an absolute prerequisite for people to reaching their potency. The responsibility to ensure that these needs are met should belong to all of us, society. The World Summit for Children, held six weeks ago in New York, gathered more world leaders (among whom, importantly, was His Eminence Cardinal Casaroli) to discuss issues related to children, than have ever come together to discuss any topic in history. This gathering of 71 heads of state and government was an affirmation that the primacy of responsibility towards children *fundamental* to all of the great religious and spiritual traditions now extends beyond the obligation of the parents of the child to be an obligation of all society, including the family and the state.

The convention on the rights of the child establishes the obligation of the state to meet children's needs. This convention *came into force* in September after a more rapid process than any human rights convention in history and with the Holy See among those first to ratify it before it came into force. Increasingly, that sense of obbligation is extending to the world community of nations, as evidenced by the world summit, and to all factions and sectors of society. Transcending its detailed provisions, the convention embodies the fundamental principle that the essentials of child survival, protection, and development should have *a first call* on society's concerns and capacities. Children should be able to depend on that commitment in bad times as well as good, in times of emergency as well as in normal times, in times of war as well as in times of peace, in times of recession as well as in times of prosperity. This principle is the foundation for the arch of protec-

tion which could now be constructed over the great majority of the world's children. So important is this that, in UNICEF's view, *it should come increasingly* to influence the direction and nature of progress in all nations over the next decade and beyond, and to be frank, we must say that looking back over even recent decades, most societies have tended to treat vulnerable children and mothers last, not first. This is the *turnaround* that we must address.

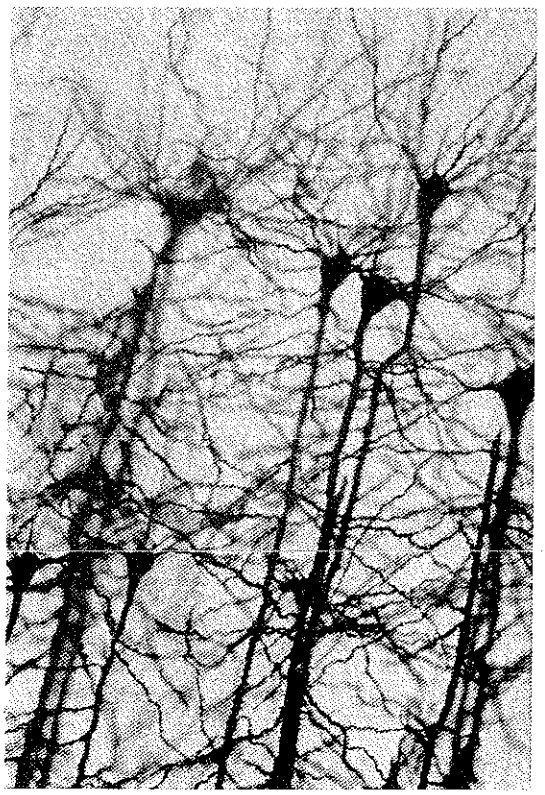
To you who have gathered in the Vatican at this conference on the human mind, you who understand so profoundly through your own religion what a child can be, to you I ask, If you do not speak out with word and action for those who have no voice, no possibility to act, if you do not take the lead, who will?

Before your eyes is that child to whom the meaning of reality is revealed, the child is held up to us as the key to the full realization of life on earth as divine promise incarnate. If you do not translate your profound appreciation for the full potency, the full promise of children, who will?

In conclusion, as we enter this final decade of the millenium, we may ask what more precious legacy could be left to the 21st century than the full, healthy development of those people who will comprise the societies of the future, that is, the children of today, and never before has any civilization done this for its total population. Perhaps there is a greater gift, but it will be given to the same efforts. We will have *crafted* the gift if the civilization which we are now becoming, which we are molding through our actions, takes for granted that the well-being of children is everyone's concern. If as a matter of course we put issues related to children high among our priorities at all levels of society, we will have *crafted* the gift: if our care and nurturing of all children spring naturally from a profound appreciation of the sacredness of life and of the most dear vulnerability of life as it manifests itself in the child.

It is quite a challenge to adult society, is it not, that total dependence of the child? Such a priority, a first call on society, will help ensure the well-being of children for generations to come, and it will offer evidence that we are progressing as a more just and humane civilization.

JAMES P. GRANT
Executive Director of UNICEF, New York, USA



CARLETON GAJDUSEK

The Life of the Mind*

The name amyloid refers to an extra-cellular fibrillary precipitate that fills the core of the plaque: they have been recognized in the human brain for almost a century.

Older brains often have many of these plaques, but they are never seen in the brains of children or young adults. They simply are a nonexistent pathological phenomenon in childhood and early adult life, but by 65 years of age, ten percent of us have plaques like this in the brain, in the brains of healthy people, not demented people, people whose brain is taken at autopsy because of neurological disease.

The word amyloid refers to a substance given a name almost 100 years ago by German chemists who were referring to a very insoluble protease enzyme resistent substance which they saw in the body between cells, usually outside of cells. It was very hard to dissolve, and therefore, they could not study it very well. They mistakenly called it *emilslide*, using the *emil* prefix referring to starches and polysaccharides. It turned out in later decades that the mistake was based on their failing to realize they were all proteins, body proteins, changing their configuration with time because of interference with their normal rate of *turnover* or long sequestration into a different configuration which allowed them to polymerize into inert substances not cleared by the body's inflammatory mechanisms.

The name amyloid was also restricted to substances that stained with a dye called congo red and became red blue-green by *refringance*. That is because of a regularity in their molecular structure as it deals with the refraction of light, *particularly so* once stained with a dye, congo red.

They are made of fibrils, and they could not be seen by Lord Hoak's microscope nor Pasteur's; they are only visible by the electronic microscope and they are about, 49 angstroms in fibulary size, and they sometimes are straight.

As previousli stated, ten percent of us healthy people have plaques at the age of 65. Twenty percent at the age of 75. Forty percent at the age of 85. Seventy percent at the age of 95, and what is never seen is a centenarian's brain without them. They are a universal human phenomenon.

In those best preserved, still Mozart playing, still chess-playing, still jogging nonogenarians who die while jogging, perhaps.

In addition to that we have neurons that have a precipitate inside them, called a neurofibrilary tangle. They are made of fibers, and these fibers have peculiar properties. They are called *perilicle* filaments that double, they have 80 angstrom periodicity in their twist, but they are amyloid, and surrounding them is amyloid in straight fibers, no neurofibrilary tangles have only these *perilicle* filaments, they have both kinds, they are inside neurons.

These are the structures of Alzheimer's, presenile or senile dementia. Without both of these structures, no neuropathologist in the world would agree with a clinician's diagnosis of Alzheimer's disease; he would dismiss it. All Alzheimer's disease patients have brains loaded with these two structures, more or less of one or the other.

One other phenomenon is the *birofringant* cup around smaller vessels of the brain. And this material is also amyloid, and 90 percent of Alzheimer's patients have masses of this around their vessels, often causing small microhemorrhages because they make the vascular wall brittle, but in normal brains the figure is the same: 10 percent in the sixties, 20 percent in the seventies, 40 percent in the eighties *right on up to all of us in late life.*

This intracellular precipitate certainly doesn't belong in youth or middle life as previously said. We never see it. An extracellular precipitate with dead neurites, the fibers of brains filling it — sometimes it's a big regular one sometimes it's a more irregular mass — and then the cupping of vessels with the material. These are the three entities that characterize Alzheimer's disease. The great discovery in this field of our aging brain and Alzheimer's disease was *presaged* by Colin Masters and his group and Glenner in California and Colin from Australia and work with Beireuter in Germany. When they found that the aminoacid sequence of the chemical that makes that amyloid in all three places, inside the cell, outside the cell, and around vessel walls, was a polypeptide, and they sequenced it.

It was very exciting for us to realize they were all the same. We always thought they might be different phenomena. They are all made of the same *building block*. In fact, it's a 44 aminoacid polypeptide which has no *bicosselation slide*. Our biochemists can synthesize it in the laboratory and they do, so the question was where it came from,

* This lecture was transcribed from a tape recording without having been reviewed by the author

and in our laboratory and in four other laboratories around the world in the last decade we have cloned the CDNA for the precursor protein that leads to this amyloid and found it is a protein conserved in nature with almost no evolution. It is present in lobster as it is in snake and it is present in all mammals from bird and reptile and fish to man and it is one of the best conserved proteins in the world, showing the least evidence of evolution with only a few aminoacid differences between man and mouse and mouse and guinea pig, and it's only a small piece of this protein, 42 aminoacids, that is *cleaved off* to make that abnormal deposit of aging. We have been trying to discover *where* the protein is watersoluble and what portions of the molecule are fat-soluble, whether or not it penetrates the membrane and passes through the lipid membrane around cells.

This led us to guess that the protein made a pass through the membrane. We were right.

And what we have learned is that this precursor is on chromosome 21 by using a radioactive probe to hybridize with the human chromosome, and it is *on the long arm of chromosome 21*.

It is on chromosome 16 in mouse, and then when we do what is called inside hybridization, we look for the *message RNA* that that gene makes as it is expressed in the cytoplasm of a cell using a copy of it that's been *radiolabeled*, and it shows us that the neurons are filled with it.

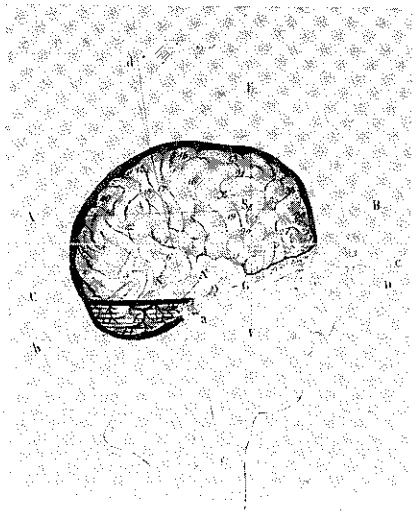
And so, in an Alzheimer's-diseased brain, we see that the *hypocampus* is the most affected part of our brain in terms of neuron loss with aging. We have very few cells left in Alzheimer's disease. In fact, 80 percent can be gone and in a normal aged 80- year-old, he has often lost 80 percent of them as well.

We have normal, healthy, *cognitively clear* people in their seventies and eighties who have lost more than 80 percent, and every cell left may have a tangle in it; what is important is thus the quality of the remaining neurons.

Now, let me say a few more things about amyloid as a molecule. Amyloid occurs outside of the brain with different precursor proteins behind it. In aging, it deposits in the heart muscle, in the heart conductive fibers, in the pancreas, in the liver, the spleen, the kidney, but the proteins that lay down that amyloid are different from those that do so in the brain, and the precursor one in the brain is unique. We have found that it actually is a protein we call *proteasemexin* 2, very important, as it sticks outside the cell for regulating cell stimulary factors, like nerve growth factor and endothelial growth factors. It couples with them and helps the cell ingest them and destroy them, making them a negative feedback loop and turning them off, so we suddenly have the reason why all cells of all animals have this.

But something goes wrong with it with age, and *massively wrong with it in galloping senescence*, Alzheimer's disease, that disease which affects one-half of us who reach our nineties, one-third of us who reach our eighties and get into mid-eighties, 20 percent of all people in the seventies in the world and about five or ten percent of those in the sixties.

It definitely puts a ceiling on how long we probably can live, how long our mind can have the machinery of our brain to continue functioning.



Second childhood has been a metaphor for aging for millennia in many cultures. Pre-literate aboriginal peoples of indigenous cultures on six continents have recognized this metaphor linguistically and in pantomime. Their children spontaneously recognize the return to childhood of the very aged kinsmen in verbal and in mime metaphor when first encountering it early in their lives.

It has been reiterated over the centuries in myth and legend, poetry, drama and scripture in most languages. We of science have belatedly sought to more explicitly define the universally observed decline of function in this return to childhood only in the past century, where the philosophers, physicians and poets of the ancient world all recognized it as the last phase of the human life span in more humanistic terms, slowing down, *bradicinesis*, decay in skilled abilities, restrictive ambulatory and other motor performance, decline in *mnemonic* and other cognitive functions, and finally a return to the dependency of infancy with loss of sphincter control and self-feeding ability, and even the assumption of the curl posture of infancy — these are what real old age has meant to most peoples. Those fortunate few who show little of this in their advanced years are said to be young.

In most species, biological evolution has genetically programmed the obsolescence of the individual after peak reproductive efficiency in the interest of *curtailing* nonreproductive mating and of preserving resources, especially food supply, for the still reproductively efficient young.

In the mayfly, this has been expressed in the extreme with *genetically programmed quick extracellular crystalline* and plastic fatigue *with age in hours* in the *kytin* hinge of the wings. Those who would defy the wisdom of the gods, from Orpheus and Prometheus to Ponce de Leon, Faust, and Dorian Gray, have not been more successful than the medieval alchemists in finding the elixir of life.

This is not a pessimistic message. Many religions have diverted our urge for immortality to life eternal

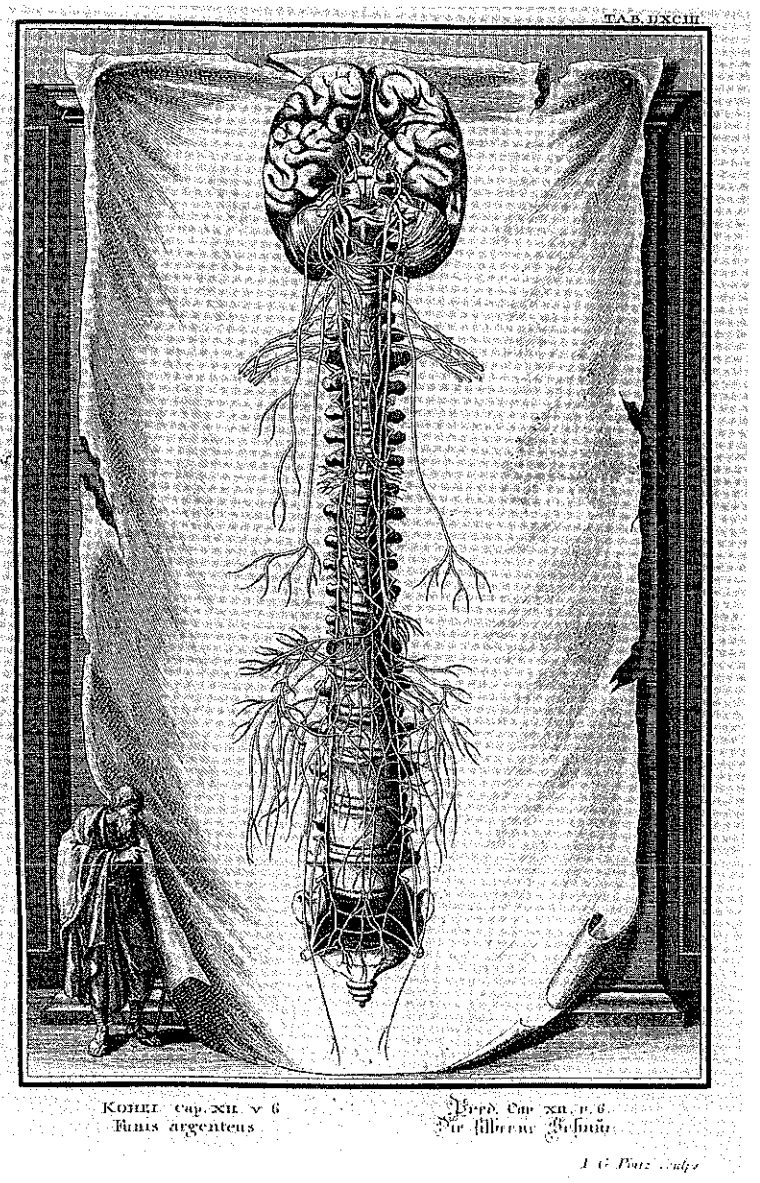
beyond the grave or to reincarnation. Even many primitive societies have their dead living in a world of spirits and ghosts. Only now do we find many who strongly resist leaving the world to the young, abandoning it to our children, *getting out of the way*. Never have the major religions of mankind adopted this stance.

Fortunately, the programmed senescence of our brain, has set a finite limit to our life of the brain, and all we can leave behind besides ashes is the reduction of entropy in the products of our loins and minds.

Greedy modern man has recently wrung more than three decades of life expectancy granted him in man's first million years on earth, which was sufficient for the accomplishment of an Alexander, a Mozart, and a Christ, but fortunately for our children, the gods have not deigned to grant much over a century even to their most favored in the past, today, and probably ever.

Confronted by this knowledge of the transience of his mind, man has responded to this mystery of the finite life of his brain with some of his finest works of art in word, in song, and in deed.

Prof. CARLETON GAJDUSEK
Nobel Prize Winner in Medicine, Director of the Laboratory for Studies of the Central Nervous System at the National Institute of Health, Bethesda, USA



HIROSHI NAKAJIMA

Epidemiology of Mental Disturbance Around the World

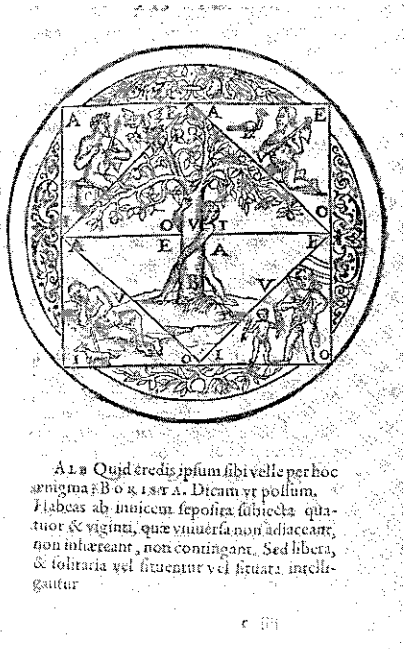
Mr Chairman, Your Excellencies, Monsignori, distinguished guests, ladies and gentlemen,

Once again you have honoured me, Professor Marini Bettolo and Archbishop Angelini, by inviting me to attend this fifth international conference. The programme has been of greatest interest. I only regret that I have not been present throughout. I commend the Pontifical Council for Pastoral Assistance to Health Care Workers and the Pontifical Academy of Sciences for having selected a theme — " the human mind " — of such importance to all humanity; a theme that has received much less attention than is its due.

The image of the human being, and what constitutes well-being, can be explored and defined by the mind of man. For the *inquiring human mind* is the instrument that seeks knowledge, sculpts our high ideals, expresses human values, and provides our sense of enjoyment or of suffering in life — our vision of the world. It can define illness and it can define health.

However, the Constitution of the World Health Organization states that health is not merely the absence of disease or infirmity; it is " a state of complete *physical, mental* and *social* well-being ". It is not possible to have one without the other two. It is the equilibrium of all three that constitutes " health ".

The Constitution also calls on WHO " to foster activities in the field of mental health, especially those affecting the harmony of human relations ", and " to establish and maintain epidemiological services "; in short, to seek to understand the conditions of mental disturbance, to deal with cause and consequence, and to promote " health " in its fullest sense.



A 1 a Quid credis ipsum sibi velle per hoc ænigma? B o s i s e r a. Dicam vt pollum. Habeas ab inicem sepositas subiecta quatuor & viginti, quæ vniuersa non adiaceant, non inhæreant, non contingant. Sed libera, & solitaria vel fituentur vel fituata intelligantur

While WHO is concerned with the full range of technical and social issues relating to health, I shall focus my remarks today on the epidemiology of mental disturbance around the world. I shall speak first about the epidemiology of mental disorders, and about the challenge they represent for health services and for society. Then, I shall briefly refer to the size and nature of our tasks, in relation to the psychosocial aspects of health and illness.

The most significant result of epidemiological research on mental disturbance in recent years has been the discovery that mental disorders are both *frequent* and *ubiquitous* in all populations. Many professionals and lay people find this difficult to believe. Yet, a multitude of well-designed epidemiological studies have provided convincing evidence that no nation is spared mental illness, and the frequency of mental disorders is much higher than is generally believed.

The number of persons suffering from the most severe mental and neurological disorders is estimated at about 300 million (Fig. 1). Of these, some 55 million suffer from schizophrenia and 40 million from epilepsy. The number of people affected by severe depressive and anxiety states, and severe disorders of conduct and personality, in other words affective disorders, is estimated to be 110 million, or 37% of the total of 300 million. Dementias account for 32 million. Some 11 million are mentally retarded. At least 52 million are addicted to alcohol and drugs. Not included in this chart are the numbers of persons with milder forms of emotion-

al disorder and mental retardation, and other less severe forms of mental illness.

No group of illnesses causes more difficulty for epidemiologists than mental illness. This is because of the difficulty of definition, the difference in perspective of different observers, and changes in both over time. Throughout history, insanity has been variously viewed as a manifestation of the divine, or outright possession by evil spirits. The judgement placed on behaviour is closely related to the culture and tradition of society, which vary in place and in time. Much of what, in this liberal age, is accepted behaviour was considered psychopathic at the turn of the century. Even now, the nature of mental illness is not always fully understood, and the stigma has not been totally removed; therefore, mental illness tends to be underreported, or not reported as illness at all.

In our time, mental illness has been attributed in the extreme to entirely psychological, or entirely physical, causes. In addition, confusion in terminology and criteria has made it difficult to assess the implications of many studies at different points in time and place. No doubt biological, social and cultural factors all play a part.

Schizophrenia is an example of a major mental disease of major public health concern, which has been subject to various interpretations, and is assumed to vary widely in incidence between different nations and populations. What are the epidemiological facts?

In the results of a WHO study conducted in different cultural settings, in selected cities, in seven countries — Denmark, India, Ireland, Japan, the USSR, the United Kingdom, and the USA, in spite of great differences in the socioeconomic and cultural conditions of these countries, the incidence of schizophrenia is not significantly different (Fig. 2). This raises very important questions concerning its etiology. In the study, a set of standardized instruments was applied by investigators who had been trained together. They thus achieved a high level of reliability in their assessment of the symptoms of mental illness. Without this, differences due to the style and the cultural and educational background of the interviewer would probably have become apparent. This point is illustrated by the incidence rates which would have been obtained had the psychiatrists' own unstandardized diagnoses been used.

The study which led to these findings about schizophrenia, and other epidemiological studies in different parts of the world, have contributed to awareness of the differences that can be expected if instruments developed for work in one culture are used uncritically in another. Such studies have also led to advances in the development of techniques for assessing the mental state, and the determinants of mental illness. For example, WHO has helped to develop a series of instruments and interview guides, in equivalent versions, in a variety of cultures.

We shall now refer to instruments developed by the WHO mental health programme over the years and the numbers of countries in which they were tried out and adapted for local use in the idiom of the population (Fig. 3). We have instruments for the assessment of mental state, disability and social environment, and also methodologies for screening for mental illness, and guidelines for clinical diagnosis. Other instruments have also been developed by investigators wishing to compare results and pool data. As a consequence, it is possible today to develop collaborative work when the nature of the scientific question requires comparisons of data obtained in different cultures, or when joint work is desirable for other reasons.

The application of these instruments has also led to discoveries of major importance for planning health services and for training. For example, a comparative follow-up study of schizophrenia has shown that patients with similar clinical pictures at the point of inclusion in the study, in fact had significantly different disease courses and outcomes over the years that followed.

As for the course of the disease over a period of five years, in patients from developing, compared with developed, countries, outcomes were categorized as excellent, medium or poor, depending on degree of remission or recurrence (Fig. 4). What is remarkable is that the patients in the developing countries, namely Colombia, India, and Nigeria, had, on the whole, a

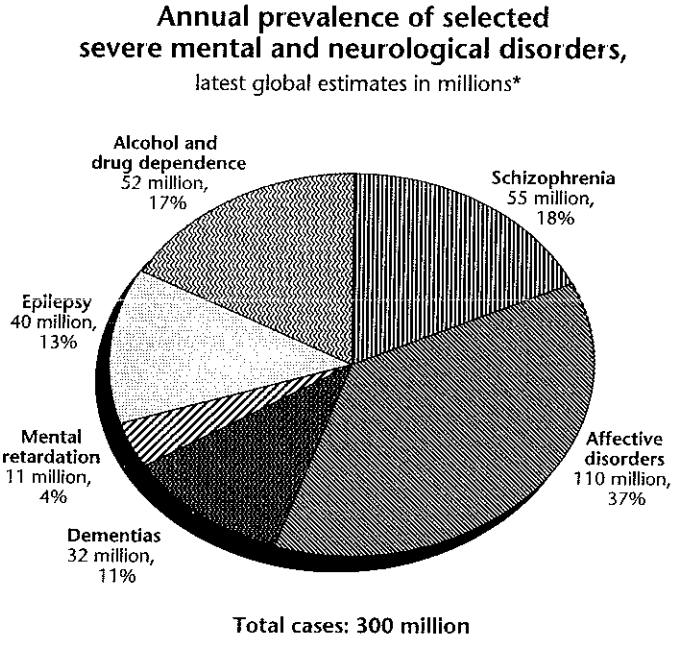


Fig. 1

significantly better outcome than patients in the developed countries, such as Czechoslovakia, Denmark, USSR, United Kingdom, and United States of America, in spite of their similarity at the start of the study. The reasons for this difference are not completely clear. A variety of follow-up studies are being undertaken to try to find the answers. Are there aspects of older cultures, sacrificed in the name of industrialization, that we should make every effort to resuscitate?

It must also be kept in mind that evaluation of the course of mental illness and assessment of interventions are modified or mitigated by the nature and perspective of health service personnel and systems in different cultural settings. This underlines the importance of educating psychiatrists and other health personnel in mental health epidemiology and the wider cultural and other factors that have to be taken into account.

While some mental disorders show invariance between settings, others do vary in frequency in different cultures. Dependence on alcohol and narcotic drugs is a good example.

There is an inverse relationship between cocaine dependency, on the one hand, and opium/heroin, on the other. This can be due to a number of factors, including geographical proximity to production sites, as well as prevailing cultural and low enforcement practices.

It has been well established, in studies carried out in various parts of the world, that a significant proportion of patients who consult doctors seemingly for physical complaints have in fact underlying psychological problems.

Estimates derived from studies in different geographical areas vary between 11% and 46%; that is, from one sixth to nearly one half of all contacts in general health care are because of psychological problems (Fig. 6). People who come to the general health services often meet practitioners, including doctors, who have had only superficial training in mental health or formal psychiatry. They therefore miss the diagnosis, fail to prescribe the appropriate medicine, or do not correctly follow up and control treatment. Or worse, a few may even harbour so much prejudice against the mentally ill that they provide more punishment than cure, or they fail to treat them altogether. In some developed countries, for example, it has been shown that only one patient with a mental disorder out of three receives a correct diagnosis and therapy from the general practitioner.

These figures are similar in both developing and developed countries. Perhaps contrary to expectation is the difference between these two groups of countries in the prevalence of mental disorders attributable to organic brain damage. Epilepsy, for instance, is several times more frequent in developing countries. In Europe, its prevalence ranges from 3 to 5 per thousand, whereas in several African countries the reported prevalence is 20 to 25 per thousand. The greater frequency of organic brain damage in the third world is due to inadequate perinatal care, the multitude of parasitic and infectious diseases affecting the brain, and the prevalence of malnutrition. While such findings need further investigation, they point to significant possibilities for preventive action, by means of the appropriate education of general health care personnel, design of health systems with full community participation, and provision of other appropriate measures at affordable cost.

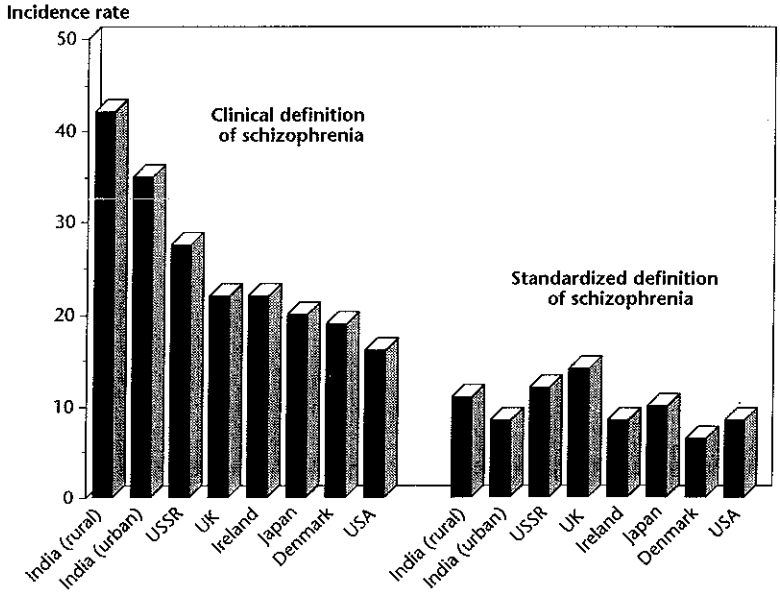
What is the socioeconomic burden of mental illness on productive life expectancy in a typical developed or developing country?

The seventh figure shows the distribution of years of life lost due to premature death (defined as death before the age of 60 years) from ten leading causes, for a developed and a developing country, that is, for Germany on the left-hand side of the screen and for Mexico, on the right-hand side. The leading causes of death include infectious diseases, cardiovascular diseases, cancers, accidents, homicide, suicide, and so forth. The shaded area, which you see spiralling around in the two pie-charts, indicates the proportion of the estimated loss due to neuropsychiatric and psychosocial causes.

The enormous loss, in total figures, can be further illustrated by focusing on one of the leading causes of death mentioned in the chart, namely suicide, as shown in the eighth figure.

Suicide is closely associated with mental illness. It is likely that some three-quarters of all suicides are di-

Incidence rates per 100 000 population aged 15-54 (both sexes) in selected cities in indicated countries for the "clinical" and for the "standardized" definition of schizophrenia



Source: WHO Study on Determinants of Outcome of Severe Mental Disorder (1986)

Fig. 2

rectly caused by a mental disorder. The number of people who have committed suicide (often linked to a treatable mental disorder such as depression) demonstrates yet another cause of damage to society from mental disorder. It causes suffering, isolates people because of the stigma attached to it, and leads to economic loss and disability. It also contributes to premature death in alarming proportions, especially in certain vulnerable age groups, including adolescents of both sexes, and late-maturity (pre-senile) adults.

Mental health programmes also have to deal with other psychosocial problems of a still more ill-defined nature, such as (1) general malaise in some populations, (2) the demoralization of communities, and (3) the " burnout " syndrome in health workers, especially those providing intensive care, and in schoolteachers, social workers, and others. These problems cannot be readily measured by the traditional epidemiological methods employed in psychiatry. Measuring and understanding these problems, and the wide psychosocial dimensions of life, require an active alliance with social scientists and others, aimed at strategies for action adapted to the culture and the times in which they are applied.

Figure 9 shows projections for the increase in cases of senile dementia between 1975 and the year 2000. But, in fact, projections of current trends of the numbers of people with mental illness are generally gloomy. It appears that mental health problems will increase drastically, driven by population expansion and growing numbers of the elderly, urbanization, destruction of the environment, economic crisis, complexity of social structure, and inability of individuals, communities, and social services to cope.

Is this to be our accepted fate, or is it because we live in a transitional culture and environment? Look at how young people take easily to using a modern computer, compared with the reserve with which older persons approach the same instrument. Future society will be even more complex, with more competition for space, as well as economic and social and resources. But mankind should be able to adapt and

WHO instruments for epidemiological, clinical, biological and diagnostic studies

Area of assessment	Number of countries in which instrument was tested and adapted
Assessment of mental state	
• overall	+ 40
• depression	10
• dementia	7
Assessment of disability	10
Assessment of social environment	10
Screening for mental illness	25
Guidelines for clinical diagnosis	+ 40

Fig. 3

Outcome of schizophrenia in Field Research Centres (FRCs) in developing and developed countries

Group of field research centres	Outcome of schizophrenia		
	Excellent	Medium	Poor
Developing countries	28%	13%	59%
Developed countries	9%	17%	74%

Definition of outcome after five-year follow-up period:

Excellent: Full remission of episode of inclusion, or remission with mild remaining symptoms, no further episodes.

Medium: At least one subsequent non-psychotic episode, but no psychotic episode

Poor: At least one subsequent psychotic episode

Source: International Pilot Study on Schizophrenia (1990)

Fig. 4

evolve. I am optimistic that the future will be less stressful for our descendants.

Developments in molecular biology, for example, have allowed us to probe even deeper into the basic components of life. Advances in imaging technology have allowed us to see vital processes taking place within the living body. Specific biochemical and genetic defects underlying many current mental disorders will be determined, allowing us to develop modifying and corrective measures. Similarly, new knowledge, such as the delayed effects of "slow" viruses on mental functioning, the role of genetic factors, and the cause of Alzheimer's disease, together with advances in pharmacology and pharmaceutics, will result in new classes of drugs and improved therapeutic strategies. It is hoped that these will do much to dispel the gloomy predictions of mental illness for the future. Many of the solutions are at hand, and need not be costly, but they do require the skills and the patience to counsel, educate, and lend human support.

At the same time, we must continue to seek a fuller understanding of the human mind, while respecting the basic principles of human rights. Every human being, whether mentally or physically ill or healthy, is entitled to consideration, personal respect, participation in decision-making in accord with capabilities, assurance of benefit, avoidance of suffering, and fair treatment in a spirit of equity and social justice. Tolerance and mutual support must characterize the health programmes of the future.

We have reason to be optimistic about this. An increasing number of governments are awakening to the necessity, and the urgency, of developing mental health strategies, programmes and capabilities, as integral parts of their overall national health development strategies. They are doing so in order to enhance the quality of life of their citizens, and not merely to provide security, or protect society or a particular form of government. There is a revolutionary increase in the information being exchanged about ways of managing mental illness in different countries. Facilitating the exchange of such information between countries is one of the paramount func-

Drug abuse reported to United Nations by selected countries or areas (1988)

Country or area	Rate per 100 000 population		
	Cocaine	Heroin	Opium
Argentina	626 4	–	–
Chile	119 7	–	–
Ecuador	283 0	–	–
Mexico	108 4	32 3	–
Hong Kong	–	–	57 0
Malaysia	–	–	145 0
Myanmar	–	95 8	–
Philippines	0 3	–	39 6
Singapore	–	336 6	16 8
Sri Lanka	–	206 0	–
Thailand	–	100 3	108 7
Iran, Islamic Republic of	–	273 3	911 0
Pakistan	–	378 7	210 4
Austria	–	35 0	55 0
Canada	40 8	3 9	11 5
Italy	0 5	349 1	–
Spain	103 6	146 2	–
UK	1 6	29 6	1 2
USA	5,012 3	202 2	–
USSR	–	0.7	10.8

Source: Commission on Narcotic Drugs E/CN 7/1990/14. 2 January 1990

Fig. 5

Psychological disorders in general care services

Estimates from standardized interviews, various years in 1980s

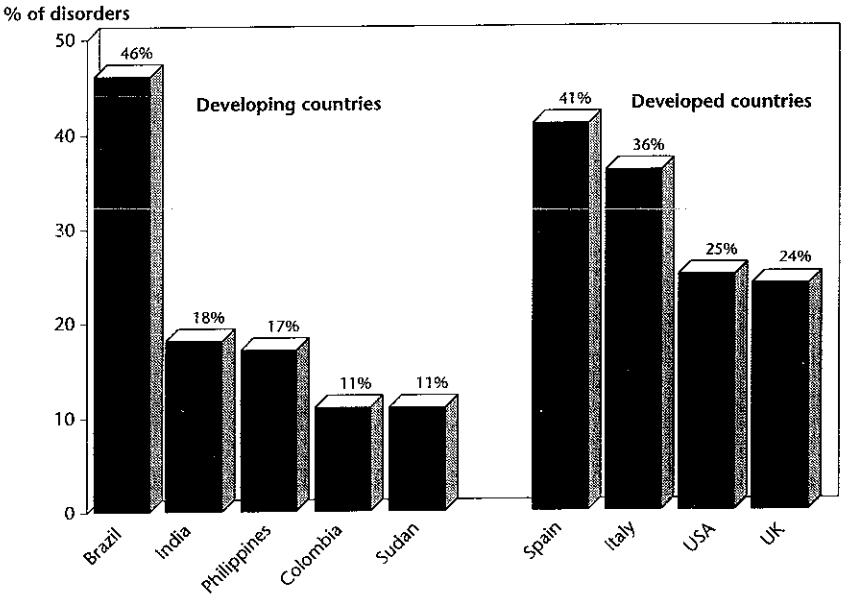


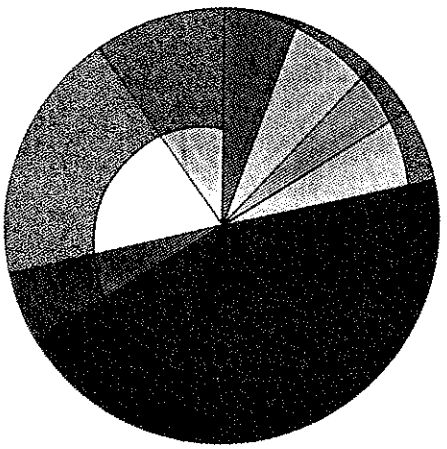
Fig. 6

FIG 7 MENTAL HEALTH AND PREMATURE MORTALITY[a b]
SANTÉ MENTALE ET MORTALITÉ PRÉMATURÉE[a b]

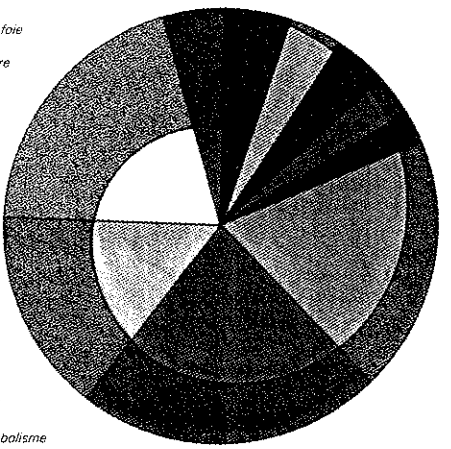
Percentage distribution of years of life lost due to premature death from the ten leading causes[c], ordered by importance of neuropsychiatric and psychosocial contributions

Répartition en pourcentage des années de vie perdues en raison des décès prématurés imputables aux dix principales causes de mortalité[c], par ordre d'importance des contributions neuropsychiatriques et psychosociales

An example of a developed country (Federal Republic of Germany)
Exemple de pays développé (République fédérale d'Allemagne)



An example of a developing country (Mexico)
Exemple de pays en développement (Mexique)



- Chronic liver disease and cirrhosis / *Maladies chroniques et cirrhose du foie*
- Diseases of pulmonary circulation / *Maladies de la circulation pulmonaire*
- Diseases of the respiratory system / *Maladies de l'appareil respiratoire*
- Ischaemic heart disease / *Cardiopathies ischémiques*
- Congenital anomalies / *Anomalies congénitales*
- Perinatal conditions / *Affections périnatales*
- Malignant neoplasms / *Tumeurs malignes*
- Accidents / *Accidents*
- Suicide / *Suicide*
- Homicide and other violence / *Homicide et autre violence*
- Cerebrovascular diseases / *Maladies cérébro-vasculaires*
- Infectious and parasitic diseases / *Maladies infectieuses et parasitaires*
- Endocrine and metabolic diseases / *Maladies endocriniennes et du métabolisme*

Indicates rank by contribution from neuropsychiatric and psychosocial disorders / *Importance de la contribution des troubles neuropsychiatriques et psychosociaux*

[a] See text pp. 24-28. / *Voir texte pp. 24-28*

[b] Defined as death before age 60 years based upon 1981 mortality statistics / Décès avant l'âge de 60 ans d'après les statistiques de mortalité de 1981

[c] See table p. 25 for a description of ICD rubrics. / *Voir tableau p. 25 pour la description des rubriques*

Source: Based on data available to WHO. / *D'après les données à la disposition de l'OMS*

WHO 881422

Fig. 7

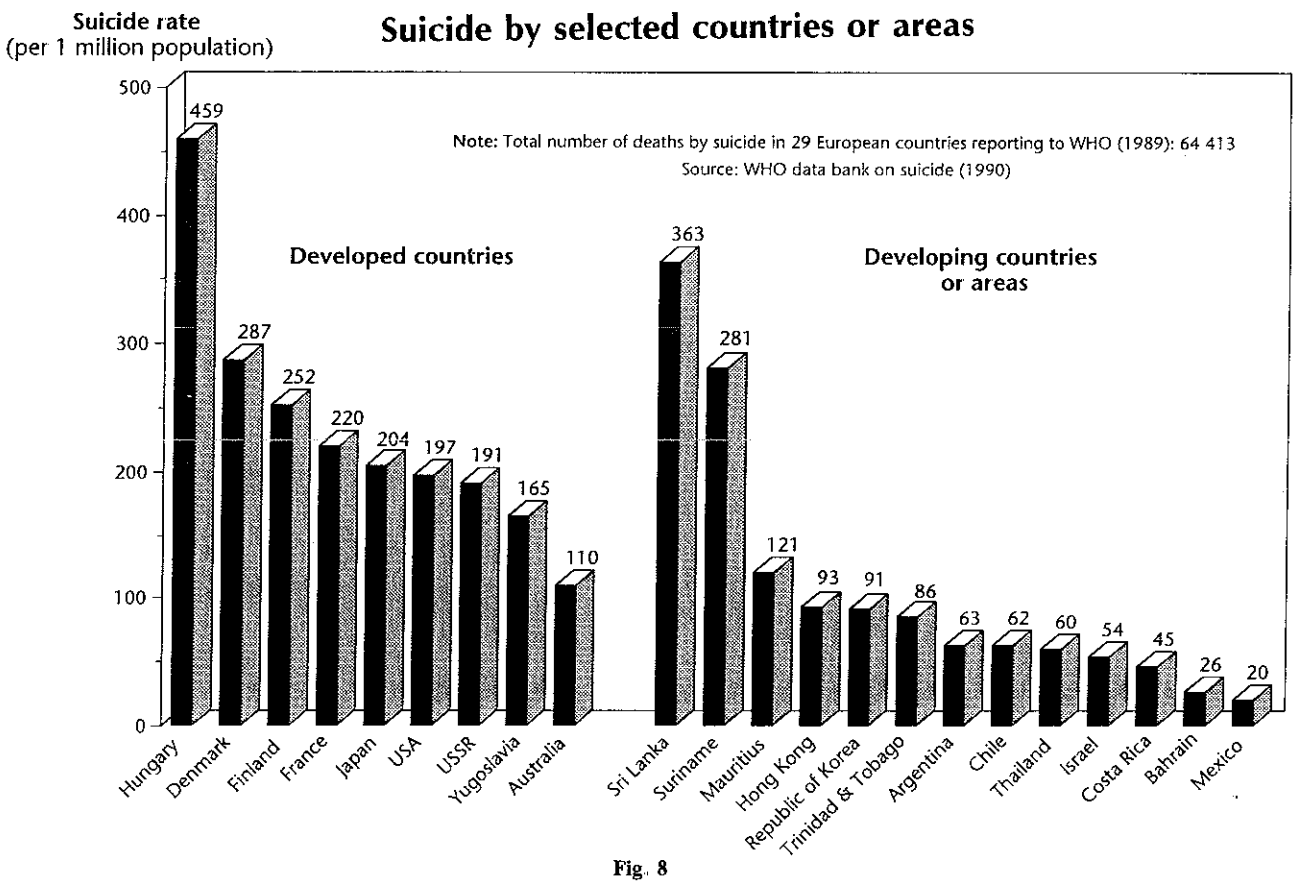


Fig. 8

tions of the World Health Organization.

On our way to a better future, epidemiology provides us with valuable tools for measuring progress, and gives us various options for the solution to problems. The social sciences, including anthropology, can help us to understand the meaning of the changes that occur. With goodwill and wisdom, I am sure we shall move forward. However, the energy for such progress has to come from deep within ourselves, from our inner conviction that the goal of promoting mental health and harmony in human relations, " in our image and likeness, " is achievable.

Dr. HIROSHI NAKAJIMA
Director-General, World Health Organization

Effect of population changes between 1975 and 2000 on cases of senile dementia on a given day

Age group in years	Percent change 1975 - 2000	
	Developed countries	Developing countries
65 – 69	24	99
70 – 74	43	112
75 – 79	53	121
80+	65	138
Total 65+	**54**	**123**

Source. M. Kramer. Acta psychiat. scand. Suppl. 285, vol 62. 1980

Fig. 9

LOUIS W. SULLIVAN

Decade of the Brain

Archbishop Angelini, distinguished scientists and leaders, ladies and gentlemen

I am pleased to participate in this conference at the beginning of what promises to be a most remarkable time for the biomedical sciences — a time that holds nearly unimaginable promise for medicine and science alike.

We are embarked upon a quest to discover the solutions to some of the deepest mysteries facing humankind: to understand the processes of the mind and of the brain, and how their functions are related. Yet, in spite of overwhelming challenges, our knowledge about the brain is steadily expanding. Our biomedical research enterprise is one of the great achievements of our culture — a bequest of immeasurable value to future generations.

It is important — critical — that this exciting quest be presented, discussed, and debated before an international audience. But while we are examining the advances and challenges of brain research, we must not lose sight of the people who benefit from our work.

The people who suffer from stroke, from brain and spinal cord injury, from degenerative and neurogenetic diseases, from schizophrenia and drug addiction: these are the people for whom we are working; these are the people who desperately await our findings. We must never forget that our work is more than what happens in the laboratory; our work provides hope to people around the world for ultimate triumph over the frustrations and tragedies of disorders and injuries that impair the functioning of their minds and their brains.

However, the benefits of our work could not reach our patients with neurological and mental disorders without the help of health care professionals. I salute the physicians and nurses of the world who dedicate their time, their energy and their talents to helping the many people suffering from disorders of the mind and the brain. Our health professionals are the ones who witness the effects of such disorders first hand, and they are the ones who ultimately utilize our research findings to prevent, contain or treat disorders of the brain.

Medical professionals and research scientists alike know that many of the most urgent and compelling health problems in the United States and throughout the world are characterized by the conjoining of biology and behavior. I refer particularly to conditions such as addiction, AIDS, and mental illness, in which behavior and biology are melded through the mechanisms of the mind.

The urgency of these new developments has caused health research to take a position of higher prominence among world priorities. In the United States, President George Bush and the Congress have focused scientific and medical attention on the challenges posed by diseases and disorders of the central nervous system by declaring the 1990s as the "Decade of the Brain." In the U.S., and in the many countries with whom we are working, the next ten years will be dedicated to mounting a broad and intensive effort of the highest priority.

Our purpose is two-fold: first to *learn more* about the functioning of the healthy brain and to define the role of genetic linkages, and then to *use that knowledge* to find solutions to the major disorders that ravage the brain and the mind. Within the past year we have witnessed many great discoveries, and we are on the brink of many more.

As the neuroscience and biomedical research communities in the United States mobilize for this great endeavor, I recall an analogy by someone whose name seems particularly suited for this conference — Sir Russell Brain. He observed that "... if you look at a tapestry through a magnifying glass, you will see the individual threads, but not the patterns: if you stand away from it, you will see the pattern, but not the threads."

With the human brain, when we examine the nervous system, we are looking at the threads; when we explore the mind, we perceive the patterns. As we focus on learning more about one, we also increase our knowledge of the other. The recent explosion of scientific knowledge about neurological and mental illness has been profoundly influenced by major advances in the neurosciences, especially molecular neurobiology, imaging, cognitive neurosciences, neuropsychopharmacology, and molecular genetics.

In few other areas does our work hold such incredible potential as in genetic research. Our effort to map the human genome — to understand the information encoded on the chromosome — is a noble endeavor. The initiative, coordinated at the National Institutes of Health, is under the able direction of Nobel Laureate Dr. James Watson, the discoverer of the double helical structure of the DNA molecule.

Once completed, this gene map will be of inestimable benefit to

medicine. There will be vital information for the field of behavior and brain sciences; our progress has already brought us very close to being able to isolate and "correct" faulty genes, a procedure that opens the possibility of being able to treat or cure related neurological and mental disorders.

Success in these endeavors is dependent upon our using wisely the resources that we have available, and sharing the knowledge that we acquire. I should note that the proposals we have made for implementing the Decade of the Brain place a high premium on international collaboration.

The National Institute of Mental Health Advisory Council has proposed, for example, an International Neurosciences Trust to stimulate brain and mind research activities throughout the world. It would be designed to energize and inter-relate U.S. governmental neuroscience research efforts with private, philanthropic, and multi-national organizations such as those emerging from the European Science Foundation Programme and EC 92.

This Trust would better enable us to exploit the worldwide explosion of new knowledge and opportunities that have strained the capacities of governmental research support mechanisms in many countries. Scientific agencies and organizations are planning or have begun collaboration with our National Institutes of Health to establish or contribute to brain and mind research activities in the countries of Australia, Canada, Czechoslovakia, and Ecuador, and in Germany and Hungary, here in Italy, and in Mexico, Spain, and Venezuela.

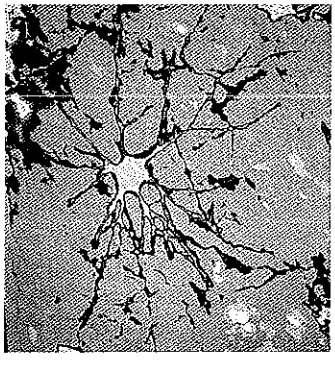
We also encourage international collaboration in the related fields of molecular genetics and neuroimmunology; the cooperative effort of Japan, Europe, the U.S. and other nations could produce monumental — *fantastic* — laboratory results.

Ninety percent of what we know about the brain we have learned in the past ten years. In the next ten, we can expect that knowledge to expand exponentially. This expanded research effort holds out promise for *conquering many mental and neurological illnesses within this decade*. Extraordinary discoveries are ahead, possibilities only dreamed about by past generations of scientists and physicians on whose shoulders we stand today.

But success in these endeavors depends on using all the resources available to us, including computer program simulation and use of animals in research. Use of animals in research, as you are all aware, has become especially contentious. The United States is strongly committed to the *humane use* of animals in research. But animal research is a critical, integral component of our biomedical research enterprise. We need the vigorous world-wide support of scientists and of world leaders on this crucial issue.

In the 1990s, animal rights extremists constitute a clear and present danger to developing knowledge that is directed to the betterment of human health. In equating to animals rights traditionally reserved for humans, these activists pose a threat not only to research but to the vitality of the human spirit.

Religious institutions cannot remain on the periphery in this struggle. The religious leaders of the world possess the authority and voice to affirm the necessity of appropriate and humane uses of animals in biomedical research. Any assertion of moral equivalence between humans and animals is an issue that organized religion must refute vigorously and unambiguously.



As policy makers and as scientists, we must continue to support basic biomedical research for the primary purpose of expanding our knowledge of human biology. As history has shown, basic research has often led to discoveries with far-reaching implications for many diseases.

The foundation of our knowledge about disorders of the brain and nervous system is built upon *basic research in the neurosciences*. To continue such remarkable — *astounding* — clinical successes as we are witnessing now, we must maintain our focus on basic research which later leads to clinical applications.

This premise is well-demonstrated in brain science: molecular genetic techniques that did not previously exist have enabled us to identify the location for genes associated with Huntington's disease, familial Alzheimer's disease, manic-olepressive illness, and neurofibromatosis.

As for the United States, we are committed to actively pursuing continued scientific research. In keeping with his declaration of the Decade of the Brain, I am pleased to report that President Bush is a strong supporter of biomedical research, and *earmarked* $8.1 billion for fiscal year 1991 to fund such research through the NIH, and more than one billion more for research supported by the Alcohol, Drug Abuse, and Mental Health Administration.

At the National Institutes of Health, we have already begun work on significant projects putting to use our new knowledge on the brain. We have established a National Gene Bank for Mental Illness and a central computer system for storage of clinical and pedigree information, and we are designing research programs in the neurobiological mechanisms of HIV and AIDS dementia complex, child and adolescent mental disorders, and molecular genetics.

With these terrific advances and new-found abilities come difficult decisions, and the challenges and responsibilities we will face during the next few years will be no excep-

tion. In brain science, and in our clinical studies of mental and addictive disorders and neurological illness, we are addressing some of the most complex questions ever raised in medicine, and perhaps ever in human experience. The work ahead of us will be painstaking, demanding, competitive, often controversial, and always urgent.

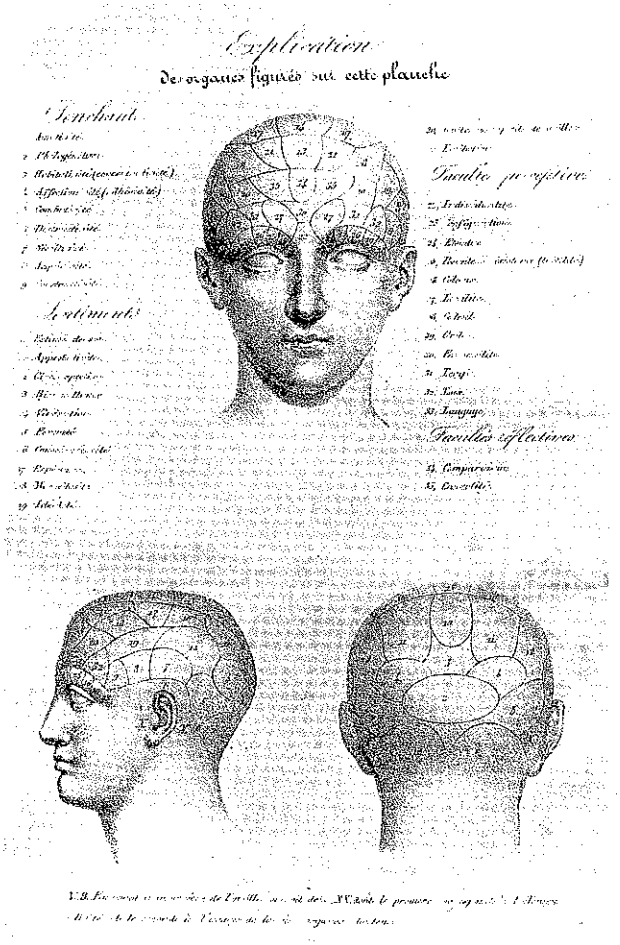
Formidable challenges will stand in the way of progress — challenges that will test our ingenuity and our perseverance. We will also face difficult questions and tough decisions in health care, science policy, and resource allocation. And we will face very serious ethical questions. As we search for answers, all of our beliefs and values will be challenged — for scientists, patients, physicians, philosophers, and policymakers alike.

But in spite of the inevitable arguments and controversies, scientists world-wide need to maintain their dedication to research. I need not remind you that the hopes and the health of millions of people throughout the world are riding on your findings and on your work that will follow this conference.

I am confident that we can handle any challenges that we meet. With the attention of our countries and the efforts of our scientists focused clearly on achieving our goals and improving the lives of millions of people, we cannot help but succeed.

I feel very certain that we are coming closer to the day when we will be able to touch Sir Russell Brain's vision — when we will understand the intricacies of how the threads of the brain are woven together to create " l'esprit humain " — when we will understand the remarkable organization of the human mind.

Hon. LOUIS W. SULLIVAN, M.D
Secretary of Health and Human Resources, USA



ANDRÉ FROSSARD

Intelligence and Transcendence

Man is an animal who feeds on transcendentals, my excellent master Aristotle said, which amounts to asserting that man is about to die of hunger: the One, the True, the Good, the Beautiful, etc. are now incapable of being perceptibly grasped in the deep cultural silence that has been spreading over us for some time.

The Beautiful was the transcendental of monarchy, honor, the word given, nobility (including that of one's sentiments), chivalry, courtly love (I am, of course, speaking theoretically). We French decapitated this transcendental under the Terror and have not seen it again since then. We replaced it with the Good (still speaking theoretically), under its pseudonyms of Freedom, Equality, Fraternity, etc. — this reign lasted for a hundred years, before yielding its place to the One, which is the transcendental of collectivism, public life, and social and urban standardization: this is the One which a short time ago burst apart in the East. It must be noted that these transcendentals are gathered together only in God. On earth they divide and pitilessly wage war on each other.

The True, which has its chance, which has never been of use in politics, remains, but runs the risk of arriving too late.

Before starting to explain this disastrous diagnosis, allow me to pay homage to the experts who have spoken here this week and who fully justify the lofty place our modern society grants to Science.

For scientists, today, are utterly alone when it comes to putting into practice three virtues unfortunately abandoned by other men, including Christians, which are Attention, Objectivity, and Humility.

Our contemporaries are incapable of attention, and their weakness can be excused in a number of ways: everything deafens them — the rumble of airplanes, cars, and uninterrupted political speechmaking; the mass media parade before their eyes a succession of brief images of equal duration, whether it is a question of a war, a flood, the latest song by the latest hit singer, a volcanic eruption, or models displaying high fashion, without its being possible for the unfortunate spectator of this relentless continuum to halt the pace of the images to meditate, if only for a second, on what has been flashed before his eyes with the speed of a conjuror. Only in this way can silent attention, that essential condition for the exercise of intelligence, be practiced in the midst of city traffic jams, or laboratories, where it arises in the company of objectivity, another unknown virtue wherever it is regarded as an impossible exercise.

I affirm that objectivity is a virtue and deserves to be considered as such to the extent that it assumes a real departure from oneself, a genuine stripping of oneself, according to the meaning this term had in the past in contemplative monasteries. Objectivity is difficult, but not absolutely impossible, and without it researchers would never discover anything.

They would not even make the slightest discovery if they lacked sufficient humility to let the microbe and the other little animals enchanting their gaze express themselves; and it may be asserted that all wise men are humble *in the pres-*

ence of the discoveries to which they will give their names.

Having thus paid this tribute, I turn to the subject of intelligence and transcendence which has been proposed for me, in the manner of a required figure in a figure-skating contest. While reflecting on it, I realized that man was lost.

Oh, you can certainly conclude that this is not a moral condemnation that I am hurling in the face of man, which, in the final analysis, would fall upon myself. I am not casting him into hell, where I myself would be forced to follow — if not precede — him.

He is probably not worse today than he was in other times, though this century of ours has been especially fertile in massacres and has often — at Auschwitz, for example — given lessons in cruelty to all the devils of darkness, and in spite of its having shown no mercy to its children, tossed down the throats of the crematoria or gotten rid of with no scruples today, while the fact that they have not yet been born is invoked as an excuse.

All of this is in the order of sin, and I am not a judge; nor do I have the vocation which creates public prosecution. In all that I deplore, in all I denounce, I well know that I have my share in responsibility, by virtue of that communion of sinners to which I belong, as my readers seldom miss the opportunity to point out to me.

When I say that man is lost, I mean that he is lost like a chick in the forest lacking even a grain of white rice to indicate its path. He does not know where he is going or where he has come from.

In other times intelligence was of service to man for the purposes of reflection. But since the fatal "I think; therefore, I am" of Descartes, it has been of use to him only to reflect about himself; and what he perceives — or, rather, what he guesses — beyond the variegated appearances and illusions his reflection proposes to him is the part of nothingness from which he has arisen and towards which kind psychologists help him to return on a compulsory basis.

Intelligence and transcendence have dialogued for a long time in that strange entity we call spirit, about which we have frequently heard remarks in this very place

and which is perhaps nothing but an aptitude for the divine, a pure potency resulting from our physical organization which becomes an act through contact with God — or with Charity, which is another name for his Person.

The spirit is not positive except in God, and when it draws away from Him, it is nothing but negation and destroys the earth. Deny God to the spirit, and the spirit will destroy us, morality, and society.

Doesn't decreeing — as is done more and more often in our day — that "God is unknowable" amount to denying God to the spirit? During a Mass celebrated before television cameras, did I not hear a priest begin his homily with these words, capable of making Christians dizzy: "O unknowable God," as the Athenian priest of the Apostle Paul's time could address his prayer "to the unknown God"?

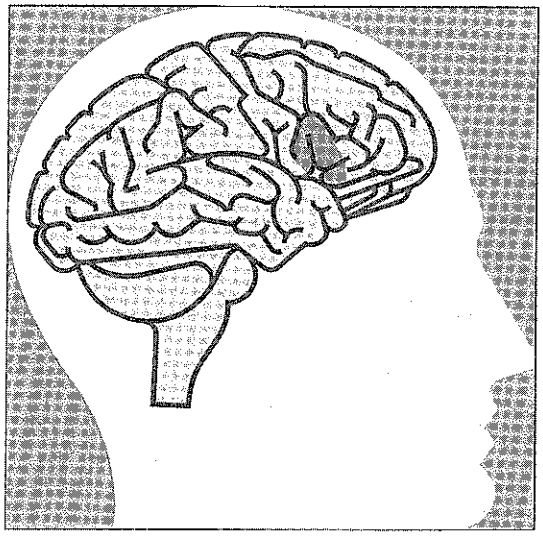
Is this, then, the great discovery of contemporary thought: that the God who passed through the first garden with the breeze at sunset — the God who said to his faithful, "Learn from me, for I am meek and humble of heart," the God of revelation of the Hebrews and the Christians, that God who has shown such goodness in making himself known — is unknowable? And have we needed two thousand years of reflection to reach the conclusion that we know nothing about the One we call "Our Father" in joy and in sadness, in fear and weeping or in hope?

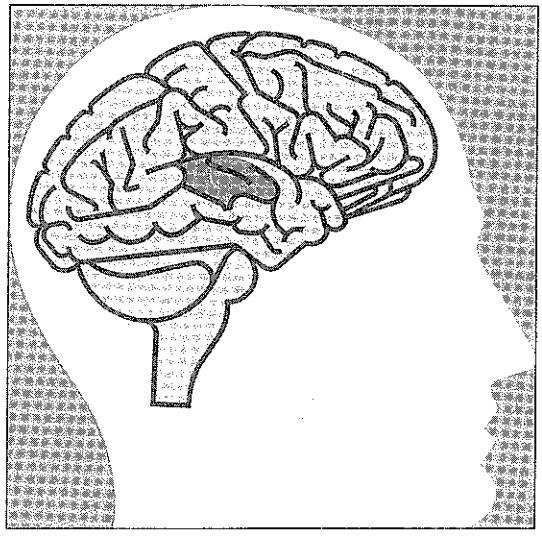
Alas! The inexorable corollary of the "unknowable God" is the unknowable Man, the man unable to say to himself *he is someone*. He was an image of God, but if God is unintelligible, what can we say we are? What remains of the protection our condition as creatures ensured for us? In losing the sense that there is nothing to fear by appealing to our divine filiation, we have lost our identity and are now not in a position to give a definition of ourselves. I said man was lost. I should have tempered this rather polemical affirmation by saying that he has lost sight of himself. He can no longer oppose his origin against the manipulators who will soon appropriate his being even before birth (provided they let it come into the world, which is supremely uncertain) to make it interchange-

able or standardized, according to their thought-frames, and fit for service in Aldous Huxley's " brave new world. " A prefabricated man who will believe himself to be perfect because he will no longer ask questions and will not grasp that his main superiority over other animals consisted of knowing himself to be imperfect and finite.

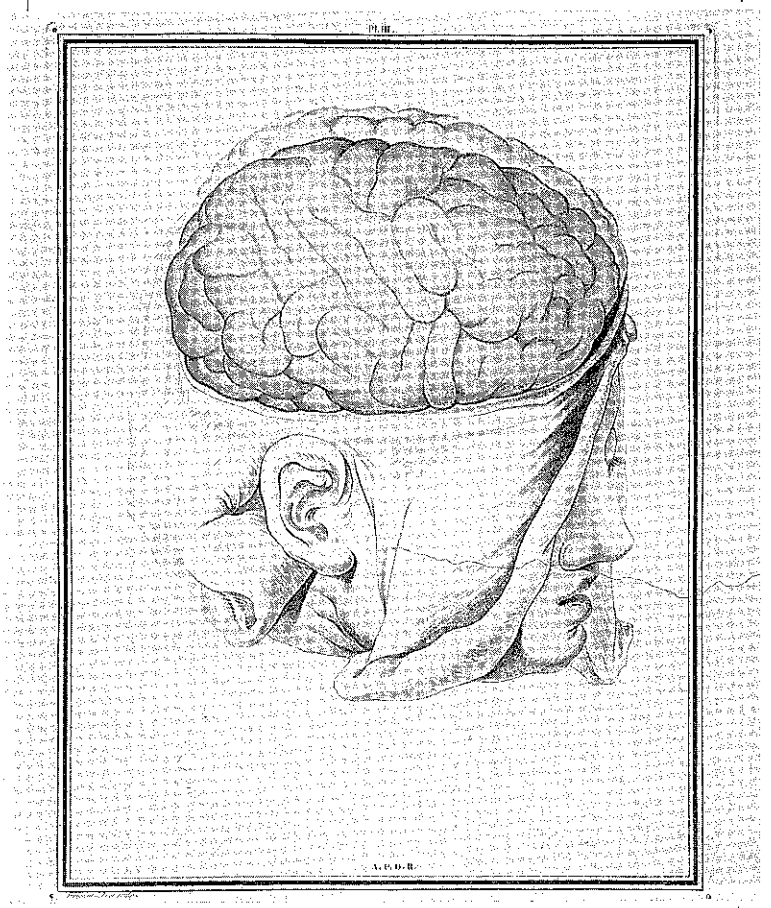
Pope John Paul II told us one day that Christ was the one " who revealed man to himself. " The time has come to recall these words if, after having gotten lost, we do not want to find ourselves before Moloch, who fixes his glass eye upon us and absorbs us into his fiery belly, where he has already incinerated innocence, sweetness, and love — about which we would know nothing fundamental unless God Himself had come to speak to us concerning them one day on the hills of Galilee.

ANDRÉ FROSSARD
Member of the French Academy





Round Table



Cultures and Mental Illness

AIRES GAMEIRO

Culture as Endangering or Facilitating the Well-Being of the Mental Patient

Introduction to the Round Table on Cultures and Mental Illness

Before I introduce the theme of this session of the Conference on Culture and Mental Illness and the eminent speakers who will take part I want to thank the organizers of this conference, and especially His Excellency Fiorenzo Angelini, President of the Pontifical Council for Pastoral Assistance to Health Care Workers, for his invitation to me to take part. It is a challenge to which I will try to respond as best as I can.

I welcome all of you who have come to listen to the speakers and to reflect on such an important subject.

In my introductory speech I will deal briefly with three main points:

I) Culture as an element of human growth which helps to integrate personality.

II) Culture as an inhumane and pathological factor as regards mental health.

III) Recreation of a culture of cultural patterns as an indispensable means of rehabilitating and reintegrating institutionalized mental patients.

1. Culture and balanced human growth

1) Culture as a complex set of patterns of social thinking, symbolic representations, values, feelings and behaviours, is, so to speak, " outside " and " inside " of every person.[1]

2) Externally, culture is considered an object of research for anthropologists, sociologists, and social psychologists, but it must be of concern for everybody. Internally, culture is taken into account more by clinical psychologists, psychiatrists and other health and pastoral care workers. And surely, by those who are aware of and involved with their own growth.

As integrated in the person, culture is in one's mind and heart, as very dynamic memories and experiences, and in one's behaviour, as an expression.

In spite of all the research and study done up to the present in different relevant areas, culture cannot be separated (and very often cannot even be distinguished) from one's personality. Person, personality, and culture are intertwined closely together in any particular human being, though in him we are able to consider layers and patterns of culture according to personality theories.

Research on ethnopsychiatry has thrown light on some correlations between culture and the normality-abnormality continuum.[2]

It is a commonplace that biological or organic psychopathological approaches maintain that no matter what the culture, the percentage of the population affected by a specific type of mental illness remains constant. On the other hand, psychological and ethnosociological approaches maintain that in every ethnic group there are two main categories of people: personalities who are fragile in the face of cultural changes and those who are more independent from such changes and factors.[3]

3) In fact, from a psychological and social point of view, culture, as relatively steady patterns of accepted and imposed behaviour, has some important effects on people's equilibrum.

Three main situations may present themselves.

3.1) A culture of more or less constant patterns may help people to keep their personality integrated, consistent, and heathy.

As long as the patterns of culture do not change or do not change abruptly, persons keep their somatic, psychic, and spiritual health and well-being in an easier way.

3.2) On the other hand, what I would like to emphasize is that rapid changes in culture very often become a factor causing distress and illness in a considerable number of vulnerable people.

3.3) A third point concerns the move from one culture to another when people emigrate. Emigration is very often an abrupt move from one culture to another. When migrants move *alone* to a very different and more complex culture, mental health troubles are likely to emerge in a considerable percentage of people.

Research on transculturation, inculturation, and on phenomena of migration in different parts of the world illustrate this principle. You do not need to decide if the harmful results on mental health are caused by the migration alone or if culture shocks are simply co-factors which concur to increase stress conditions and provoke states of temporary or permanent illness. I myself have a certain experience in this area, having conducted dozens of meetings, talks, and workshops in twelve countries with Portuguese mi-

grants, from Canada to Australia, on stress, adaptation, addiction behaviour, etc. of migrants.[4]

All the foregoing situations show how persons and culture function together as one integrated unit.

2. Inhumane and Pathological Types of Culture

Some types of culture and some patterns of them may increase the suffering and painful condition of those who are already affected by mental illness, and many even aggravate or cause new pathologies.[5]

In very competitive countries mental patients tend to be more discriminated against and put into "rejected" categories than in simpler societes. Trends of opinion even suggest again and again different direct or camouflaged strategies to eliminate these patients as useless or nuisance people.

We live today in these countries in a selfish and narcissistic culture aside from some islands of social and humanitarian concern for those who suffer from neglect.[6]

On the other hand, less complex societies and cultures may be too dehumanised in other aspects in caring for mental patients, and may not respect their dignity. Some of their culture patterns may also underlie pathological symptoms inviting some types of patients to express their illness in a culturally accepted way.[7]

Social categorisation of people in superior and inferior groups is considered by Social Psychology a means of organising society in such a way that dominant groups may get more favorable conditions to the detriment of inferior ones.[8]

Unfortunately, mental patients and other handicapped people never function as socially dominant groups. They suffer very often from abandonment and from an unfavourable and stigmatised identity imposed on them.[9]

Current trends in social and community psychiatry try at present new ways of remedying dehumanising situations for mental patients.

For the last thirty years anti-psychiatric, social, and community psychiatry approaches analysed the institutionalised and ghetto culture in modern societies, created for mental patient categories.[10]

The conclusion is almost always the same, with slight differences: mental patients are pushed to a ghetto culture and a lot of "good" reasons and excuses are given. And what is worse, these patients are quite often forgotten by governments and economic powers.

What some groups and countries now try to do is to create a kind of new culture or a new approach to integrate these people into the cultural and social mainstream, with respect for their dignity, as we will see in the third part

3. Culture, Rehabilitation and Humanised Life for Mental Patients

Culture may and must be changed, not only to avoid pathologising factors but also in order to contribute to rehabilitating mental patients fully, whenever possible; or at least facilitating for them more humanised care and a worthwhile life.

Health as wellness is not just a medical concept. The different aspects of mental health as personal wholeness, wellness, and well-being include self-esteem, positive self-image, and creative relationships. This state of wellness depends on the self-awareness of being socially accepted and on the experience of being cared for as a person of worth in an environment that may be as normalised as possible.[11] In short, it is a process of global and integrated growth, no matter what the limitations are.

Here, too, there are cultural differences in regard to what experts in mental health think will better innovate cultural changes in facilities for mental patients.

To prevent ghettoizing them in inferior categories or resocializing those who are already institutionalised, the basic principle is to create new cultural values and new cultural patterns of rehabilitation, assuming responsibility, "resettlement," and restoration of the family for them.[12]

These cultural changes in the mental health system must always respect the fundamental values and rights of the patients. Besides mental rehabilitation, they have to contribute to improving their self-concept, self-esteem, and their entire self-realization as human persons integrated into a network of human relationships. In another place we expressed a full rehabilitation process with the concepts of trans-categorisation and trans-identity.[13]

Before concluding I will point out just two main models of how these cultural innovations in the mental health field might be carried out.

The first model is that of de-institutionalisation, being implemented mostly in some western English-speaking countries, as far as I know. This model seeks to integrate long-term mental patients, until now in huge hospitals, into a quite normalised life through small residences, job training, and full or sheltered employment, according to their health, age, etc.

In fact, this model is often more a trend to be implemented than a reality already achieved.

The second model existing in other countries, consists mainly of transformations in the big psychiatric hospitals so that their living conditions and social life become more humane and closer to what is "normal." In some places the big units of these old and big psychiatric hospitals are divided into small ones of

twenty or so patients. Those who may be cared for in their homes or domiciles will be visited and cared for there in a family atmosphere.

Common to both models is to treat acute patients increasingly in units of general hospitals or as outpatients; and to reduce the dimensions of traditional old hospitals.

Another common feature is to distinguish and separate mentally retarded people from psychotic patients and care for them in more normalised centers and residences without psychiatric names. An important concern is to maintain their bonds with relatives, friends, and churches.[14]

Meanwhile, in the third world countries those responsible for mental health attempt not to make the same mistakes made in industrialized countries, until thirty years ago. Instead of considering as an ideal putting as many psychicly disturbed people as possible in institutions, they are now trying to offer these people solutions more consonant with their culture and, I hope, more humane. To be so they have to achieve curative results, as much as possible, and at the same time to develop self-esteem, self-realization, and increasing social and family relationships, as we have already stated.

Conclusion

Culture, social environment, microculture, and personal growth and health are so intimately related that they deserve deeper and deeper attention by health professionals concerned with prevention, treatment, and rehabilitation of mental patients.

The mass media have developed so quickly and extensively that we very often pretend our world is a culturally homogeneous village. We forget that so many differences between cultures still exist and make a difference; and so many socially marginalized categories, such as mental patients, live permanently in a deprived and humanly distressing culture.

I think all this must be a matter of concern for all of us in the health field and in the Church's pastoral care.

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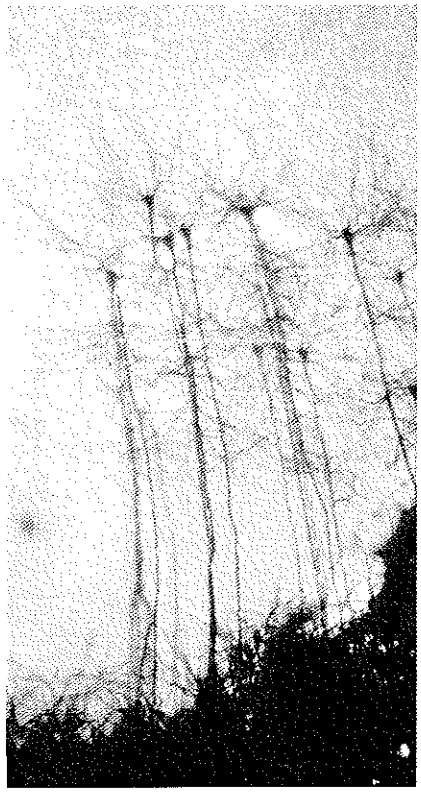
[1] CLIFFORD GREETZ defines culture: as " an historially transmitted pattern of meanings embodied in symbols, a system of inherited conceptions, expressed in symbolic forms by means of which human beings communicate, perpetuate and develop their knowledge and attitudes toward life, " in M. CARVALHO AZEVEDO, S. J. *Inculturation and Challenges of Modernity* (1982) p. 8

[2] Cf. R. FOURASTÉ *Introduction à l'ethnopsychiatrie* 13-38.

[3] Cfr. Ibid. 90-121 and 130-150.

[4] A. GAMEIRO *Psychosocial and cultural problems of migrant families. Proposed answers*. Paper presented to the International conference of the IFOU, Athens, Oct 1989.

Cfr. Also A. GAMEIRO, *Emigrants, psicologia social, conflitos e desafios culturais* (1984) cap. 30 *Patologias culturais dos emigrantes* (p. 98-99); and *Identidade Portuguesa em Expressões culturais de Emigração* (unpublished book) by the same author.



[5] Gf G. DEVEREUX *Ensayos de Etnopsiquiatria General*; and F. LAPLANTINE, *L'ethopsychiatrie* (1973)

[6] DANAH ZOHAR *The quantum self. A revolutionary view of human nature and consciousness rooted in the new physics*, Bloomsbury (1990). Laplantine considers the western culture a " schizophrenic " one (*L'Ethnopsychiatrie* p. 112-127).

[7] Cf. H. B. M. MURPHY *L'Apparition de sentiments de culpabilité en tant que symptome dépressive courant*: une comparaison historique portant sur deux continents, in *Psychopathologie Africaine* 1980, XVI, 2, 143-169.

[8] Cf H. IAIFEL, *Grupos Humanos e Categorias sociais* I e II (or. 1981) (1983); A. GAMEIRO, *A sistémica e os doentes mentais de evolução prolongada e crónicos* in *Hospitalidade* 53/208/Jul-Set. 1989.

[9] Cf GLYNIS BREAKWELL, *Threatened Identities* (1983).

[10] See A. GAMEIRO *Breve história da psiquiatria social*. Da *psiquiatria Social à psiquiatria comunitária* in *Manual de Saúde Mental e Psicopatologia* 4ª Ed (1989) 193-240.

[11] Cf note 10.

[12] Cf. YVES PELICIER, *Reabilitação, Responsabilização e Rehabitação de Pacientes Mentais* in *Hospitalidade*, 52/203/Abr-Jun 1988, 12-14.

[13] Cf. A. GAMEIRO *Transcategorização social e transidentidade do doente mental*, in *Hospitalidade* 53/209/Out-Dez 1989; and A. GAMEIRO *Dar uma identidade social positiva aos doentes psiquicos. Reflexão à base do sistema C.I.C. da Psicologia Social* in *Hospitalidade* 53/207/Abril- Junho 1989.

[14] It is worth mentioning here JEAN VANIER s innovations " The Arch " and "Faith and Light" communities, even if they are mainly with mentally handicapped people. Community and family relationships in Faith and Light communities are a must, with one third handicapped, one third parents or close relatives, and one third friends, especially young people.

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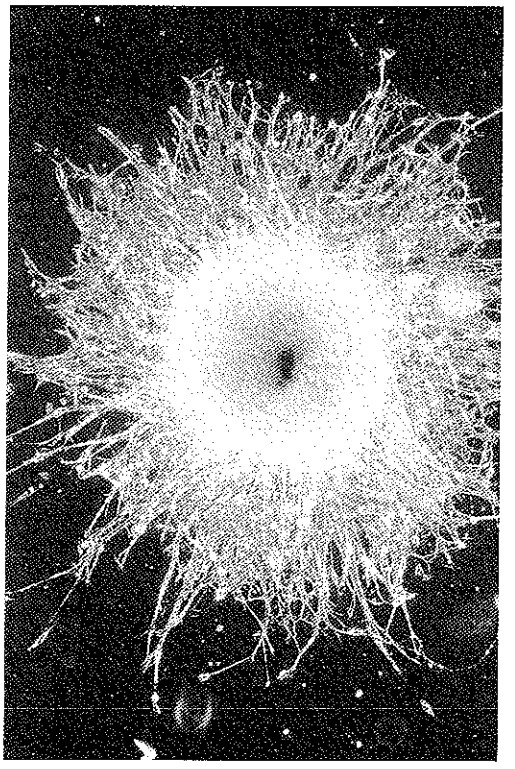

SHU LIANG

Chinese Culture and Mental Disorders

Human normal and abnormal mental activities — thought, mood, and behavior — are evidently influenced by the social milieu people live in and closely related to their own cultural background. Brain function and psychological activity of human beings will develop, be molded, and evolve in an appropriate sociocultural setting in which their ideas, beliefs, sense of value, and behavioral model have been formulated. This also influences an individual's attitude to social changes in the outside world and susceptibility to and tolerance of psychosocial stress. Consequently, the ill behavior, clinical manifestations, frequency rate, and course determine the kind of mental disorder involved and the treatment methods acceptable to culture.

International studies on schizophrenia by WHO in different cultural settings have shown that, no matter what different regions, nations, and social classes are involved, the clinical profiles of this disorder are almost identical, and it has been assumed that the disease is present in the genetics of the organism. However, outcomes for schizophrenics in nine different cultural settings have proved different. Better outcomes are found in developing countries than in developed ones. It has been suggested that the better prognosis in developing countries might be related to culture, social and family life, and the psychosocial support system.

The relation between culture and depression has recently interested many scholars around the world. A cross-cultural study on depression has been carried out in Switzerland, Canada, Japan, and Iran. The same research was also applied to 241 depressed patients in northern China, with identical methodology. The results showed a difference in clinical pictures. Many somatization symptoms were observed in Chinese patients and fewer delusions of guilt and nihilistic ideas or sexual symptoms. This might relate to the Confucian teaching that people must control their emotional reactions to the outside world — especially sexual activity — for emotional response is associated with decreased organ function. People thus tend to express their depressive experiences through somatic complaints, such as a " broken heart, " " stomach pain, " and so forth; they are ashamed of or avoid talking about sexual acts. An epidemiological survey showed that the prevalence rate for depression in China was much lower than in Western countries. Psychotherapy is treatment connected with the outlook of the people. We agree with the opinion that " the principle of psychotherapy must be adapted to the sociocultural background of patients' daily life, psychological state, family structure, social customs, and beliefs. " We thus apply cognitive psychotherapy to support patients in a depressed condition.

Another example is a culturally-linked-syndrome — the so-called " Koro syndrome. " This is a mental disorder related to folk beliefs originating from traditional Chinese medical teaching: the sex organ is deemed to be fundamental for human life. Patients experienced the shrinkage of the priapus into the abdomen as a fatal symptom. It is characterized by the outbreak of epidemics in southern China and in Southeast Asian populations coming from China.

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FRANCISCO ESCOBEDO

The Human Mind, Cultures, and Mental Illnesses

Bilateral Influence Between Culture and Some Tropical Cerebral Diseases

Introduction

If we accept on this occasion, among different approaches, that culture is the "general framework" in which a group of people living in a defined geographical area develops and progresses with particular characteristics, we can see that this frame work is shaped by a series of aspects and factors, among which I could mention beliefs, religion, ideas, hopes, aspirations, wishes, education, knowledge, nutritional status, race, health condition, and many more.

All of these topics are important, some more than others, but when they are related to culture they are always considered according to their most valuable aspects, and appreciated levels, especially when they accomplish nobel purposes.

So, as an example, if we talk about the hopes of a population, they are regarded as the basis for culture, when those hopes have superior and important goals, and not those that refer to superficial aspects.

All these attitudes that shape and guide human decisions and actions give results which leave a mark on culture, like discoveries, monuments, works of art, literature, etc.

All of them in general are highly esteemed and important factors that condition the lifestyle, and explain why man and society live in a special way at a certain time.

Culture is largely the result of certain men's mental structure and of the activity and productivity that comes from it; also important are genetics and race; on the other hand, culture is the consequence of historical events and some aspects of the environment that affect the development of man, mainly related to the geographical area where he lives and flourishes, weather, altitude, water, land, etc.

Culture is not static. Culture changes with time, and the change is the result of variations in one or several of the aspects that shape it.

These changes have a direct repercussion on the human being and have been the subject of study to identify the mechanisms by which human populations change and adapt to their environments, as well as to evaluate the influence of these adaptations on human variation and the implications these processes have for human evolution.

The integral human being is the result of his thoughts, and his thoughts are determined by culture; on the other hand, thoughts appear as a result of brain activity, of brain and mind activity that also participates in culture, having an important bilateral interrelation, in the light of the evidence that functional disorders of the brain, pathological processes, or cerebral diseases that strike a great number of individuals will have an influence on culture.

In Mexico and in other similar countries of the world, a disease exists, called cysticercosis, which affects the brain, and because of its high incidence through past history we can assume that it could have had an influence, if not on all, on certain aspects of culture.

In this presentation we will discuss the possible interaction between human culture and a tropical cerebral disease like cysticercosis. We have to assume that potentially negative side effects may result.

Also considered is how a human population's unique adaptational perspectives have made contributions to our understanding of the lifestyle and culture of some groups of inhabitants. Most of the people in science accept the concept of human variation, which may explain to some degree the differences in "culture" among different populations as well as relevant behavioral variables unique to specific groups.

As a result, particular interest has increased in the interaction among human adaptation, biological and cultural variation, and cerebral disease processes.

Cysticercosis

1. The parasite and acquisition of infection

Cerebral cysticercosis is the presence in the brain of the encysted larval form of the porcine tapeworm, Taenia solium. Infection and disease are increasingly recognized not only in many areas of the developing world but also in industrialized nations without endemic disease, principally because of the migration of infected persons. Cysticercosis is particularly common in Mexico and other parts of Central and South America, Africa, India, China, Eastern Europe, and Indonesia.

Knowledge of the life cycle of T. solium is crucial to understanding cysticercosis. In the usual cycle of transmission, only the pig harbors the larval stage of T. solium, and human beings acquire the adult tapeworm by eating undercooked pork. But people can also become infected with the cysticercus, or lar-

val stage, by accidental ingestion of tapeworm eggs.

Ingestion of food contamined with ova is the most common cause of infection.

Proglottids or eggs or both are discharged in the feces. If ingested by human beings or swine, the eggs hatch in the small intestine, burrow into the venules, and are carried to distant sites, usually the muscles and brain, where they develop into mature larvae or cysticerci after 60 to 70 days.

Thus, cysticercosis can be a serious health problem, when persons ingest undercooked pork and indiscrimininately infect themselves and their environment.

2. *Historical remarks*

It is necessary to mention that on the American Continent, particularly in Mexico, pigs did not exist before European people arrived in the fifteenth and sixteenth centuries, and for this reason we have to assume that this geographical area was free of Taeania Solium taeniasis as well as cysticercosis.

In America, there are reports mentioning the existence of the wild boar since pre-Hispanic times, and Mexican people had great appreciation for its very rich and abundant meat.

It is recognized that the wild boar may harbor the larval stage of T. solium, but this animal was never domestic; for this reason it is difficult to believe that it could have been infected from human faeces, in case these were contaminated with T. solium eggs.

In the oldest manuscript related to medicine known on the American Continent, the De la Cruz-Badiano Codex *Libellus de Medicinalibus Indorum Herbis*, translated from the Nahuatl to the Latin in 1552, kept at the Vatican Library for three centuries and returned to Mexico in May of this year as a special present by the Holy Father John Paul II, there is a preparation devoted "to killing the intestinal worms": white incense and several special herbs, prepared in a coction to be drunk. This text does not say what kind of intestinal worms these were; probably they were not T. solium.

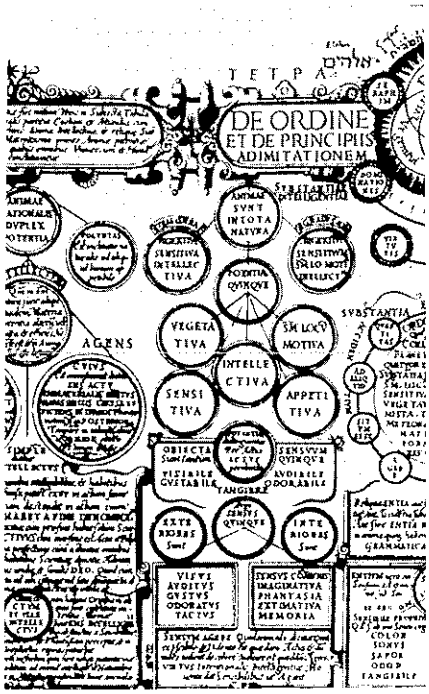
But once the pigs arrived from Spain and were included in the domestic life of the Mexican and Spanish people living in America, if some of them presented cysticercosis and if among the conquerors there were some potential carriers of the tapeworm, then the parasite T. solium had all the neccessary steps to fulfill the biological cycle.

Contamination of the human population living on the American Continent with the cysticercus of the pig lead to human taeniasis, and contamination with the eggs and proglottids in human faeces has subsequently led to human cysticercosis.

The infection of pigs and man spread rapidly, as has been seen more recently in other geographic areas, like West New Guinea, previously free of this disease, as reported by Dr. Gadjusek.

A similar situation should be presented in Mexico, and through the years and with evolution, cysticercosis has reached the significant number of cases that we now diagnose.

In Spain, during the middle ages, when the population was composed mainly by Spaniards, Muslims, and Jews, the pig was one of the basic nutriments, particularly for the popular classes.



We should remember that the two sacred writings, the Torah as well as the Koran, prohibited for Jews and Muslims respectively the consumption of pork meat. Public ostentation in eating this kind of meat was used to distinguish between Christians and Moors or Jewish people. Eating pig was a demonstration of being a real convinced Christian with "purity of blood."

For that reason it was so natural that during the transatlantic voyages to America, the Spaniards brought with them, among other products and animals, a good number of pigs as a very nourishing and highly appraised nutriment as well as an animal that meant a seal of lineage for the people who consumed it.

In America pigs were welcomed and did not experience any discrimination for religious or racial reasons, and they were promptly included in the daily diet.

Then the pig, when considered as part of a habitual diet in a group of individuals, was an element that facilitated distinguishing among races and religions in Spain; in America, where it was accepted without any prejudice, it represented an integrating factor for the different ethnic groups, but at the same time was the mechanism through which — most probably — Cysticercosis was introduced to the new continent.

3. *Pathophysiology*

Cysticerci can lodge in the parenchyma, subarachnoid space, or ventricular system of the brain, and in part the location determines the clinical presentation.

Symptoms and signs are manifestations of three major pathophysiologic processes: 1) the mass effect, 2) the inflammatory response evoked by the parasite and the immunological reaction of the host, and 3) obstruction of the foramina and ventricular system of the brain.

4. *Signs and symptoms*

The signs and symptoms of cerebral cysticercosis are nonspecific and varied, depending not only on the number, location, and type of

the parasite, but also on the biological stage of the cysticercus. They are due to parenchymal lesions, which cause seizures and focal deficits, increased intracranial pressure secondary to communicating and noncommunicating hydrocephalus, and meningitis. Headache is practically universal in patients with hydrocephalus. Nausea, vomiting, impaired vision, confusion, dizziness, and ataxia are also commonly reported. Papilledema and changes in mental status frequently occur in patients with hydrocephalus, and focal deficits are common in those with mass lesions. But there is a significant number of cases with minor or no symptoms at all.

5 *Diagnosis*

The diagnosis is established by consideration of the clinical history, signs, laboratory and serologic tests, and radiological and image findings. A history of exposure is extremely helpful in considering the diagnosis.

6. *Treatment*

Treatment of neurocysticercosis has been based on drugs that control symptoms and inflammation and surgery that reduces intracranial hypertension and hydrocephalus or parasite burden. Results are not totally satisfactory in terms of curing the disease because the parasites — or the damage they induce in the brain — may remain.

Neurocysticercosis, in spite of being a life-threatening disease in severe cases, is generally an acute or long-lasting infection affecting the quality of the patient's life and social environment with a certain impact on culture.

Comments

Fortunately, in recent years two medical advances have changed the prognosis of cerebral cysticercosis.

The first is the increased availability of CAT scanning and Magnetic Resonance, which have contributed both to a more accurate diagnosis and to a better understanding of the pathophysiology. Clinicians can now easily identify lesions and assess changes in lesions or their disappearance during treatment.

The second advance is the successful therapeutic results with specific drugs such as Praziquantel and Albendazole in certain well-selected cases.

Both aspects, together with the application of sanitary measures for the control of cysticercotic pigs, for the control of the human carriers of the adult tapeworm and for the control of the eggs in the environment, and health education, will significantly improve the future of these patients, and a decrease in the number of cases and those factors should have an impact on culture.

The human being gets sick and passes away in socially determined circumstances, according to lifestyle, work characteristics, health policy, medical facilities, and cultural aspects, among other factors.

The health/disease phenomenon is comprehended in the general social process and determined to an important degree by economic and cultural variables; according to these variations the way individuals get sick, the predominant incidence of certain diseases, the severity of the clinical pictures, special disease susceptibility, increased individual morbidity, life expectancy, and reason for and etiology of death will vary.

This analysis can provide useful insights into the consideration of the bilateral influence between some tropical cerebral diseases and culture.

It is clear that cross-fertilization of ideas and viewpoints among scientists, medical doctors, philosophers, and theologians can lead to synergistic approaches to problems which are mutually beneficial to all, and to humanity.

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HENRY BABEL

Man Created in the Image of God and Scientific Anthropology

The honour of being invited to the City of Rome to take part in this international conference in my capacity as a Protestant theologian is matched by the responsibility I feel in giving this brief paper. A presentation of my point of view on the doctrine of man created in the image of God in relation to contemporary scientific anthropology.

As the programme states, I am the pastor of the Calvinist cathedral of St. Peter in Geneva. This cathedral is the starting point and the symbol of Protestantism in the west. It seems to me to be appropriate to start with a very brief summary of Calvin's interpretation, made during his lifetime, of the doctrine regarding man created in the image of God.

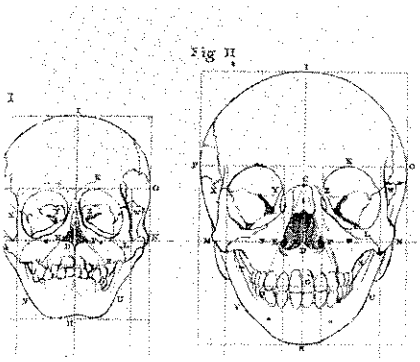
Calvin's Attitude Towards the Doctrine on Man Created in the Image of God

Nobody has ever disputed Calvin's authority in matters relating to biblical exegesis or style. He was born in 1509 and died in 1564, and is regarded as one of the great figures of the French Renaissance. Some Catholic writers, such as Bossuet, Imbart de la Tour, and Brunetiere have even seen Calvin's book *The Institution of the Christian Religion* as a masterpiece in both vernacular and theological-science terms.

At root, Calvin's theology is interdisciplinary: in his opinion, for each doctrine to be accepted, it must be based upon a rigorous philological study of the oldest Hebrew text of the Old Testament and the oldest Greek text of the New Testament.

Starting with a correct translation, what in his opinion is important is to harmonise these texts with a view to their expression in Christian preaching and action. His work *Christian Institution*, whose first edition appeared in 1536 and whose last edition was issued in 1559, was the first work of theology written in French. In order to overcome difficulties which presented themselves, Calvin never ceased during his life to change and develop the content of this publication.

In this work Calvin states that the doctrine by which man was created " in the image and likeness of God " — a doctrine based upon verse twenty-six of the Book of Genesis — fashions the spiritual nature of man. It is precisely this nature which distinguishes man from the animals and, in a special way, from the other living things that " creep upon the earth. " Here is to be found the reason why this image includes, in a certain sense, the physical structure of man — a structure characterised by an upright position.



" It is undoubted — writes Calvin — that the soul is the centre of this image...; if somebody wanted to tell me that man holds his head up high with his eyes directed towards the sky so as to contemplate his origins, whilst the animals have heads which look downwards, I would make no objection. This is because the concept by which the image of God is spiritual — as can be seen in these apparent signs — always remains valid " (*Institution*, 1, XV, 63).

In Calvin's view, in the biblical text the words " soul " and " spirit " are synonymous wherever the second is separated from the first. In this case it refers to the " immortal but created spirit, which is the most noble part of man. " When these two words are associated the soul refers to what in Hebrew is called " nephesch " — that is to say, the vital principle which is within us all.

After giving emphasis to this, Calvin expounds the idea by which there is a consubstantiality between the human spirit and the divine Spirit — notwithstanding the passions which often afflict and perturbs us. " The human spirit, " he writes, " is like a workshop in which idols are fashioned. "

As a result, corporeal and spiri-

tual health implies an intervention on the part of the divine Spirit in our most intimate being. This experience he describes as the " secret work of the Holy Spirit. " In such a way must man be recreated in the image and likeness of God by this same Holy Spirit. Calvin sees in the use of these words " image " and " likeness " a repetitive construction which is frequently present in Hebrew writings.

In Calvin's view, a correct interpretation of a biblical text does not only require philological study but also the intervention of the divine Spirit in the mind of the person who studies that text. He defines this experience as " interior testimony of the Holy Spirit. " And it is this that the French Protestants have symbolised with the Huguenot cross. A cross with a dove from which emanates light which descends on the conscience of the believer.

The Doctrine of Man Created in the Image of God and Scientific Anthropology

In my opinion, in four and a half centuries so much has happened that theologians of all the Christian traditions must, if they do not wish to remain misunderstood or become marginalised, re-examine their ideas and concepts in the light of new facts presented by scientific research. Not least because with regard, first and foremost, to our concept of man, it is impossible to ignore the progress achieved by scientific anthropology since the Renaissance — a development of more importance than the philological analysis of the sacred texts.

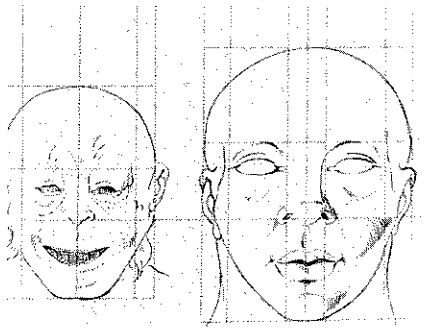
What does scientific anthropology teach us about man?

What most strikes me here is that, starting with Darwin and Lamarck and going on until Levi-Strauss and Konrad Lorenz, scientific anthropology has emphasised our dependent link with the physical world with ever-increasing insistence. It has also stressed, in relation to this link, the state of corporeal inferiority in which we find ourselves in the struggle for life when compared with other living creatures. Today, it is scientifically established that our species would not have survived if it had based itself upon muscular resources. It cannot be disputed that the development of our neurocerebral system, which is linked to our upright position, has compensated for this lack of corporeal resources.

To put it briefly, we owe our survival to our capacity to think, to effect choices, and to create. In a word, to the power of the mind.

Nowadays it is not unsual, even in educated circles, to meet people who reject the notion of spirit in the name of scientific anthropology, asserting that it is too abstract, vague, or unprovable in experimental terms.

Let me, therefore, appeal to your experience in its most immediate, concrete, and palpable sense. We who are assembled here in this hall, while I talk to you, consider ourselves as being people able to say " I " in contact with others and with the world, as being people able to think, to have feelings, to make decisions, to will things, to hope and to love. And it is as a result of this directly observable and fundamental phenomenon of awareness of ourselves that we are able to give credence to those scientists who teach us that each one of us has a brain which is composed of millions of nerve cells organised in complex networks having hierarchies and parallels.



If, as etymology teaches us, a phenomenon is " what is offered on its own to observation, what is shown, and what appears in an immediate sense, " it is clear that the first proven phenomenon is not the brain in all its amazing complexity, but observation, which is also linked to awareness of ourselves. As the school described with the term " phenomenological " emphasises in particular, the drama of science lies in often forgetting its origins and in confusing secondary observations, which are certainly important, with primary observation, without which it would not exist: awareness.

Does this primary phenomenon coincide with the infinitely complex structure and the psychochemical structures of the neurocerebral system? Objectivity requires us to recognise that we here encounter two sets of facts which are certainly linked but which are also very different: on the one hand, the relative simplicity of the act of awareness, which allows each one of us to see ourselves as a " self " which thinks, which suffers, and which is happy; on the other, the extreme complexity of the central nervous system.

To speak the truth, this paradox is more unsettling because the relative simplicity of the first seems in inverse ratio to the extreme complexity of the second.

Awareness does not only amount to knowing but in knowing that one knows. Now, all of us before knowing that we were equipped with a brain and a million neurons knew that we existed. What is more: famous writers and composers have created immortal works without knowing anything about the results of neurophysiology and the human sciences interested in the mechanisms of the brain.

Corporeal Energy and Spiritual Energy

In our times it is impossible to argue that the descendants of *Homo habilis* — that is to say, ourselves — do not owe their development to their upright position and their cerebrospinal development. But does this perhaps mean that the phenom-

enon of personal identity is the result of a sum of miniphenomena which are rigorously programmed by physical-chemical laws? It is probable that these determining factors exist, and nothing would be able to transgress them with impunity. But I have never met a single materialist who was ready to consider himself a robot.

We all have to face choices! " Should I do this or that? " The experience of hesitation is the proof, without any possible room for dispute, of the existence of a decisional power which transcends cerebral automatisms and is at the root of the need to choose.

In a few words, a person is much more than the simple sum of his parts. But what kind of relationship does he have with these parts?

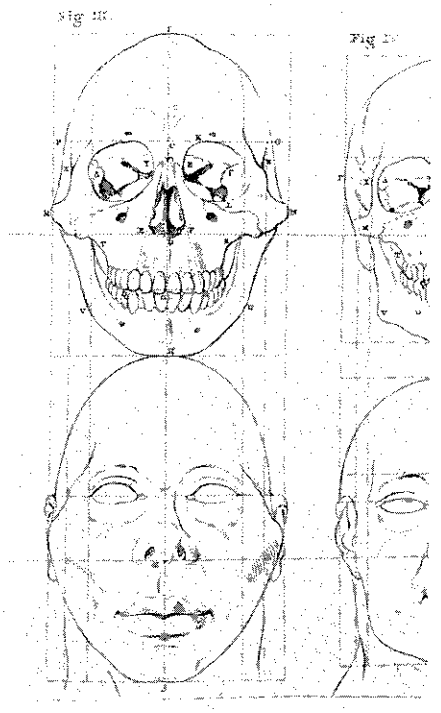
The positivism of the end of the last century, of which certain so-called scientific mentalities have not yet liberated themselves, rejects the notion of spirit and deems it too vague. But is the notion of matter less vague after the revolution caused in the field of the sciences of nature by quantum physics, by the relativity of Einstein, or discoveries in the nuclear field?

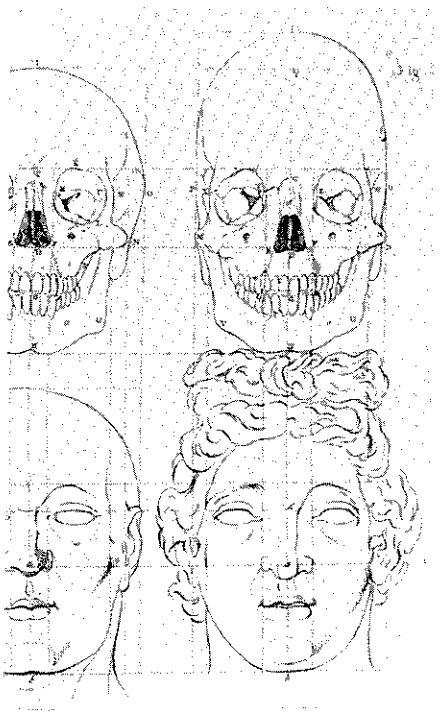
In the age of mathematical formulae by which physics describes behaviour in determined conditions and in calculable terms, there is a constant return to the equivalence of matter and energy. Matter is presented to us as a certain quantity of energy which is more or less condensed into, or dispersed in, a portion of space.

On such a basis the temptation to identify mental, moral, and spiritual energy — the term used is of little consequence — with corporeal energy is very great. But how, then, can one explain the fact that women are often more courageous than men, and children more so than adults; that people in whom corporeal potential is much reduced, even to the point of being almost dead, are more lucid and courageous than people who are said to be " fit " and in full health?

Let us return to the text of the Book of Genesis.

In the Hebrew text the word that we translate with " spirit " is the word " rouach, " which refers, in reality, to the phenomenon of breath or breathing. In the second chapter, verse seven, of this book we read: " And the Lord God formed man of dust from the ground, and breathed into his nostrils the breath of life; and man became a living being. "





This seems to me to clearly indicate that man is a psychochemical compound who owes his life to a phenomenon of exchange of energy — as is completely confirmed by modern biology. The neurologists, in particular, teach us that of all our organs the brain is the one that uses the most quantity of oxygen. Have we not, therefore, arrived at the point of understanding that every action which seeks to preserve and develop the psychic health of man must encourage respiratory and corporeal discipline?

It now remains to better define what allows us to differentiate ourselves from other living beings, even though it is the element which makes us similar to them.

The Power and Drama of the Spirit

If the human spirit, by being a power for reflection, a faculty of choice, and a creative drive, has been the energy which has hitherto ensured our survival, it is also the factor which can lead us to our ruin — depending, of course, on what use we make of it. This is because the very same power which has built cathedrals and hospitals can spread illness, devastation, and death.

Corruptio optimi pessima. There is nothing worse than the corruption of the best. What should be done?

It is said the face of the world has undergone a greater change over these many decades than over many centuries. And some scientists declare than the changes that will occur between now and the next millenium will be much greater in number than those that have taken place while humanity has existed.

Indeed, *nolens volens* we have entered an age that is without precedents or reference points — an age which is characterised by an interdependence at a planetary level due to scientific discoveries and their application in technological terms. How can we ensure, restore, and develop the spiritual and corporeal

health of people both individually and collectively in societies of this kind?

In my opinion, the heirs of the different religious and ethical traditions of humanity must urgently and speedily rethink and reformulate their theology in the light of new forms of knowledge and the new situation in which we now all find ourselves. It seems to me that no model of the past, however respectable it might be, can meet the demands of present and future needs.

In the west and in the industrialised nations this movement of secularisation is irreversible. This is because technological innovations change the lifestyle of individuals and societies in a very rapid fashion. On the other hand, the means of information and communication are ever more dominated by powers which elude the control of our religious institutions.

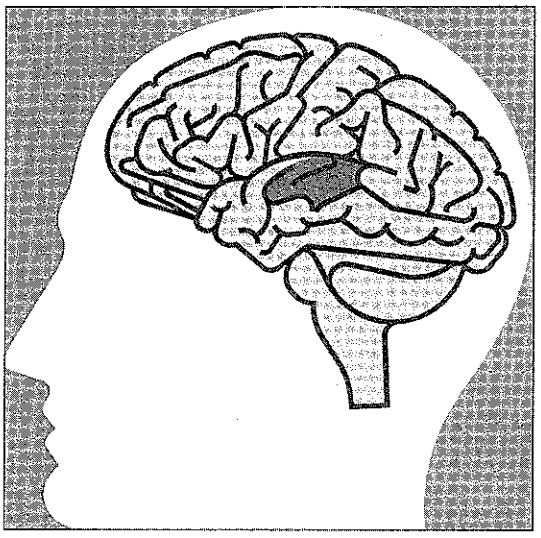
Man has risen very high on the ladder of living creatures because of the spiritual prerogatives that God has accorded him. He is thus constantly exposed to falling very low. Calvin writes: " The spirit of man is a workshop in which idols are fashioned. " By this he means the fatal confusion between the absolute and the relative. In a few words — the overturning of values.

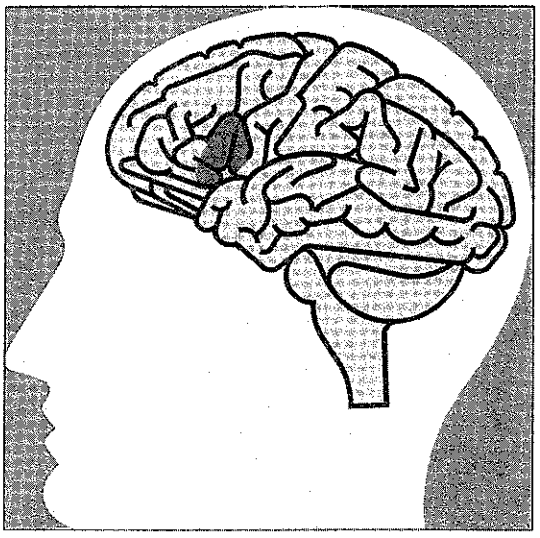
In societies of this new kind, the heirs of our different Christian traditions must, therefore, seek to make men both adult and responsible. That is to say (to employ the same terms used by the Book of Genesis), living beings which " do not creep upon the earth " but who are able to stand up and solve problems, overcome obstacles, and search out the path of the future, however narrow it may be.

This is only possible with the favour of the Holy Spirit, that sovereign energy, that wonderful source of spiritual and corporeal healing which the Apostle Paul, on the basis of his personal experience, expressed in the following terms:

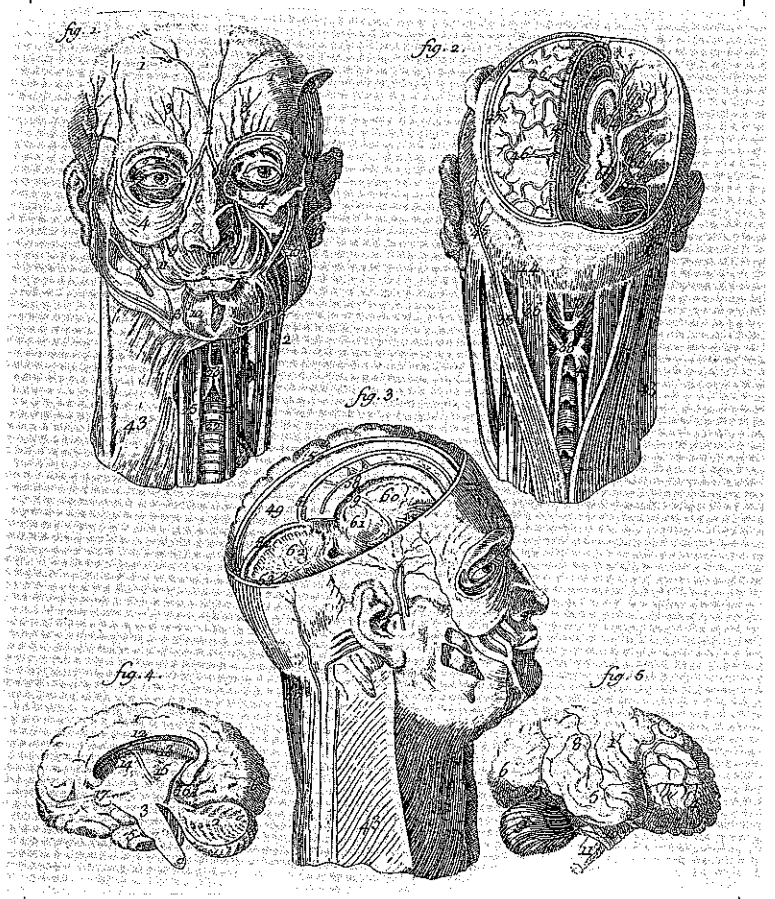
" Now the Lord is the Spirit, and where the Spirit of the Lord is, there is freedom " (Second Letter to the Corinthians 3:17).

REV. HENRY BABEL
Pastor of the Calvinist Cathedral of St. Peter in Geneva, Switzerland





Round Table



Problems in Care: Human, Organizational, Ethical, Juridical, and Pastoral Aspects of Psychiatry

ELIO GUZZANTI

Introduction to the Round Table on Problems in Care: Human, Organizational, Ethical, Juridical, and Pastoral Aspects of Psychiatry

In order to define the field of psychiatric care there should be an initial identification of the specific problems and questions of health and illness which command our attention and interest — and this is most certainly no easy undertaking.

The difficulties that exist in effecting a classification of mental illnesses which would be accepted and considered satisfactory by everybody are well known. However, there are a number of schemata which can prove of distinct utility.

For example, the classification of the World Health Organisation makes the following categorisations:
- psychoses and dementia;
- neuroses, pychopathies, sexual deviations, drug addiction, and mental disorders which are not psychotic and which are not of organic origin;
- oligophrenia.

Another example is the classification adopted by the *Diagnostic and Statistical Manual of Mental Disorders'* (American Psychiatric Association, 1980), which, indeed, does not use the term " illness " but the word " disorder " and makes the following fundamental distinctions:
- psychotic disorders;
- affective disorders;
- personality disorders.

This classification introduces a new element with the category of conditions which need attention and treatment but which do not result from mental disorders. Examples of this are, for instance, difficulties in the world of work and studies, relationships within the family, and so forth.

It is obvious, therefore, that it is not at all easy to define the complicated matrix of needs and answers which are involved in providing care in the field of mental disorders and illnesses. This arises from the extensive range of subjects, conditions, and situations which are to be found in an area where the concepts of ' normal ' and ' pathological ' frequently have ill-defined boundaries and where direct care and assistance are not always invoked even though they are clearly necessary.

For these reasons, the question of mental health, within the context of the Health for All in the Year 2000 programme of the World Health Organisation, should be examined and investigated in order to achieve a situation where in all the countries of the world particular needs are identified and possible solutions involving care and treatment are implemented and carried into effect.

And here one notices that the epidemiological estimates available refer to an incidence of major mental illness in the population which is higher than 1.1%. This figure rises rapidly and greatly exceeds 10% if problems of anxiety and depression, and the so-called functional handicaps of the school age are taken into account.

The field of care and treatment, therefore, is very large, and the same may be said of the human, organisational, ethical, juridical, and pastoral aspects which are present in the actual implementation of that care and treatment.

It is, indeed, evident that in a field where disorder arises because of the interrelationship of biological, social, and psychological factors, the actual response to the causes and practical handling of the consequences of the disorder itself involve a series of actions and therapies which are of a very special kind.

If, indeed, it is true that all illnesses have by and large serious consequences for those who are afflicted, their families, and society, one should recognise that such consequences are more serious and of a particular character when it is the human mind that suffers, the human mind being something which " synthesises and transcends the psychosomatic reality of man " (Angelini).

Patients with mental disorders, in fact, can display a wide variety of clinical conditions and behavioural malfunctions. But, and this is true especially with regard to severe forms of mental illness, they also have special characteristics which differentiate them from other patients, and this is because they often display:
- a lack of awareness regarding their illness;
- a lack of motivation in seeking and obtaining care and treatment;
- difficulties in judging and evaluating reality.

In certain special cases there is also a potential dangerousness for themselves and other people.

This is why treatment of mental disorders is not always asked for voluntarily by the patients themselves. On the contrary, in a certain proportion of cases (in Italy the average is twenty-three per cent) recourse has to be made to compulsory treatment according to the laws which apply in each country.

Whatever the case, we here find ourselves, as has already been said, dealing with a series of disorders and conditions which should have,

in relation to each circumstance, a special approach according to the place, time, and character of the diagnostic, therapeutic, and rehabilitative action which is necessary, the operative model of which must necessarily take into account the physical, psychic, social, and spiritual aspects of each individual patient.

Over the last thirty years, and especially in certain countries, we have witnessed a tendency towards a form of care and treatment of mental disorders which is effected near to the usual residence of the ill person, with the least possible disturbance of his social, biological, and general life rhythms.

This concept, which is both logical and human, requires the provision to well-defined communities of various necessary services which can put a policy of primary, secondary, and tertiary prevention into practice. For this reason mental health centres and general practitioners should be active in the extensive field of primary prevention. They should identify the subjects at risk and the risk factors, and foster action which is necesssary to prevent the emergence and development of disorders and pathological conditions. This, however, will not always be possible, and in such cases services must be made available to ensure the diagnosis and the treatment of pathologies which are in an acute phase — with the goal of achieving secondary prevention aimed at preventing the advance of the affliction and setting in motion a rapid recovery of the patient through a process of rehabilitation, not least in regard to his resocialisation.

One can say, with respect to these two aspects of the question, that notwithstanding the fact that there is a great deal of diversity in the conceptions that are held in each country regarding mental disorders and the opportunities available for the organisation of care, there is basic agreement on principles and models of action.

The organisation and implementation of tertiary prevention, however, presents a rather different picture. Such prevention is largely directed towards the chronically sick, where the aim is to hinder or prevent a further deterioration in the patient's mental or physical condition and to maintain the highest possible level of self-dependence in matters relating to the essential and functional aspects of daily life.

The positions of many countries in this field are not similar and this has caused many human, organisational, ethical, juridical, and spiritual problems in the achievement of overall aims. Such a state of affairs has also created serious difficulties for people with chronic mental illness. I am referring here to both young and old and to their families, and I would like to observe that the number of old people with similar afflictions is subject to constant growth.

Wherever, indeed, it has been believed that the problem of illness and mental disorders could be solved always and only with so-called "community care" — that is to say, largely with mobile clinics or with intermediate residential answers — the chronically ill and their families have not always received the benefit and support of a place of care and treatment which was suitable or available for a sufficient period of time.

Our entire human, organisational, ethical, juridical, and pastoral attention, therefore, must take into account the very many ways in which mental disorders and the circumstances which entail psychiatric care are expressed, deal with them in the right spirit, and tackle them both with suitable training and preparation and with a network of services in which each service which is provided has a specific purpose directed towards the needs of each individual patient.

Above all else, however, there must be a deep and constant sense of Christian solidarity of a kind which will ensure that the patient and his relations feel that they are not alone — that they can overcome the most difficult moments and the greatest difficulties together. All this should take place without reference to abstract ideological concepts and ideas and with full respect for the dignity of the human person, of which the mind is the highest expression.

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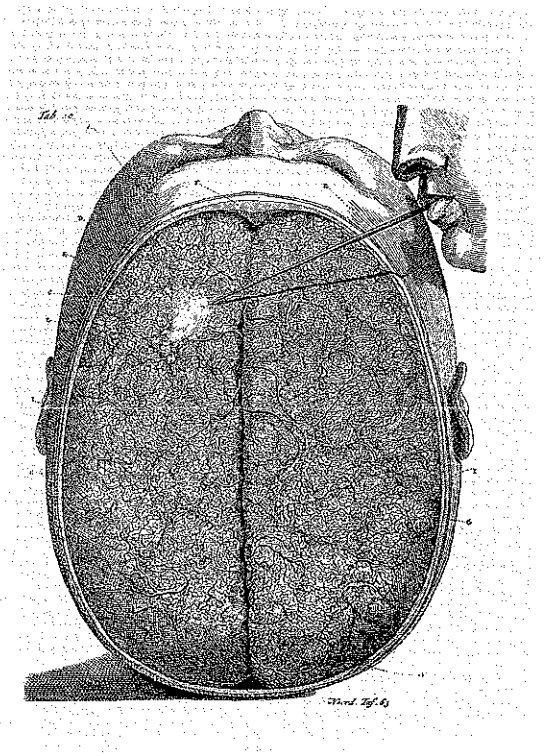


NICOLA OCCHIOCUPO

The Legal Contours of Psychiatric Care

1. Reflection on the legal outlines of psychiatric care cannot dispense with a necessarily rapid historical preamble on the origins of and reasons for a problem which has been made the object of thoroughgoing legislative policy only in recent years in Italy and in other countries.

At the root of psychiatric care there is a whole historical process of progressive recognition of the dignity of the psychiatrically ill as persons. In fact, it was from the sixteenth and seventeenth centuries onwards that people started regarding madness as a mental illness. In that same period, for example, the first hospices to shelter such patients and isolate them from the generality of society arose. The modern psychiatric hospital, the institution which functioned on a large scale in the nineteenth century throughout Europe, traces its origins back to that context.

The control and segregation those institutions required did not, however, arise as a " rational, " scientifically motivated response to mental illness, but as the reaction of a society which did not want to face the problem, but eliminate it by delimiting the area in which it was manifested.[1]

This historical fact is at the root of the inequality and mortification of the dignity of the psychiatric patient. Medical identification of a difference is adopted by society to stigmatize an inequality which sets the normality of the majority against the pathology of the mad, the sick, and the mentally retarded; consequently, the task of society and science is not to help the patient, but to segregate him so as to avoid his affecting the healthy part of the social fabric.

This vision of the psychiatric problem has changed only in the contemporary world, concomitantly with the transformation of institutions and the relationship between the individual and society.

Psychiatric services have also changed: their primary end has become the person, his needs, and his life, within a community transforming itself so as to attain the satisfaction of these needs. Finally, the relationship between health and illness changes. The value of the person, whether healthy or ill, in addition to the value of health or illness — and, therefore, illness itself — cannot be turned into an instrument of alienation and segregation.

In this context, it is in recognition of the dignity of the person as such that the foundation for the legal discipline of psychiatric care should be sought.

At this point the subject may be pursued in general terms, since the the affirmation of the dignity of the person is an acquisition which has been and is being spread throughout the world, as recent experiences in openness to democracy in Eastern countries demonstrate, for example.

Furthermore, this approach is confirmed and approved in international documents and texts containing norms.

2. I feel we must start from these texts to establish the general contours of legal problems in psychiatry.

The analysis will be structured into two sections: one, offering what we might call a " perspective, " is aimed at providing a general picture of the principles and values which ought to be related to the psychiatric patient as well, as we have seen; the other is instead more specific, addressed to the study of the Italian context, which in some respects may be regarded as emblematic of a certain way of understanding and acting normatively as regards the problems of psychiatry.

We shall start from the general premises. The international community, as we know, beginning at the end of the second world war, has generated a series of documents devoted to protecting man's rights and freedoms: the *Universal Declaration of the Rights of Man*, approved by the United Nations General Assembly on December 10, 1948, described by the current Pope as a " real milestone on mankind's path of moral progress "; the *European Convention to Safeguard the Rights of Man and Basic Freedoms*, agreed upon in Rome on November 4, 1950; the *European Social Charter*, approved in Turin on October 18, 1961; the *International Pact on Economic, Social, and Cultural Rights* and the *International Pact on Civil and Political Rights*, approved by the United Nations Assembly on December 6, 1966; the *Final Act* of the Helsinki Conference on Security and Cooperation in Europe, adopted on August 1, 1975.

As is clear, these are just some of the most important documents relating to the rights of man. Though differing in form, nature, and effectiveness, they are all aimed at reasserting the primacy of the person and his rights, and, in spite of the fact that they are often violated by the signers themselves, they lose none of their significance

or moral, political, and legal force.[2]

The norms contained in these international documents may now be said to comprise a real "legal system," in other words, a complex of norms whose enforcement is guaranteed, among other things, by the possibility of implementing genuine instruments for legal protection against their violation; by way of example, let us recall individual appeals by citizens against their governments to the Human Rights Commission of the Council of Europe (articles 25, 35, and 48 of the *European Convention on Human Rights*), or to the United Nations Committee on Human Rights (provided for by Article 28 of the aforementioned *Pact on Civil and Political Rights*).

These international norms also represent sources of production or instruments — i.e., they enable international organizations or individual States to activate further mechanisms for the normative protection of human rights (let us recall the Resolutions of the UN General Assembly or the internal laws for the execution of international agreements).[3]

This may be observed, to cite just one instance, precisely in the international norms regarding psychiatric care and recognition of the rights of the psychiatrically ill.

These norms are mainly contained in the *European Convention on the Rights of Man* and the *International Pact on Civil and Political Rights*. More precisely, they reflect two basic principles: that of equality (Art. 26, IPCPR, and Art. 24, ECRM) and that of nondiscrimination (Art. 26, IPCPR, and Art. 14, ECRM). The latter principle, in particular, requires States on a national level to provide suitable instruments so as to ensure positively that all involved receive equality in treatment, with no distinction based on any personal situation, including, then, that of the mentally ill.[4]

It must also be added that the guiding principles indicated have been integrated and precisely defined — also in reference to the mentally ill in particular — in the *Declarations* adopted by the UN General Assembly on the rights of the handicapped and the mentally ill (in 1971 and 1975, respectively)[5] in addition to the *Recommendations* adopted by the Ministers' Committee of the Council of Europe in 1983 and 1985 concerning legal protection of those affected by mental disturbances.[6]

As we see, these are norms deriving from the International Pact and the European Convention, mentioned above, which serve precisely as sources of production for such measures.

Both sets of norms confirm the principle that the mentally ill have a right to respect for their human dignity[7] and, consequently, to self-determination. They thus revolve around the fundamental value of the human person. For this very reason they activate a further mechanism of guarantees for the patient as a person.

These guarantees may be outlined as follows.

A) A need for the medical ascertainment of the state of insanity to be scientifically valid:[8] this means that mental illness must be recognized and confirmed by scientific, medical, and clinical evaluation, while leaving room for any definition reflecting the need to safeguard social peace and safety.

B) The patient's right to medical-psychiatric treatment which is appropriate for his state and functional for his social readjustment, in the same deontological and scientific conditions as those of all other patients.[9] Those suffering from psychic disturbances rarely need a hospital bed, but, rather, a protected place in which to reconstruct a balance with the world of intersubjective relations. And this is valid for any patient, even more so if he is affected by psychic disturbances.

C) States' commitment to establish norms which, while according broader protection to mental patients subjected to involuntary hospitalization, will guarantee two conditions: a) it is up to the doctor alone to evaluate the therapy and the appropriateness of hospitalization; b) insofar as is possible, the patient's will must be respected; his agreeing to hospitalization, if impossible or vitiated, must be substituted for by the intervention of an independent authority to be identified by national law.[10] The physical protection of the patient cannot, therefore, degenerate into segregation or violence.

D) Commitment — i.e., the measure integrally depriving the patient of personal freedom — is admissible only if justified by a serious danger which may arise for the patient or others. The final decision on commitment rests, in principle, with a jurisdictional body or other "appropriate" authority designated by the national law. However, in the event that the competent body lacks jurisdictional status, the patient's right to appeal to a judicial organ in order to protect his rights must be recognized.[11] This discipline, structured in this way, is justified by the special "exceptional statute" for psychiatry,[12] which is poised — as will later be pointed out — between medicine and social defense.

E) The medical and personal treatment accorded the hospitalized mental patient must be provided in asylums, psychiatric hospitals, or *ad hoc* multi-specialty wards, with conditions and treatment on a par with those offered to all other hospitalized patients.[13]

F) The patient's right to physical and psychological integrity constitutes the standard for evaluating the legitimacy and limits of medical and psychiatric care.[14]

G) As regards the protection of civil and political rights, international law refers us to national law to determine the premises for establishing the loss of such rights, in constant respect for the patient's physical and moral integrity.[15] More specifically, international law also makes a distinction between the mental patient's capacity to act (in regard to the management of economic behavior), which may be limited, and the capacity for discernment (as regards the sphere of interpersonal relations), which, as we have seen, is assumed, in principle, to be indispensable. Nevertheless, national legislation does not also reproduce this differentiation, and the result is to formulate norms on the mental patient's capacity on the basis of an absolute presumption of incapacity, which is then expressed — as has happened with Italian legislation — in a presumption of dangerousness.[16]

3. The international deontological medical codes and the declarations of principles provided by international bodies in this field have

also been inspired by this international legal system.

Such codes include the so-called "Hawaii Declaration" of 1983;[17] the deontological code prepared by the European Community's Member States;[18] the Resolution by the World Medical Association;[19] and, even before, the Report by WHO on the state of national legislation on mental illnesses and obligatory health care.[20]

In addition, on a community level, we should remember decision no. 87/551 of November 17, 1987 by the Council of the European Communities,[21] which adopts a program coordinating the development of the EEC (for the 1987-1991 period) in the field of medical and healthcare research, including that done in psychiatry, for the purpose of implementing an international standard for scientific knowledge and guarantees of equal treatment for all patients.

4. It was stated that all these documents are based on the assumption of the recognition of the mentally ill's human dignity — the dignity flowing from the fact that the condition of mental illness challenges society and requires it to recognize the mentally ill as active subjects.

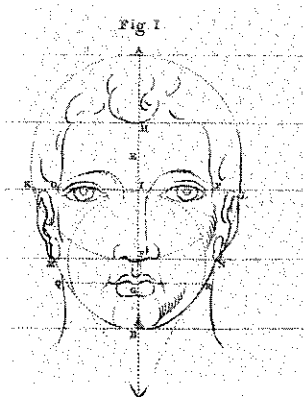
This important presupposition is not by chance alone a basic point for the Church's pastoral care of the sick, now contained in the document drawn up by the National Consulta for Pastoral Assistance to the Sick, a body of the Italian Bishops' Conference, published on May 13, 1989 and entitled, *The Pastoral Care of the Sick in the Italian Church*.[22] As is well known, it followed after a series of significant statements by Pope John Paul II (particularly the Apostolic Letter *Salvifici Doloris* of 1984), which indicated the leading features of the Church's path in working out a doctrine on the sick and led to the creation of the Pontifical Council for Pastoral Assistance to Health Care Workers, headed by Archbishop Fiorenzo Angelini, who manages to unite science and faith in exemplary fashion.

And we know that this doctrine has found support in the daily commitment of volunteers in caring for the mentally ill and deficient. Christian service to the sick, as conceived by this pastoral orientation, is not, indeed, exclusively reserved for specialists, but is for the whole community, from the family to the facilities at work in the area.

The favorable reactions to the initiatives of Christian volunteers are, among other things, an eloquent response to the structural difficulties of the public bodies providing services when it comes to projecting solutions in keeping with the "humanitarian" aims of psychiatric care: a service, in other words, offered by individuals or groups in a free, unselfish way, to develop solidary action at both public and private facilities.

A significant example has been furnished in Italy by the work camps organized by some young people from the Catholic Guides and Scouts Association of Italy in Palermo — one of the most emblematic experiences. The young people taking part in the camp shared life with patients for a week, from lunch to work, precisely to restore a climate of real participation by the mentally ill in social relations, which is the fundamental premise for their integration and of respect for their dignity.[23]

Also worthy of attention are the initiatives by volunteers undertaken at Parma by a group of persons whose tireless leader is Mario Tomasini.



Pastoral action to protect the patient's dignity and freedom comes within a more complex framework, however, of involvement and solidarity with the weakest and neediest, going against the repressive and segregationist logic which has characterized government activity in psychiatric care.

5. We have referred to documents emanating from differing sources so as to stress, among other things, the existence of a vast orientation — though underlying conceptions are diversified — involving protection of the mentally ill. In this perspective, it seems useful and appropriate to recall some basic principles which characterize the Italian constitutional system and which cannot fail to appear as criteria governing national legislation, as the aforementioned international principles themselves already do.

The human person is the reference point for all the international texts, and the person's dignity, even in cases of mental illness.

It is around this hub of the dignity of the person that the set of constitutional principles turns. The special object of the Constitution, what gives it a distinctive characterization, is precisely the human person[24] as the subject, foundation, and end of the system — the person's rights are "inviolable," in such a way that they cannot be frustrated in any manner by anyone.

This conception informing the entire system is consecrated in Article 2 of the Constitution, which "recognizes and guarantees the inviolable rights of man both as an individual and in the social structures in which his personality develops."

In keeping with this basic formulation, the Constitution has sought to clarify and establish in other articles that the preeminent end of the Republic is the full development of the human person (Art. 3, II c.); the equality and identical dignity of all persons (Art. 3, I c.); the protection of health as a fundamental right of the individual and concern of the collectivity (Art. 32).

In this perspective, the Republic is committed to eliminating the obstacles which impede the attainment

of the human person's full development in society.

Consequently, the public authorities themselves have the task of intervening with suitable instruments to free the person from all negative conditions in pursuing the above-stated end.

And it is appropriate to stress that among the negative conditions hindering the attainment of the established aim we should include mental illness, which, among other things, impedes obtaining the state of psychophysical equilibrium which our Constitution protects in Art. 32 on asserting that " the Republic protects health as a fundamental right of the individual and concern of the collectivity. " Health, then, is taken up by our Constitution as an indispensable presupposition so that the person may exercise all his connatural attributes.

It is, therefore, a fundamental right of the person to be primarily and unconditionally protected as a mode of being of the person himself. And, as fundamental, it is also a right of freedom, irrepressible and inviolable.

It is not by chance that the second paragraph of Art. 32 precisely delineates the contours of medical action for man's health. It in fact asserts that " no one may be forced to undergo a specific medical treatment except according to the provisions of the law. In no case may the law violate the limits imposed by respect for the human person. "

Respect for the human person is thus once more the inspiring value for any health action whatsoever.

6. It is obvious that such a value must also inspire the action of psychiatric care. Art. 32 of the Constitution does not explicitly mention the protection of the rights of the mentally ill. And yet it is evident, in the unanimous testimony of doctrine and as demonstrated by the preparatory sessions of the Constituent Assembly,[25] that the second paragraph of the same article, referring to obligatory medical treatment, was conceived precisely to detail the cases of coercive action in the field of psychiatry, for the purpose, above all, of not prejudicing the most elementary rights of the mentally ill, whose condition is compared to that of any other person to whom the Constitution ascribes dignity and value.

From this standpoint the legislation dealing with psychiatric care in our system must be read and interpreted.

Aside from the norms of the Civil Code (Art. 414 seq.) concerning the status of disablement, the current regulatory framework is constituted by Law No. 180 of May 13, 1978, later reabsorbed into the law instituting the National Health Service, No. 833 of December 23, 1978.

The basic inspiration for this law, in the wake of the debate arising during the nineteen-sixties and seventies among psychiatric workers of the so-called " anti-psychiatry " tendency,[26] consisted of recognizing that medical action, in the face of the pathologies of psychiatric disturbance, ought to play a role that was not even dominant, since the phenomenon involved the individual and all the elements of his life.

Law No. 180, though appearing in haste to meet the need to avoid the referendum repealing the old norms contained in the Law of February 14, 1904, No. 36, on insane asylums and psychiatric patients,[27] set two indispensable priorities for the regulation of the subject: 1) attributing to mental patients the same status as that of all others; 2) denying the need for any coercive hospitalization.

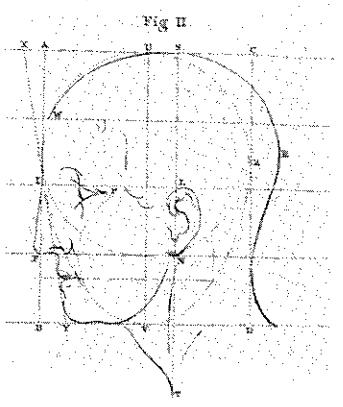


Fig. II.

Alongside these guidelines we should place, for example, the provisions tending to eliminate the " principle of custody, " which is typical, as will be seen, of prior legislation, together with the characterization of the concept of " social dangerousness " in terms of public security, the uncontrolled spread of the posture of coercive hospitalization, now provided for only in cases of justified therapeutic emergency.

Together with these indications, however, we can recognize in the law some uncertainties as well due to the poorly defined placement of hospital services, situated midway between the general structure of health protection and the specific one protecting the mentally ill.[28]

At present, through Articles 33, 34, and 35 of Law No. 833 of 1978, the care of the mentally ill finally came under the National Health Service. The short existence of Law 180 has not, therefore, been able to produce decisive and concrete effects. Moreover, the health reform has encountered not a few obstacles to its implementation, with extremely serious consequences in the field of public care, as is well known.[29]

Nevertheless, the innovative features of the reform must be evaluated positively, in any event, particularly if we take the Italian legislation previously in force into account.

We know — and it was pointed out earlier — that the public authorities became interested in psychiatric hospitals, and thus in the care of the mentally ill, even before the State included among its tasks the area of health care, by way of special services. Indeed, in the nineteenth century, while health care was left to charitable institutions — later transformed into IPAB — psychiatric assistance fell under the jurisdiction of the Province.[30]

In this way, from 1865 on the duties of the Province also included " providing for the maintenance of poor imbeciles " (Art. 172, No. 6 of T.U. Com. and Prov. Laws of 1865; Art. 201 T.U. of 1889; Art. 217 of T.U., 1890). The separation of regulations for the varied

branches of health care went back, then, to those years and was perpetuated until 1978.

Law 14 of February 1904, No. 36, fell within this perspective; through it, for the first time in Italy provisions were formulated on insane asylums and on the insane themselves, and Law 431 of March 18, 1968,[31] whereby, after some significant statements by the Constitutional Court, two new institutions were introduced: voluntary hospitalization and outpatient psychiatric care. Voluntary hospitalization, in particular, undermined the conception of an insane asylum, renamed " psychiatric hospital, " as a place of custody for dangerous patients and restored its dignity as a place of care.[32]

7. With respect to these precedents, Law 180 made a markedly innovative contribution to this field which was consistent with the constitutional principle of the protection of health.

It is especially derived from regulations for compulsory treatment. Indeed, in this law health care is always regarded as a public service, because the ultimate concern it seeks to protect is general: social peace. Compulsory treatment, however, though satisfying a public concern, involves an irrepressible subjective right: the right to health.[33] In this way health regulations move from a predominantly public-law, repressive emphasis to a mainly private and liberal one, as codified in the principle (Art. 33 of Law 833, 1978) that " medical checks and treatment are as a rule voluntary " — as already recognized, it will be recalled, in the second paragraph of Article 32 of the Constitution.

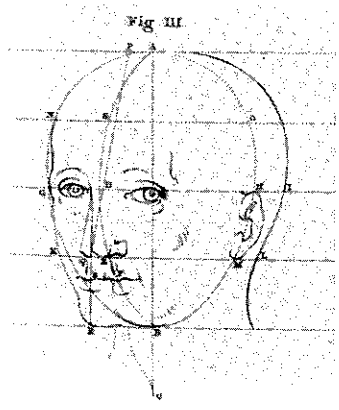
In fact, in harmony with international principles, compulsory treatment must be strictly limited in duration, unlike the previous variety, characterized by perpetuity. This is, moreover, in keeping precisely with the principle in the second paragraph of Art. 32 of the Constitution.

Law 180, in its original title, was already marked by the aim of regulating the TSO's, and this orientation is confirmed by the text of the current Article 33 of Law 833, wherein the reference to Art. 32 of the Constitution is clearly involved in such a way as to tie in with the second paragraph of the constitutional norm, where the limit of substantial validity is established: respect for the human person. Other norms reflect this end.[34]

In addition, these principles should be combined with that of equality, referred to by international provisions, but also clearly present in our system, in Article 3 of the Constitution.

Consequently, ordinary law must respect the principle of equality, and TSO's must thus come to be referred to a generality of individuals finding themselves in a special, but identical situation. The principle is violated where the measure has provided for distinctions among the potential beneficiaries based on criteria different from those strictly linked to the illness to be prevented or treated in the best interests of the collectivity or where some are allowed to undergo treatment in better conditions than those of others.

This subject inevitably leads us to speak of the problem of the personal freedom of the mentally ill. The precise reference — not contained in the text of Law 180, but expressed in Law 833, as dictated by Article 32 of the Constitution — appears to seek a derivation of all public measures — be they medical examinations or treatments — which may affect the citizen's liberty from a single normative law, mitigating the negative effects of such an effect with the pursuit of an end (protection of health) which, if not higher, is at least equal to this liberty.



Similarly, the principle of consent to medical treatment also reflects the duty of solidarity which characterizes our Constitution (Art. 2) and which refers to respect for the person and his freedom of determination.[35]

Nevertheless, to comprehend the value of these principles in greater depth, we must examine more closely the model for organizing protection of the mentally ill which is provided for by the framework of norms referring thereto.

This model, in its normative outline and practical implementation — in spite of its private-enterprise and liberal inspiration — seems to be classifiable as an administrative-type model.

The Constitutional Court's indications,[36] and the abrogation of Articles 1, 2, 3, and 3 b of Law 36 of 1904 by Article 11 of Law 180 should have led the legislator to provide for a procedure of a jurisdictional type, in observance as well of the orientations emerging on an international level, as we have seen. This has not occurred, however.

On the contrary, Law 180 and Law 833 have adopted a different model, which may be described as predominantly administrative, inasmuch as judicial authorities take part in it only by exercising a power of subsequent control and a function of possible jurisdictional protection. Indeed, the measure involving compulsory treatment is taken by the Syndic (Mayor) on the basis of a justified medical proposal and must then be corroborated, after examination and the receipt of information, by the Tutelary Judge.

It is true that internationally, as regards compulsory psychiatric care, there is remittal to internal legislation, on condition, however, that it provides for the intervention of a judicial authority. Nevertheless, this " national saving clause " is identified with very precise limits for individual States.

It may be found in some foreign examples, as in the United States,

which is rather special, characterized by a diversified typology of competent authorities, extending from an ordinary Court (California) to a Jury of nonexperts (Wisconsin) and a Commission which examines the person's mental state and draws conclusions on a legal level as well, communicating its results to a court with the final say on the fate of the mentally ill (District of Columbia), or, as in the Anglo-Saxon model, where there are administrative bodies with the function of judging.[37]

In Italy, on the other hand, with Law 180 only the important objective required by international norms on medical action has been achieved. Law 180 entrusts to the physician — and to him alone — the task of evaluating the mentally ill. The decision to hospitalize may follow from this evaluation alone.

8. Analysis of the Question

Article 34 b, § III assumes that "compulsory medical treatment under hospital conditions is provided for patients affected by mental illness if the clinical picture imposes urgent and indispensable therapeutic action." In addition, it "may be implemented in regard to patients presenting alterations in their psychic functions such as to render them unable to look after their own needs and protect their own security, while at the same time constituting a serious danger for that of others." As we see, this provision seems to evoke what is stipulated by international principles on the subject, which recognize dangerousness as a presupposition that is not necessary, but that may be connected with others of a clinical or medical nature for the purposes of compulsory treatment. The measure of coercive hospitalization must find its *raison d'être* first of all in the urgency of therapeutic action.

Moreover, this is borne out by the fact that this normative provision draws fully away from what is stipulated by Article 1 of Law 36 of 1904, which established dangerousness and public scandal as a necessary presupposition for commitment.[38]

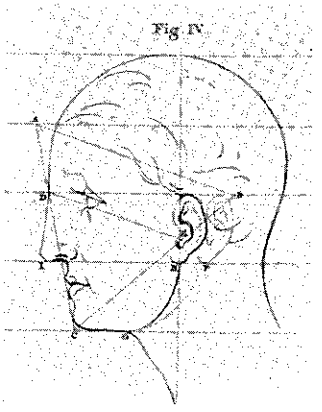
But in the light of this provision, the problems left open by Law 180 are also understood.

It was not by chance that the Constitutional Court, in Sentence No. 211 of 1988,[39] asserted that with such a law "the treatment of the mentally ill has been transformed from a problem of public safety to an essentially medical problem or one of patients' return to society. In this way, whereas the powers for public safety which may be exercised in this area are reduced enormously or disappear, those connected with compulsory medical examinations or treatments are reclassified and assigned to Syndics."[40]

It is at this point, therefore, that the problem of the legitimacy of compulsory medical treatment should be faced and resolved, in reference to the principles protecting personal freedom.

A reading of Article 32 of the Constitution describing it as a special norm with respect to Article 13 has indeed been furnished,[41] while others have proposed a reading which differentiates the operative spheres of the two norms.[42]

If the premises pointed out earlier are firmly maintained, it may be observed that the distinction between asylum treatment and real detentive measures has its *raison d'être*.[43] But not on this account should it legitimate the absence of appropriate judicial action.



Once again, this is deduced from the international framework.

Article 5 of the European Convention on the rights of man compares cases of insanity to those of privation of personal freedom (section "e"). In this way, among other things, the European Court for the Rights of Man[44] has established that the English procedure of *Habeas Corpus* is also applicable for urgent ascertainment of the legitimacy of provisions limiting personal freedom in the case of mental illness.[45]

9. With these premises, it is possible to situate the proposals for reforming the system of psychiatric care.

Political debate on the psychiatry question in recent years has, as we know, occasioned a whole series of proposals to modify Law 180 proceeding from all parties.

In summary, two positions may be pointed out:

a) one tending to defend 180 in its original formulation, deemed to be valid and advanced, and to improve its modes of application while removing the obstacles still impeding it;

b) a second view, on the other hand, aiming at substantially modifying those points in the law identified as not very clear and, above all, responsible for current problems in managing psychiatric health care.

One basic reason lies at the root of both these orientations. The current problem is not just one of guaranteeing full respect for the freedom and dignity of the human person in every case, but also of adapting such principles to real scientific knowledge on psychic illness and the urgent need for suitable care facilities.[46]

Practice in recent years has in fact demonstrated that we need to pay proper attention to pathological processes of average duration as well, which require prolonged medical care, in any event, just as we need to treat the most serious neuroses separately. For this reason, legislative proposals identify treatment categories midway between chronic and nonchronic patients.

In addition, they stipulate that compulsory medical treatment should be provided in every suitable place, including the patient's home, to enable him to exercise his rights

again in civil society — during hospitalization, according to a widespread theoretical classification, they may be termed " rights awaiting expansion. "

Prof. NICOLA OCCHIOCUPO
Rector of the University of Parma, Italy,
Professor of Constitutional Law at the School of Jurisprudence

[1] We know that the most in-depth research on the phenomenon of madness and of the segregation of the ill has been conducted by French epistemologist Michael Foucault, who, since the 1960's has devoted a series of important studies to the origins of insane asylums in modern Europe *Histoire de la folie* (Paris, 1961), *Nascita della clinica* (Italian trans., Turin, 1969), and *Io Pierre Rivière* (Ital. trans., Turin, 1973) deserve special mention. See also D. Saterini Mari, *Immagini della follia* (Bari, Italy, n.d.).

[2] For a picture of the current state of development of the rights of the human person both nationally and internationally, with special reference to the instruments for implementing the principles contained in the universal Declarations, see W. Krawietz, *Evolution des Rechts und der Menschenrechte*, in Festschrift fuer Helmut Schelsky (Berlin, 1983), 319 seq.

[3] Cf. G. Biscottini, *La salvaguardia internazionale dei diritti dell'uomo*, in *Diritti dell'uomo e società internazionale* (Milan, 1983), 159 seq.

[4] For a broad and analytical panoramic view of international norms on the subject, see M. Scalabrino Scalea, *La tutela del malato di mente nel diritto internazionale*, in *Medicina e morale* (1987), 97 seq.

On the principle of " nondiscrimination, " L. Paladin, *Il divieto di discriminazione e la Convenzione europea dei diritti dell'uomo*, in *Riv. dir. int.* (1974), 446 seq.

[5] UN General Assembly, Resolution 2856 of Dec. 20, 1971 and Resolution 3447 of Dec. 9, 1975.

[6] Recommendation No. R (83) 2 of Feb. 22, 1983 and Recommendation No. R (85) 3 of March 15, 1985.

[7] Article 3 of the above-cited Declaration of 1975.

[8] Article 2 of Recommendation R (83) 2, cit.

[9] Article 2 of the aforementioned Declaration of 1971 and Article 6 of the Declaration cit. of 1975.

[10] Cf. M. Scalabrino Scalea, *op. cit.*, 106.

[11] It is a principle of guarantees in keeping with Articles 5 (§ 1), 2, 4, and 6 (§ 1) of the European Convention on Human Rights.

[12] F. Basaglia, *Che cos'è la psichiatria* (Turin, 1967), 24 seq.

[13] Article 5, § 1 of Recommendation R (83) 2.

[14] Cf. Articles 3 and 4 (§ 1 and § 2) of the European Convention on Human Rights; and Articles 5 and 6 of the American Convention on Human Rights.

[15] M. Scalabrino Scalea, *op. cit.*

[16] Cf. N. Parisi, *Il consenso del malato psichico fra diritto internazionale, diritto interno e norme deontologiche*, in *Medicina e morale* (1987), 75 seq. In Italian jurisprudence in recent times, see Cass. Pen., Feb. 14, 1985, in *Riv. Pen.* (1986), 555.

[17] The Declaration has been adopted by the World Psychiatry Association and published by Amnesty International, *Ethical Medical Codes* (London, 1983) - [18] Cf. note 30 in N. Parisi, *op. cit.*

[18] Cf. nt. 30 di N. Parisi, *op. cit.*

[19] Resolution adopted in Venice on May 15, 1983.

[20] F.G. Scoca, " L'assistenza psichiatrica nel Servizio sanitario mondiale, " in *L'assistenza psichiatrica dopo le norme del 1978* (Milan, 1981), 9 seq.

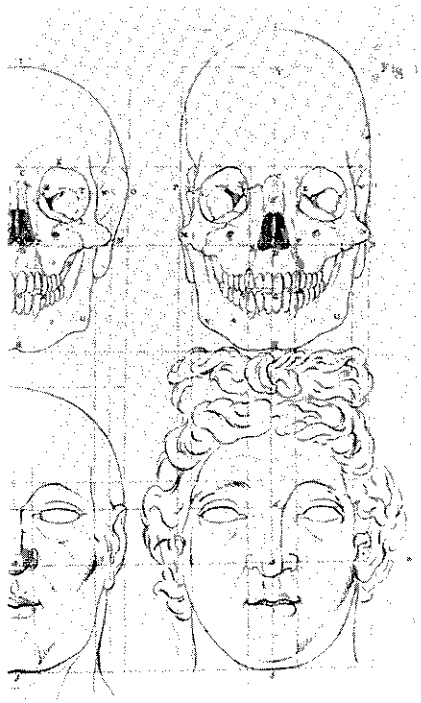
[21] In G.U.C.E., L. 33 G of Nov. 24 1987 20

[22] Cf. " Comunità cristiana e pastorale sanitaria, " in *Medicina e morale* (1990), 453 seq.; *Gli ammalati realizzatori della misericordia*, s. 1. (1983); G. Biffi, *I malati nella comunità ecclesiale* (Bologna, 1987); *Pastorale dei malati gravi*, edited by the Congregation for the Doctrine of the Faith (Bologna, 1982).

[23] V. Sanfilippo, " Volontariato e assistenza psichiatrica: il caso Palermo, " in I. Colozzi, L. Tavazza (eds.), *Volontariato e salute* (Bologna, 1988), 223 seq.

[24] I have dwelt on this topic in the monograph *Liberazione e Promozione umana nella Costituzione. Unità di valori nella pluralità di posizioni* (Milan, 1988), with special reference to the nexus between the right to health and development of the human person; see also my " Costituzione italiana e 'raccomandazioni' di organismi europei per una disciplina normativa della c.d. ingegneria genetica, " in *Dir. soc.* (1988), 499 seq.

[25] D. Vincenzi Amato, " Art. 32 - 2° comma, " in *Commentario della Costituzione*, edited by G. Branca (Bologna-Rome, 1976), 167 seq.



[26] See now the writings of F. Basaglia: *Dalla psichiatria fenomenologica all'esperienza di Gorizia* (Turin, 1981) and *Dall'apertura del manicomio alla nuova legge sull'assistenza psichiatrica* (Turin, 1980). In addition, on the "anti-psychiatry " movement, see E. Venturini, *Dieci anni di antipsichiatria italiana* (Turin, 1979).

On the historical evolution of Italian legislation, see R. Canosa, *Storia del manicomio in Italia dall'Unità ad oggi* (Milan, 1979) and F. Della Peruta (ed.), *Malattia e medicina. Storia d'Italia*, vol. VII (Turin, 1984).

[27] For a summary legislative picture, see A. Pizzi, *Malattie mentali e trattamenti sanitari* (Milan, 1978) and V. Lazzari, *L'assistenza ospedaliera e manicomiale* (Florence, 1953). On the reform of 1978, A. M. Vecchietti, *Salute mentale e riforma sanitaria* (Milan, 1983).

[28] Cf. A. Pizzi, *op. cit.*, XIV seq.; M.G. Giannichedda, " Salute, diritti, controllo sociale. Modelli di psichiatria dopo la riforma, " in *Dei delitti e delle pene* (1986), 7 seq.; N. Cipriani, " I trattamenti sanitari obbligatori nel sistema delle garanzie costituzionali, " in *Sanità pubblica* (1982), 149 seq.; P. Cendon, *Un altro diritto per il malato di mente* (Naples, 1988).

[29] See the data published and commented on in " Assistenza psichiatrica: l'insegnamento dell'esperienza " and " Otto anni difficili per l'assistenza psichiatrica, " in *L'Assistenza sociale*, no. 1 (1989), 57 seq. and no. 6 (1986), 33 seq., respectively.

[30] Cf. F.G. Scoca, *op. cit.*, 5 seq.

[31] On this law and the doubts about constitutional legitimacy it has raised, see D. Vincenzi Amato, *op. cit.*

[32] Cf. C. Castronovo, " La legge 180, la Costituzione e il dopo, " in *Riv. crit. dir. priv.* (1986), 607 seq. and P. Cendon, " Un convegno a Trieste tra diritto e follia, " in *Pol. Dir.* (1986).

[33] E. Balboni, " I servizi sociali, " in G. Amato and A. Barbera, *Manuale di diritto pubblico* (Bologna, 1986), 981 seq.

[34] On the general picture of the norms for this field, see C. Castronovo, *op. cit.*, 612 seq. and N. Cipriani, *op. cit.*, 152.

[35] D. Vincenzi Amato, " Tutela della salute e libertà individuale, " in Giur. Cost. (1982), 2462 seq.; L. Macchiarelli, T. Feola, S. Naldini, " Sulla nuova previsione normativa del ricovero per trattamento sanitario obbligatorio del malato di mente, " in *Zacchia* (1987), 194 seq.; C. Smuraglia, " Trattamenti sanitari e tutela dei diritti fondamentali, " in *Quest. giustizia* (1989), 399 seq.

[36] For analysis of the jurisprudence of the Constitutional Court on this subject, see V. Andreoli, " Gli infermi di mente avanti la Corte costituzionale, " in *Giur. cost.* (1968), 1084 seq.; C. Castronovo, *op. cit.*; M. Luciani, " Le infermità mentali nella giurisprudenza costituzionale, " in *Pol. Dir.* (1986), 439 seq.

[37] Cf. C. Castronovo, *op. cit.*, 630 and especially E. Balboni, " Salvaguardia dei diritti del singolo e difesa degli interessi della società nell'azione svolta in Inghilterra dai tribunali amministrativi del servizio psichiatrico nazionale, " in *Studi in onore di P. Biscaretti di Ruffia* (Milan, 1987), 25 seq.

[38] M. Romano, F. Stella, " Ricoveri, dimissioni e trattamento terapeutico dei malati di mente: aspetti penalistici e costituzionali, " in *Riv. it. dir. proc. pen.* (1973), 403 seq.

[39] Sent. of Feb. 25, 1988, no. 211, in *Le Regioni* (1988), 764, with comments by M. Sica.

[40] For analogous positions by judges of merit, see Pretura di Bracciano, Feb 16, 1987, in *Giur. Cost*, Parte II (1987), 754 seq.; T.A.R. Sicilia, April 3, 1987, no 331, in *Foro it*, III (1988), 321.

[41] Cf., among others, S. Panunzio, " Trattamenti sanitari obbligatori e Costituzione, " in *Dir. soc.* (1979), 888 seq. and F. Modugno, " Trattamenti sanitari 'non obbligatori' e Costituzione, " in *Dir. soc.* (1982), 319 seq.

[42] For this interpretation, see M. Luciani, *op. cit.*, 441, and references to constitutional jurisprudence in *ibid.*, in addition to C. Castronovo, *op. cit.*, 617.

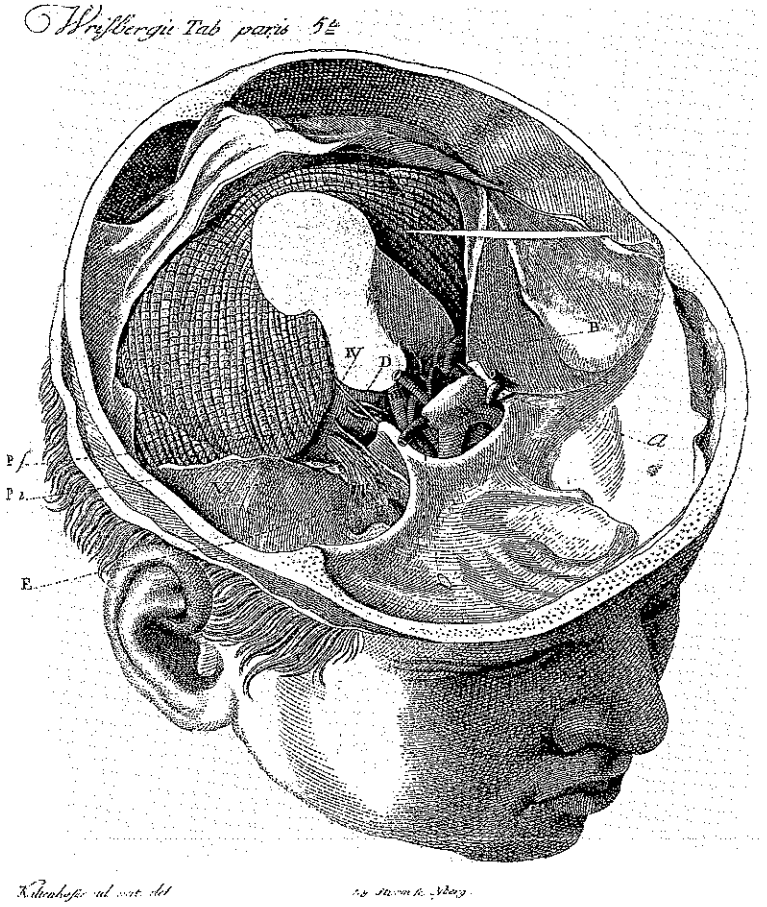
[43] Cf. M. Luciani, *op. cit.*, 442.

[44] The European Court on Human Rights, Nov 5, 1981 " X against the United Kingdom, " in *Yearbook of the European Court on Human Rights* (1981), 24, 454 seq. On this sentence, see C. Castronovo, *op. cit.*, 618.

[45] As is well known, an attitude of this kind, concerned with protecting man's health in all its multiple ramifications, by recourse to jurisdictional instruments, matured and asserted itself in the important sentence of the Court of Cassation, S.U., Oct 6, 1979, no. 5172, in *Giur. it.* (1980), I, 464, which recognizes the right to health as " an authentic right of the subject to be defended before the ordinary judge. "

On this sentence and its implications, see M. Luciani, " Il diritto costituzionale alla salute, " in *Dir. soc.* (1980), 769 seq.

[46] On proposals for reform, see C. Castronovo, *op. cit.*, 613; N. Parisi, *op. cit.*, 75 seq.; L. Benevelli, " Non occorrono modifiche ma impegni di una serie gestione, " in *L'Assistenza sociale*, 1 (1989), 59 seq.; and, finally, legislative proposal no. 2589, presented on April 14, 1988, by the Hon. De Lorenzo, Battistutti, and others, in *Riv. it. med. legale* (1989), 1152 seq.

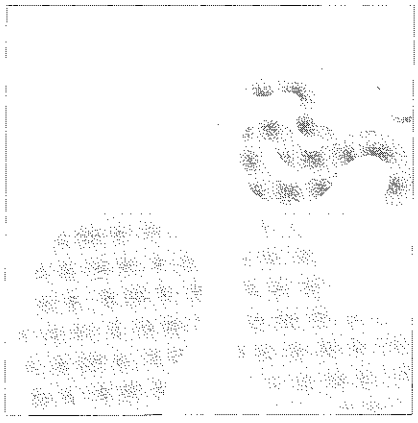


ANNA ROSA LUGLI ANDRETTA

Living with a Psychiatric Patient in the Family

I hear people speaking about the brain, but we relatives are more interested in another question: what it actually means to be mentally ill. Family life with the mentally ill does not provoke curiosity. Great cries of public protest do not arise when the extreme degradation of the family and its mentally ill member is discovered.

This situation can only be explained with reference to our fundamental ambivalence in the treatment of the mentally ill — an ambivalence which has its roots in the distress we feel towards madness. My paper concerns the experiences of families who have a mentally ill person at home, experiences which give rise to a world full of distress and powerlessness. You have lived, by now for years, in a flat with a mentally ill person. It could be a father, a mother, a son, a daughter, or a brother, but few people live with him and people visit him only rarely. Life takes place within a complicated heirarchy of silence. Nothing at all takes place which could resemble movement towards the external world. Contacts with the city are difficult and uncertain events. Each month could be the last: but, nevertheless, life together goes on, with the daily acquisition of habits which do not seem to have any end. As the furniture gets less, having been partly destroyed in one crisis or another, thus gradually changing the character of the different surroundings, things cannot be found upon which to solidly build a past. Thus with the objects which remain there exists a relationship which is without affective meanings. Periods of accommodation and tolerance, moments of hope, short-lived contemplations alternate with further moments of worry, suffering, and tiredness. Cohabitation and achieving even a brief understanding gives, every now and then, the illusion of being able to construct, after a fashion, a family unit which has characteristics similar to those of another time — a serene domestic life. But it is precisely then that the family feels most disarmed and therefore defenseless towards the illness. Like all the sentiments of its kind, this has certain unshakeable characteristics which, at least in appearance, are contradictory. On the one hand, it is without doubt the cause of shifts and turns between non-acceptance and resignation; on the other, it becomes the immediate result of every attempt on the part of a relative to occupy a space which helps and extends our affection and care. From this point of view it would appear that the whole of the weight of the illness falls, in suffocating fashion, upon the family. Whatever happens we cannot escape it. The illness is a permanent unknown: a type of invisible object even more than a hostile force. Every day its effects are recognised, its ubiquity and cunning are faced up to and studied. Even though the disturbance of the ill relative affects thought first and foremost and the body only incidentally, its action always expresses itself materially. And it is in a state of constant increase. One can never say with certainty: this comes from the illness; this has nothing to do with it. This is because it is impossible to predict when an unpredictable illness will break out or how it will change the life of a family. And because of this one member of the family usually agrees to take care of the mentally ill person and to live with him. Most often it is the mother, who refuses to turn her back on the idea of fighting this disaster, and with all the means at her disposal.



But one is obliged to weigh the effects of a forced cohabitation. There is thus born a kind of contest, but as with all long contests, it does not come as a surprise that the form of struggle becomes complicated and contradictory with the passage of time. There is a pretence of accepting the illness, a domestic code rooted in every gesture.

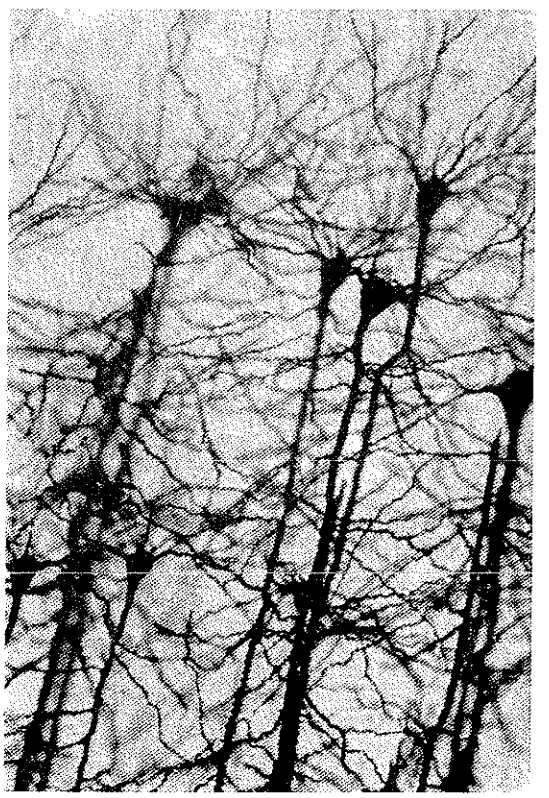
However much it is possible to identify with ways of behaving, walking, and speaking, such ways

are always different in the case of the person afflicted with the disease. Complex problems of adaptation, therefore, are created by such a situation. A child, an adult who has to face up to the problems of work or of family duties, an old person — what instruments can they have to attempt to try to free their ill relative from his condition? The difficulties which arise from this situation reach such a point that the healthy person cannot obtain any capacity to live with his ill relative, not even from his conviction that he himself, amidst all the uncertainty, is the most steadfast and the strongest. The home can seem to the mentally ill person to be a desert in which there is a danger of being lost, or *vice versa* a prison; he is afflicted by changes in mood which strike him suddenly and leave him just as quickly. They are two times and two different forms of behaviour. He cannot be distracted with concrete subjects: he either resists or ignores them. All this creates constant distress in the person he lives with. They thus experience a burdensome loneliness lacking in usual forms of behaviour. The members of the family attempt to be united, but their actions are motivated by differing intentions and the unpleasant situations which result lead the people involved to trust only to their instinct.

It often happens, when you are tired and disheartened, that you run into your own room, lock yourself in, and leave him to himself. Thus alone you slowly try to re-enter your own dimension, you try to get rid of the idea that such a severe disorder can coincide with a healthy mind and even overshadow the normality of a good life. The risk exists. You feel hostage to an implicit anxiety and a subtle fear which often comes out in physical pain. At times you are grasped by a longing for balance and by order, for those conditions, that is to say, which no longer appertain to you.

I am speaking from actual knowledge. These are true stories, accounts of a terrible and unknown world. When such stories are described by a relative of a mentally ill person, such as I am, they become distressing and desperate cries for help. But also resigned descriptions of how a person has lost not only the reason of a dear one, but also hope itself.

Dr. ANNA LUGLI ANDRETTA
Founder and President of the Association for the Defense of Seriously Ill Psychiatric Patients, Italy



RAMON FERRERO

Organizational Aspects of Psychiatric Care

Introduction

Organization is a derivative function which always comes after planning and programming. There can be no organization without the prior existence of these two functions.

For this reason when we talk of the organization of psychiatric care we must remember the existence of planning and programming. Only thereafter can we begin to consider those organizational sides of the question which can bring about suitable and adequate care.

Whereas in the past there was no planning or it was effected in relation to the ill person's period of hospitalization or to the protection of society, today this is no longer the case. Every country has become aware of the rights of the patient and of the possibilities of treatment and social integration that these patients — notwithstanding their illness — clearly have under.

It is well known that psychiatric care was for many years, and for a variety of reasons, a matter of placing the mentally ill under custody, giving them treatment which was largely ineffective, and involving in such a process ill people who in fact were extraneous to the whole process were it not for the fact that it was necessary to keep them under custody and observation.

The consequence of this has been that the advances which have recently been made in the field of psychiatry have not been effectively implemented. This is because the different types of illness were mixed up in various groups even though each group required a case by case separate study.

It is also true, however, that until 1950 — the year in which there was the appearance of the first neuroleptic (chlorpromazine) — the therapeutic arsenal to which recourse was made was not sufficient to cure a mentally ill person and integrate him into society.

Nowadays, when we can make use of all the instruments which are necessary, social awareness and concern has increased considerably, and it would be fatal not to program and to organize psychiatric care, taking into account all the instruments at hand which could make such care more effective and more humane. No infirmity has the characteristic of being so near to the spiritual core of a human being as mental illness. For this reason, in carrying out treatment and providing care we must take advantage of all those elements which are available to us so that nothing is left to chance. Herein is to be found the reason why during this round table debate we are to consider the human, organizational, ethical, and pastoral aspects of caring for the sick.

It is an evident fact that mental infirmity, which has an etiology which is still largely unknown and which has polymorphic forms of clinical expression, gives rise to problems in the spheres of the family, medicine, work, and society as a whole. This, in turn, means that the planning and organization of care must be effected with careful attention.

Historical precedents

In considering the organization of psychiatric care we cannot today ignore the medical, economic, social, and historical background which precedes modern conditions and which has influenced the character of psychiatric care over the last few decades.

A criticism today of the catastrophic situation of insane asylums of some thirty or forty years ago which did not take this historical background into account would be neither correct nor meaningful.

Both those who have worked in conditions where very little was at hand and those who have tackled the problem of psychiatric care with an abundance of instruments and techniques available — and who thus had better prospects of success — could engage in an endless discussion at a dialectical level which would be of little help to the mentally ill. Certain schools of thought have given rise to approaches which have influenced scientific, social, and political debate but which have not been of direct benefit to those who are actually afflicted. This has happened because doctrines and ideologies, which at times have been dazzled by the success of an idea clear in the mind of its proponents but little opposed at a group level, have been rapidly put into practice without an awareness of the problems which psychiatric care involves and which directly concern the ill person himself, his relatives, society in general, and psychiatric doctors and workers.

Successively these problems are better thought through, and I believe that from their careful study there should emerge a type of care which is truly holistic — that is to say, which is complete, which does not ignore important elements, which defends (for example) the right to freedom of the mentally ill person, the rights of the family

which will certainly have to take care of him but which itself, however, has the right to live in freedom.

It is not possible to defend this freedom of the mentally ill person beyond a certain limit without taking into account the limitations that his own infirmity imposes upon him. It is necessary, therefore, to be very pragmatic in dealing today with a form of care which gives space to tempting results — because there are means by which such care can be further improved. It should be considered within the context of a society which is competitive and merciless, which will not forgive the mentally ill person if he commits errors at work or in his behaviour. This person, therefore, must be suitably prepared before he is returned to the social fray.

All this is only a reflection which comes from an analysis of what has happened in a number of countries. In these countries a series of laws were passed and shortly afterwards altered in order to correct certain errors which were predictable at the outset — laws which were the outcome of experiments carried out in restricted environments and without a suitable historical perspective.

This does not mean to say, however, that we should not take advantage of new advances in knowledge in this field. But these advances should not be embodied in laws which are too rigid because of the speed in the evolution of ideas and the practical application of knowledge.

Today there are many countries which must reorganise their legislation in this area precisely because they have legislated too quickly and without taking into account all the elements which psychiatric care involves.

Basic Principles in Psychiatric Care

We are of the opinion that in order to achieve good results the organisation of psychiatric care must be based upon certain principles that hinder the repetition of past errors and which enable us to engage in the best programming possible. This should be done without, however, leaving out of consideration some difficulties which will certainly be encountered. All this is necessary to achieve the kind of care which we propose and favour.

1. *Distinguishing Different Pathologies*

Within the heterogeneous category of people to be found in psychiatric hospitals and in insane asylums clearly differentiated groups must be created. This should be achieved so that each person receives a different and appropriate treatment — in this way will one truly be able to effect what is today defined as constituting psychiatric care.

a) The Psychotically Ill

These are those who are obviously psychiatrically ill and who constitute the hard-core of those who yesterday and today can be said to be the objects of psychiatric care.

b) The Mentally Defective

Broadly speaking, these are all those people who because of this handicap have no personal and social independence — that is to say those who are chronically incapacitated.

c) The Senile and the Pre-Senile

These are afflicted by irreversible and degenerative pathologies.

d) The Neurologically Infirm

These are afflicted by pathologies which at one time were considered of a psychiatric character but which today are no longer defined in this way: epilepsy, general progressive paralysis, Parkinson's disease, tarantism etc.

e) There could be a new group devoted to pediatric psychiatry, but such a proposal would go beyond our theatre of competence because it would require forms of organisation which are completely different from those called for in the case of adults.

I have not considered in this overall presentation problems relating to the organisation of care for neurotics, for drug addicts, and for those suffering from character disorders. This is because, putting aside medical treatment, such organisation requires instruments and techniques of a social character which do not fall within the confines of the subject of our concerns at this round table.

2. *Continuity in Care*

This principle presupposes that the patient is followed during the different stages of his illness by the same team. In this way the team will feel fully responsible for the development of the patient and for everything of a therapeutic, pharmacological, psychological and occupational character which affects him.

Not everyone is involved in all the stages of the illness of the patient. This occurs especially in areas with a high concentration of population. But all these people are clearly responsible for the mentally infirm, and their help and participation are planned and programmed in group meetings organised for this purpose.

3. *The Sectorial Organisation of Care*

This is another principle which has been shown to be effective and which is in perfect harmony with those principles which have already been discussed and outlined.

This consists in giving a sector of the population to each team. In this way the team becomes responsible for all psychiatric matters present within this sector. This team should be composed of the specialists required according to the nucleus of population which is to be helped. This would be a multidisciplinary undertaking which would take into account the tasks to be performed. There would also be both external and internal periodic controls which would correct any mistakes arising in the actual implementation and application of the programme.

4. *Cooperation with the Family of the Sick Person*

This is a principle which is con-

sidered to be fundamental by many authors. This is because the family can have a decisive effect on the development of the disease or, on the other hand, can be a primary or concomitant cause.

Some people would like to see voluntary workers present together with the family. These latter, if properly trained, could make a major contribution to a cure and, above all else, to the social re-integration of the sick person.

Some Integral Elements in Psychiatric Care

In dealing with the kind of care to be used for the first group — that is to say, the psychotics — we shall set forth what is today considered necessary in the organisation of such care, given the principles of territorial allocation and continuity of treatment. No distinction will here be made between those who are hospitalised and those who are cared for according to new methods.

1. *Mental Health Centres* or *Primary Psychiatric Care*

These have the task of directing or helping patients who have a psychiatric problem or suffer from psychiatric disturbance. They are used both by patients, who go to them spontaneously, and by those who are invited by a general practitioner or another kind of specialist.

The minimum which these centres require is a psychiatrist, a psychologist, a psychiatric nurse, and a social worker.

If these centres are to provide treatment such as would be provided by a mobile clinic, then other specialists would be necessary.

2. *Day Hospital*

The people who take advantage of the day-hospital are those who need a more intense treatment than that offered by the mental health centre but who do not need to be separated from their families or from society.

Day hospitals can offer the following services: diagnostic and therapeutic departments, individual and group psychotherapy, occupational, sports, recreational, and other therapies, and social and work support.

Both patients of the mental health centres and patients who are about to be discharged from psychiatric hospital can take advantage of this service. The dayhospital can be used by one or more of the above-discussed sectors according to their respective dimensions. But it must have a minimum capacity which is able to accommodate numbers of patients effectively, without, however, going beyond certain levels. Room for between thirty and fifty places may be considered as ideal.

3. *Units for the Chronically Ill*

These units may be located in general hospitals, in polyclinics, or in psychiatric hospitals, but they must be separate from other kinds of patients.

Patients who need intensive treatment or who, for clinical or social reasons, cannot obtain such treatment in a mobile clinic, should be allocated to these units. Patients who have had an intensification in their illness after being discharged and who live in their own homes or in control flats should also take advantage of these structures.

In these units the forms of treatment are more intensive because they can utilise the fact that specialised personnel are present and patients are there for twenty-four hours a day.

Whatever the case, permanent presence must be rigidly controlled by the team to avoid abusive hospitalisation.

Whether these units are placed in a polyclinic or in a psychiatric hospital will depend on the circumstances involved.

The polyclinic has the advantage of discriminating between its patients to a lesser extent but it presents the inconvenience of not being very well equipped to have this kind of patient. This is because the provision of special modifications and changes of a structural kind — such as shutters, window-bars, spaces for occupational therapy, and so forth — end up by making it discriminatory in a way similar to the psychiatric hospital. But it does not have the latter's advantages of having more space and better conditions available for the care and treatment of these patients.

With regard to the capacity of these units, it is thought that they should not go beyond fifty places. As far as programming is concerned, it is calculated that there should be 0.5 bed-places for every thousand inhabitants. The period of hospitalisation for these patients should not go beyond thirty days. Where necessary, it would be opportune to have medium-stay units where the patient could stay from one to six months.

4. *Long-Stay Units*

Despite modern forms of treatment, it is recognised that there are types of patients with whom it is not possible to obtain immediate results, and there is thus a need for a long period of hospitalisation.

These patients may come from the old-style psychiatric hospitals (elderly patients of long-standing confinement), where they have stayed for decades and are therefore incapable of any form of social reintegration, or from newly-estab-

lished care structures which are not able to take care of them or reintegrate them into society or their families. In such situations there is a need for their confinement so that they can receive prolonged treatment.

It is becoming evident that notwithstanding all the criticisms of the old methods the new methods, also, involve a certain number of cases where confinement is required — new long-stay patients.

Nowadays what undoubtedly presents a picture of improvement is that such patients no longer remain enclosed in gigantic institutions. Instead, there is an attempt to keep them in smaller units and, if possible, in contact with the rest of society.

Many experiments have been carried out in this area in an attempt to hospitalise the patient in control flats or small residential blocks from the moment that he or she is able to socialise.

The first category involves normal flats situated in a district of a city or town, although in some nations a house in the country is preferred. In these flats four or five patients live together like a family. They are visited regularly by a social worker and they must be examined by a psychiatrist at regular intervals. The second category consists of residences where the patients can live together during the different stages of their illness. These residences have psychiatric nurses who can guarantee treatment and there are other types of personnel who can provide care. Specialists also come periodically to examine the patients.

The number of patients in these residences may vary between fifteen and twenty individuals according to the types of illness involved.

Amongst the forms of treatment which can be employed with these long-stay patients are occupational therapy and work therapy. These are known by such names but vary in their implementation according to the country which practises them. These forms of treatment have given rise to the creation of institutions which are well known as laboratories or protected workshops. These laboratories or apprentice workshops differ from what we do because of the legislation from which they derive and the internal organisation they use. There is not, however, enough space here to dwell upon the nature of this organisation. I will limit myself to a simple description. Like the other therapies which are effected in these units — physical expression, art therapy, individual and group therapy, and play therapy — these can be external units which have an organisation parallel to hospital units in the strict sense of the term.

The Care of Mental Defectives

Care for these patients depends upon the objectives aimed at in their regard. Without placing limits on the possibilities of science in the years to come — especially as concerns genetic engineering — I will consider here what can be done today for these sick people. Before engaging in a therapy it is necessary to carry out a diagnosis both as regards the intellectual capacity of the patient and in relation to his motor characteristics and his ability to socialise. It often happens that patients with a very low intelligence level are able to socialise very much more quickly than others and are able to reintegrate themselves more effectively and more long-lastingly in their place of work. I will not here describe the various possible ways of treating these patients because the field is very large, but I want to point out that it has always been considered advisable to separate their family lives from their occupational and work activity. This serves to reconnect them as quickly as possible with their normal lives.

The fact that patients are able to live in their natural family is a very positive fact. If they are not able to do so, it is necessary to organise groups of them in small residences which avoid a mass situation and favour and promote, instead, social and affective stimulation. Each residential unit should have ten or at most fifteen patients, and there should be a relative close at hand.

It is clear that when we talk of this initiative, we are referring to persons of average or extreme deficiency who are not able in take part in normal work, social, or family life.

In addition to reducing architectural structures to modern day

methods, it is accepted that in caring for these patients a fundamental element consists of utilising professional psychiatrists and psychologists who are specialised in new forms of treatment. In this category there is a special group made up of individuals who are not able to reintegrate themselves into the family or society. They are patients who are chronically defective and who also suffer from somatic and psychic afflictions and inadequacies. Fixed rules do not exist for these patients — they should be treated and cared for according to the needs of their situation and condition in as human a fashion as possible.

It is a good idea to follow the principle of avoiding care on a mass scale and to maintain contact with the family in as close a way as possible. The health authorities must help the families of these patients, but the families themselves must make their own contribution and thus lighten the burden which falls on the public health structures. Perhaps the best method would be for there to be a kind of state payment which would allow the patient to be kept within the family. In this way the patient would have a more personalised kind of treatment and the family would be relieved of the costs of care — something which, nevertheless, remains a duty.

Care of the Aged Mentally Ill

Another group which deserves special consideration in the organisation of care is mentally ill people afflicted by senile or pre-senile dementia. Because of their special characteristics it is difficult to include them in the categories of care which I have outlined above. Treatment, here, should be directed towards enabling them to use their social, intellectual, and physical faculties rather than an ad integram recovery. This last, indeed, because of the degenerative character of their condition, is not feasible. We must, therefore, accept the progressive physiological decline of all their faculties and thereby give help and care in the best way possible.

These general principles will always be valid — that is to say, as far as possible the elderly person, notwithstanding his or her dementia, must be kept within the family. If this is not possible it will be necessary to move on to general geriatric care. And if this, also, is not possible because of the great psychic disturbance by which he or she is afflicted, then one must engage in the specific organisation of psychogeriatric care in an institution suitable for such a purpose.

Experience in this area has been varied and extensive. In some places the blocks of old psychiatric hospitals have been used because the patients who lived there were for the most part elderly. In other places use has been made of town and city flats or rural houses. In such cases strict contact has been kept with the polytechnic because many of these patients, having physical impediments and debilitations, are more vulnerable to somatic than psychic illness.

Today, thanks to studies of the human brain, of those elements with a degenerative tendency, and of the possibilities of implanting new cells, this kind of care is improving. This, however, is a question of temporary improvement in the condition of the patient — such afflictions affect people who suffer from other ailments because of their advanced age, not least old age itself. The patients who can derive advantage from such initiatives are those who suffer from pre-senile dementia (Pick's and Alzheimer's disease), the effects of which can be detected from the fourth decade of life and recovery from which has more possibilities of success.

Conclusion

A recognition of the continual advances made in the world of psychiatric care and a similar recognition of the impediments to progress caused by great architectural complexes and huge institutions suggests that in the future more resources should be allocated to the development of the personal, individual, and group spheres, and to the contribution of the family, rather than to the construction of facilities which direct care towards methods which are not in the least receptive to new changes. The resources which are spent for these ends will produce increasingly better care and the good training of personnel at every level will be a continuous guarantee of forms of care which move with the times.

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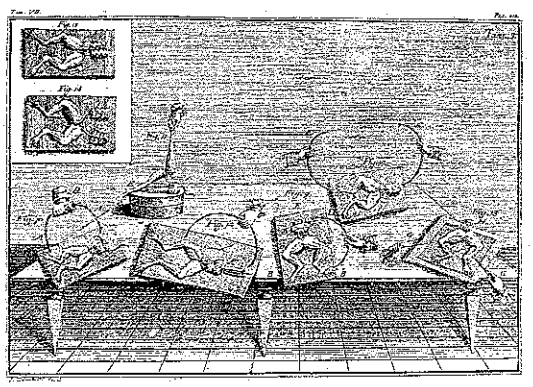
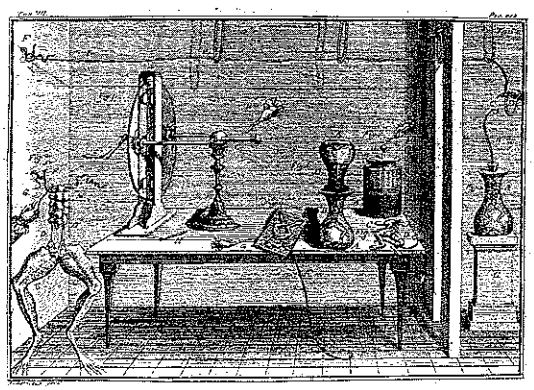




JAMES CASSIDY

Drugs and Alcohol

It always gives me great pleasure to come to Rome, to St. Peter's, the center of the Church, especially for the purpose of participating in a conference of the Pontifical Council for Pastoral Assistance to Health Care Workers. This conference on " The Human Mind " is very important because in the struggle to understand the human mind we must always be aware that the person is more than just a mind or brain, but a combination of body and mind, deeply rooted and connected.

The topics that we have been given to discuss at this Round Table moderated by Dr. Guzzanti, are the human, organizational, ethical, juridical, and pastoral problems of care. A most ambitious and challenging task to which I hope we can do credit. The subject I have been assigned under this heading is drugs and alcohol, a topic on which we could spend years of discussion; however, I will focus directly on the effects these have on the brain.

There are many types of programs throughout the world dealing with alcohol and drug abuse. What we are specifically interested in here today, however, is the long-term effects of alcohol and drugs on the human brain and the care of those individuals who suffer adverse effects from long-term abuse and who are incapable of caring for themselves.

In health care today, considerable emphasis is placed on acute care, although major problems exist with long term care of the sick and disabled. What do we do with people who are seriously disabled or are not mentally able to function in a productive manner because of drug or alcohol abuse? This, I believe, is a serious problem which warrants the Church's active involvement. The people most neglected, and most in need, are those very ones that I feel the Church can best take care of because of her dedication and concern for the less fortunate. And, indeed, those who have abused their bodies and brains are our less fortunate.

The first problem area we will address is alcoholism, a widespread problem not only in the United States, where it has the greatest social, economic, and public health impact, but throughout the world. Charness et al. have reported that in the United States alone, the annual cost of lost productivity and health expenses related to alcoholism is estimated to be $ 117 billion. They further state that " alcohol-related neurological disorders constitute a particularly large subset of the medical complications of alcoholism. The frequency of such disorders reflects alcohol's widespread use but more puzzling is the great variety of these disorders, which may involve virtually any level of the nervous system. Not everyone who consumes alcohol to excess has the same neurological complications, nor is it clear why a particular complication occurs in a given person. "

This is also true in the use of drugs, wherein certain people appear to have different responses to drugs at different levels. The article further concludes that " there also appears to be genetic disposition to alcoholism, particularly in the sons of men with early-onset alcoholism. These genetic factors may also influence the susceptibility of certain alcoholics to neurological complications. The performance on neuropsychological tests has been found to be impaired in 50 to 70% of sober alcoholic patients, most of whom do not have such readily treatable disorders. Although cognitive deficits are sometimes mild, many alcoholics have stable and severe cognitive dysfunction ranging from amnesia to dementia. These deficits are also true of many drug users.

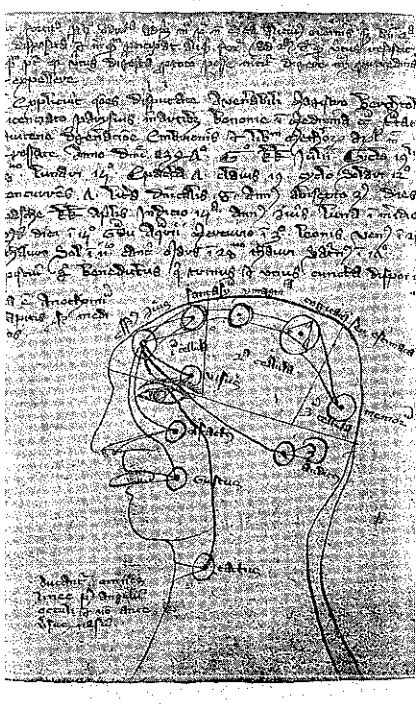
When we talk about the drug user population, the real problem seems to be among teenagers and young children using drugs. While many youths begin their drug habits popping pills, they soon progress to using " harder " drugs. As their bodies and brains are still in the growth phase, the physical and physiological damage from drug and alcohol abuse can be more severe than in an adult abuser, and the effects are often irreversible. Most of these youths don't realize the tremendous ramifications of their drug use and are ignorant as to the effects of the drugs on their brains and bodies. They certainly neither realize nor accept the fact that in all probability they are permanently damaging their chances for a productive future, both academically and professionally.

There are several approaches for the care of alcoholics and drug addicts. One of the largest and most renowned self-help programs is Alcoholics Anonymous. AA is a group therapy support program which assists and and encourages an individual in the daily struggle to remain sober. AA and similar programs have, fortunately, been quite successful. What we are interested in here, however, is not the care of those individuals who are still leading somewhat productive lives, but

the care of the individual who has experienced some form of dementia or mental difficulty because of continued abuse of alcohol or drugs. Generally, these individuals are unable to function and care for themselves once dementia has set in.

Another related problem which we are beginning to see today is that a great number of AIDS patients are now experiencing dementia. Most of these patients acquired the HIV infection through drug abuse and the sharing of contaminated needles. Several years ago when a person was diagnosed with AIDS, he would generally die within 18 months to 2 years from the onset of symptoms. This is no longer the case. Because we are now able to treat the patient more aggressively, few are dying early from cystic pneumonia, and, with treatment of AZT and other helpful drugs, lives are being greatly prolonged. On occasion, we have also observed AIDS patients who have no symptoms other than dementia. This has been a rather radical change because the patients I saw four or five years ago were very competent and were able to function well with clear cognitive processes. Now, in the last stages of this disease, it is common to find dementia. Because of this shift in the natural history of the disease, we have also had to change our way of dealing with the AIDS patients from the onset of the symptoms until the disease process is complete and the patient dies. This certainly involves another complication for the care of today's AIDS patients.

Another related illness with which we have been working is Huntington's Disease. In our nursing home in New York, we currently have between 15 to 20 Huntington's Disease (HD) patients. This is probably the largest population of Huntington's Disease patients in New York, if not around the world. The disease is a genetic disease with a dominant gene. An individual generally shows no signs of the disease until reaching 40 or 50 years of age, although we do at present have a teenager in our nursing home with Huntington's. In HD, the brain is affected and the person deteriorates. Unlike Alzheimer's patients, the Huntington's patient is very aware of his or her mental and physical deterioration. These patients are often suicidal and extremely difficult to care for and treat. Many, unfortunately, do commit suicide, although there is help available to assist them to accept the disease and work with it. Another problem with this disease is the treatment of the families. Children of Huntington's patients have a 50/50 chance of developing the disease and will generally become symptomatic around 40 — 50 years of age. The tremendous implications for the family of an individual with this disease results in great feelings of guilt, fear, and worry. There is no cure. All we can hope to do is to prolong the functioning of the individual and delay the onset of the deterioration that is going to take place.



Patients with chronic brain syndrome or dementia are among the most difficult patients of all to care for because they are generally the least rational. Also, health professionals often find it psychologically easier to assist patients who have the ability to get well and leave the hospital or who, with assistance, have a high likelihood of recovery. In cases involving dementia and mental deterioration, however, we are dealing with patients who are not going to get well and will never recover fully. It takes tremendous patience to be able to work with such patients and to be satisfied with the fact that all you are really doing is delaying their deterioration. This is very difficult to understand and accept and truly requires great dedication and compassion.

A true test of a society is how it cares for its most helpless citizens. People with mental deficiencies, in particular, are the most helpless of all. They are much more dependent on society than the poor or disabled who are rational, reasonable, and able to some extent to function.

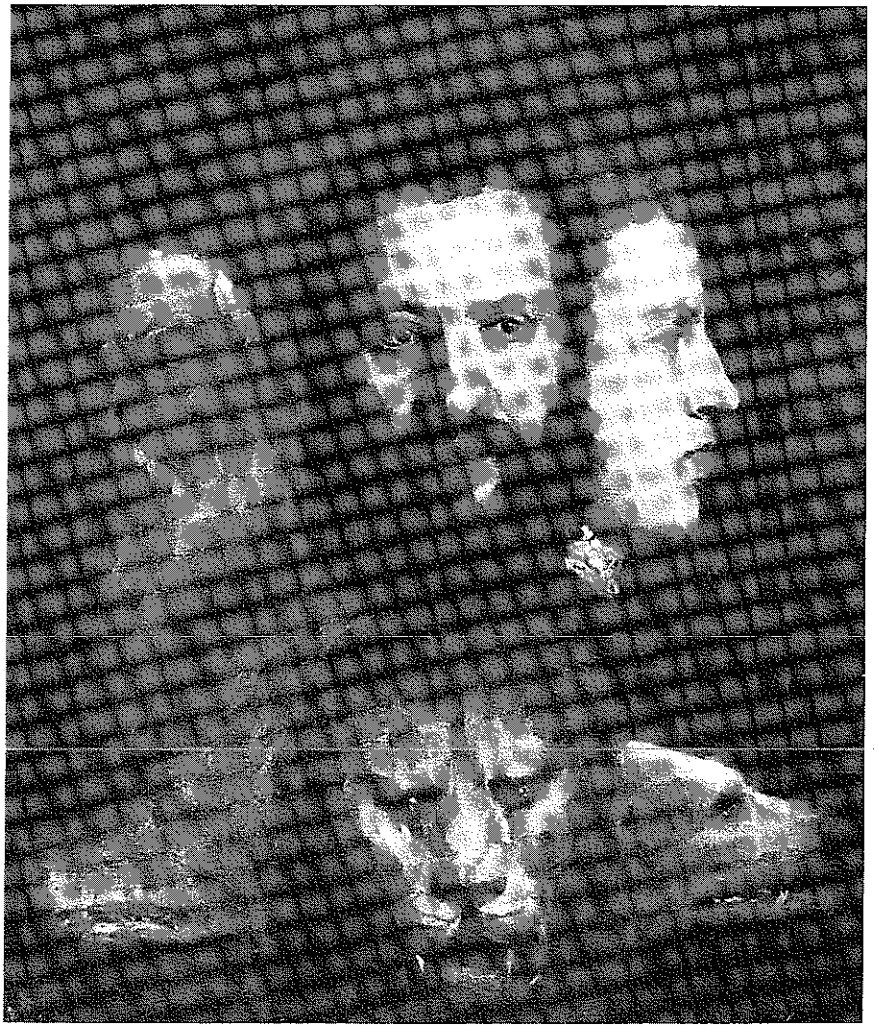
Caring for individuals who do not have control of their mental capacities requires a considerable sense of dedication, compassion, and a true respect for the dignity of the human person regardless of his ability to function or lead a productive life. It requires an appreciation of progress, no matter how small, and a sense that to use one's remaining time wisely and productively can be most rewarding.

It is often very difficult for persons without a Christian sense of

mission and faith to be able to see the value of the work that is done with these patients such as I have described. It is for us, as Christians, to reaffirm our awareness of the dignity and sacredness of each human person and to take care of each person with the love that is derived from the realization that in each person we are able to see Christ. " Whatsoever you do to the least of my brethren, that you do unto me " (*Matthew* 7:12)

We hope that in the future we will be better able to focus on long-term and special needs of individuals with deteriorating mental states, the handicapped, and developmentally disabled. We must determine and compare the effectiveness of caring for these patients in various settings such as home care, hospice, nursing home, and the hospital. We must also focus our efforts on developing care programs that will enable the individual to retain his or her dignity until death. This is the real challenge in health care today. Not just taking care of the acute patient, but being able to take care of those who have lost their mental functioning through alcohol or drugs or through some genetic disease. This requires a real deepening of faith on the part of the health care worker. Without that faith, without the realization that we should see things as Christ sees them, we are not really able to function in this field and to care for each person with dignity.

Rev. Msgr. JAMES CASSIDY, Ph. D.
Chancellor of the New York Medical College, USA



PIERLUIGI MARCHESI

Professional Training for Working in Psychiatry

1. Premise

Being fully aware of the difficulty of the subject that I am to speak upon, I asked some of my colleagues who are involved in the area of psychiatric care for their opinion. This text is the outcome of our joint reflections and I present it to this august assembly at this congress in the name of all the workers and members of religious orders who are still involved in a serious way in psychiatry.

I would also like to observe how distant my experience is from the academic world and to emphasise how much I would like to speak of my current work in the psychiatry world rather than expound and propound theories.

Perhaps, indeed, it is for this reason that I have been invited here. I had to abandon my studies after the fourth gymnasium in order to respond to the practical necessities of my order — the FBF — and to care for old people who were under treatment in a hospital in North Italy during the Second World War. Perhaps the invitation which His Excellency Monsignor Angelini so warmly bestowed upon me arose from the fact that I have held a position of direct responsibility for many years in the Italian psychiatric hospitals of the Order, and because of the extraordinary and demanding experience of being the General Prior of an Order which, with its brother members and thousands of lay workers, guides sixty-two psychiatric facilities which are spread over the five continents.

All this has come about because our founder, in the middle years of the fifteenth century, after being an itinerant, a mercenary, and a bookseller, literally went mad — in the sense that he left the conventions and constraints of his time and dedicated himself to caring for the insane in a different and modern way, as would be said today. He took off their chains and freed them from all other forms of physical restraint and proceeded to place them in more appropriate places, to feed them, to care for them, to encourage them, and to sustain them, and all this according to a prophetic and integrated vision of man and psychic suffering.

People who are involved with the world of serious psychic suffering, such as psychoses, belong to the most desperate branches of knowledge. They have had clinical and social experiences which cannot be completely or exactly described. Furthermore, models of psychiatric action and cure which have been acquired over time encounter difficulties when attempts are made to put them into practice, because of antagonisms which are absent at conferences but which immediately reemerge in practical work afterwards. As we are opposed to an all-embracing conceptualisation of the psychological and biological aspects which are involved in the case of patients who suffer from serious psychic disturbance, the study and the analysis of such patients obliges us to plan and to reflect. This involves a consideration of external factors, whether they are social, environmental, cultural, ethical, juridical, organisational, familial, economic, or work-related. They are important both with regard to the structuring of the psychosis and in the phase of the rehabilitation of the abilities which are blocked but not lost by the psychotic person.

And to be even clearer: this morning we have heard a consideration of the care aspects of psychiatry. It remains, however, true that the model of integrated action and care is the real response to a specific need of the psychotic person.

The personnel and staff who work in the field of psychiatry include experts on the psyche and experts on the organisation of services who oversee the achievement of tasks, programme and adapt structures, and regulate and encourage behaviour.

The old-style lunatic asylum was indeed something that put everything and everybody together, but it avoided certain inconveniences and disadvantages for us — the people engaged in care and treatment. These difficulties include the difficult activity of integrating different classes of workers and personnel; a wide range of spaces and services; and new elements and categories such as relatives, voluntary workers, politicians, the Press, and the Church, all of whom are " overly " concerned with our affairs. Not to mention the proliferation of very many forms of therapeutic mischief such as dancing, music, gymnastics, and so forth.

Our problems become more complicated if one thinks that we have to design, plan, and bring into being structures such as the Defence of Territorial Unity, work cooperatives, protected residences, etc. All this implies that the experts, scientists, and workers know how to develop minds and psyches which can create and organise structures fully suitable to the work of rehabilitation.

And it is because of all this that I have envied (in a very un-Christian

way) those experts on the human mind — with a Nobel prize winner foremost amongst them — who are immune to the very demanding task which has been allocated to a man in the frontine: to present (and in the presence of so many illustrious and eminent personages) a summary paper on the subject of professional training for those who work in the field of psychiatry.

Psychiatry (like medicine) is not a science, and the psyche cannot be known from outside or by using objective methods.

Psychiatry is a praxis, like medicine, which in its application utilises certain natural sciences, human sciences, cultural knowledge, social knowledge, and so forth. Another person's psyche is known " through the medium of a third party, " that is to say, by making reference to our experiences lived in their subjective aspect. And that is not all. Unlike medicine, psychiatry developed without suitable examination of the sane and healthy. The contribution that in the sphere of medicine physiology has given to pathology has occurred to a much lesser extent with regard to psychiatry. In other words, " to the vast quantity of studies which describe in great detail the state of experience of a man afflicted by more or less serious pathologies there is lacking a commensurate analysis of the experiential state of what is healthy in real life. " Furthermore, we know that the mind and the psyche, unlike other organs or functions, present a high level of uncertainty in terms of classification. For this reason, the passage fom custody to psychiatric rehabilitation requires structures and strategic forms of behaviour which severely test the psyches of both young and old psychiatric workers, above all else when one considers that rehabilitation is only possible through the medium of personal relationships based on a personal approach between the worker and the patient.

I believe that I will not encounter obstacles from those assembled here if I say that as far as the object of training is concerned, one is dealing with the training of the professional personality. The fact that stress is put upon the term personality presupposes that in addition to an acquisition of initial and ongoing knowledge (in Italy the terms are academic training and updating) the personality of the professional person working in the world of psychiatry is subject to processes of change. This is an important condition for there to be a continual integration of knowing and being, of the rules of the art and their application by the artist. All this should take place according to open lines of development and in conjunction with a multiplicity of factors: experiences, aspirations, potentialities, objective possibilities, and the cultural atmosphere.

The stress upon the term professional assumes that an " initial training " has taken place. But I will not dwell upon this subject in this paper because it is a subject for university teachers and researchers, for experts engaged in important and preparatory academic programmes, for those that dedicate themselves to preparing the future technicians of psychiatry. The forming of a professional personality is the product of academic study, of updating, but also, and in our field first and foremost, of a continual utilisation of initial training. Indeed, the idea that " above us there exists unlimited knowledge which in some way we must make our own " is false. " But science, the knowledge that really exists is what we feel that we can achieve, insofar as we perceive the force of the problem as being acute, and note the important lack of research. " The spur for our actions should be the consciousness of our ignorance, which, as we know, is already a principle of knowledge. This consciousness cannot be eliminated by any degree course, by any advance, however prestigious, in the field of physical — or, even more, psychic — knowledge. The re-utilisation of initial training unleashes, however, enormous defences against threats to our own identity — something that has affected many people during their long years of initial training.

In this sense (and paradoxically) the least defended are those who have studied the least in their specific field, those who can bring great innovations, especially in the psychosocial field. Typical of this is the statement that the Balint Groups (for the psychological training of the medical doctor) are very famous but have few practical followers.

In directing his attention not only to ill organs but to the person, to the relationship that the patient wants to establish with him, to the relationship between the body and the mind, and the subjective and affective dimension which is implicit in every doctor-patient relationship, these ideas throw the mentality of the untrained doctor into crisis. The professional identity of the medical doctor, which has been adcquired with much difficulty during long years of university work and in actual practice, cannot be thus scratched without a profound protest from the doctor himself. Permanent training is required, that is to say, a journey within oneself and an analysis of one's own ways of doing things: as long, that is, as one wants to know, relate to, or better still achieve a relationship between one's own psyche (a very powerful instrument) with that of the person who has lost or mislaid the deepest meaning of his own existence.

The other necessary requirement when one speaks of *training* — a word which covers a lot of ground — is *information*.

Whilst the objective of information (and of training) is to *reduce* (both operative and cognitive) *ignorance*, the objective of training is the reduction of our *immaturity*: ignorance is a form of immaturity which no man can eliminate but which he can only hope to diminish in size.

This wounds our narcissism, but the wound of the " wounded pupil " is for this reason always being treated (even when he has a long experience as a teacher), and it is the only condition which motivates us to grow in the field of " external " and " internal " knowledge. This last form of knowledge we can call consciousness, or better still our own knowledge of our psychic medicine (our Personality) — a medicine which is not considered seriously even in the glorious twentieth century.

In the same way a change in the way of being, which is the point of arrival for a formative project in the strict sense, cannot come about without a " break " with the old terrain and its exposure to the complexity of life and to becoming. This last is an operation which provokes many fears and which, in or-

der to be sustained, requires an ability on the part of the teacher to personalise his educative relationship with his pupil. The most resistant to training are: medical doctors, teachers, priests, sociologists, and a large number of psychologists. These are all people who, in being used to showing their knowledge, limit themselves — for understandable reasons — to sowing seeds, proposing lessons, courses, lectures, up-datings, conferences..... At the same time they forget that the transformation of a person is an undertaking which requires a deep alliance between teacher and pupil, a climate of authentic freedom, a teacher who is able to undergo " growth " (and he before any other), and to tolerate the long time that change requires.

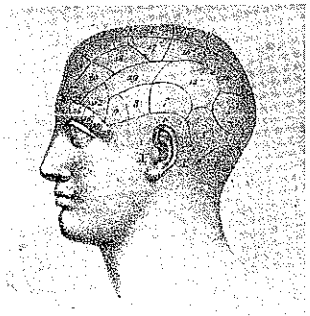
One further consideration: those that have chosen to place emphasis on cultivating the soil should not expect much recognition. Even if seeing " false prophets " in the field of training causes much pain. These " false prophets " are those people who promise rapid changes, who create easy enthusiasms, who always have a ready answer, who hold the inevitable phases of difficulty — which are the lot of those who cultivate the soil seriously — to be negative. They do not want to recognise that every transformative process is always painful, that training cannot be bought, and that it undergoes phases of uncertainty and disappointment. This is why someone declared that the training of adults — something directed at the maturation of personal capacities — is an undertaking which is sometimes exciting, often disappointing, and always disquieting.

2. Training in psychiatry and the rehabilitation of psychiatric workers

We now come to the central point of the reflection, which I would like to entitle " rehabilitation of workers who work in psychiatric rehabilitation. " The person who is responsible for the coordination and stimulation of the psychosocial rehabilitation of the chronically mentally ill is forced *to permanently rehabilitate the psychic structures of the workers in this field until they develop — over and beyond their academic knowledge and specialist practice — those abilities which the complex and various needs of the individual patient require.*

The time that elapsed between the passing of a law like the famous Italian Law 180 (which reformed psychiatric care) and its implementation was necessary to allow a rehabilitation of psychiatric workers themselves.

In dealing with the subject of training in psychiatry (and here I am speaking of post-university training and permanent training), which aims at developing our personalities as professionals, we must take into consideration the most precious resource possessed by Homo Sapiens: our mind and our brain. Here resides our invisible ability to think, to love, and to act. We have been called together for these few days to discuss this capacity, for which God made us in his image and in his likeness. Soul and mind are terms which at times are distant from each other and at times superimposed upon one another. But one cannot, however, continue to reduce the human mind to its biological or psychological partial aspects — this is because all of its component elements constitute a single and indivisible whole.



Some Nobel prizewinners have made contributions to this conference. They received their prizes because they have exposed their minds to strong stimuli, and have sought to rehabilitate their minds with new theories and hypotheses — thereby escaping the force of habit and the effects of routine.

Following their example, we must constantly expose our minds and our senses to rehabilitation — something which the psychiatric inpatient leads us and forces us to undertake continually. We will not manage to tackle the problems of our patients if we do not train our mentalities as experts or scientists to find practical solutions suitable to their needs. When we speak of training for rehabilitation we workers in the field must make use of all the methods of the human sciences which make scientists out of experts and *vice versa*. And this takes place in a continual bustle, in an atmosphere of optimism, of constant learning, and of antisclerotic activity, so that the patient can have the answers for which he has waited for too long.

Above all else, we should think of techniques and methods which are suitable for our training for the psychiatric therapeutic encounter.

The psychiatric encounter, therefore, is always and inevitably a matter involving two people who try to talk to each other, and in many cases it involves many people, amongst whom there is the patient who presents patent symptoms of mental illness. This principle establishes, once and for all, the impracticability of forms of therapy where the practice is to give drugs without any regard being paid to the patient being reluctant to take them, (as if one were throwing pills into a bin). Credibility is thus denied to the person who thinks he can treat a psychosis by administering drugs to the patient without his knowledge — for example, by putting drops of butyrophenone in his daily soup. It also removes the bases of the fatally widespread system of deceiving the patient as to the nature of the visit that he has to undergo (for example telling him beforehand that he will be examined by a dermatologist or a diatologist), or of putting him unexpected-

ly in front of a psychiatrist (having taken him there without an explanation in the same way as one would take a parcel for posting), or, more commonly, thinking that one can make him establish contact with the psychiatrist by asking the latter to breakfast so that the psychiatrist can " have a look " at the sick person who is present, and then prescribe a therapy.

The category that *schneider* presented as a positive conclusion to his work was " psychiatrist — doctor of the soul " — a worker who, in addition to having a natural curiosity for his own psychic life and the psychic life of others, manages to be himself spontaneously and freely in order to represent a trustworthy figure of identification — something which is indispensable for the psychotherapeutic process. It is this attitude or stance which characterises the absence or the salient presence of mechanisms.

This new and more human conception of psychiatry leads to an increasing emotive involvement of the worker with all the concomitant psychological problems which emerge from direct contact with the psychotic patient (threats to his sense of identity; to his own integrity as a person; to his mental serenity; with the bringing into play of his entire personality, with all its normal and pathological, conscious and unconscious, aspects).

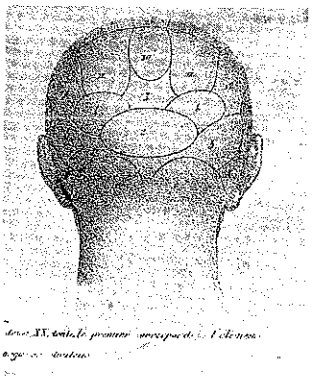
Permanent training must take these problems into account, provide support to rendering the worker responsible, and promote the concrete expression of a model of mature behaviour.

Whereas basic training guarantees the transmission of a culture and indispensable theoretical knowledge, permanent progressive training in the field of work must aim first and foremost at human qualities, at the transmission of experience, and at the constant improvement of the personality of the worker and his professionalism, so that he can be a true therapeutic agent.

In our psychiatric facilities training is centred on small groups: aggregations of people in an operative group who, in trying to tackle tasks and achieve common objectives, bring about changes in attitudes and the acquisition of new abilities and, in the final analysis, cognitive and affective-emotional growth on the part of its members.

In this way there is an attempt to develop a process of experienced learning; a constant connection between theory and practice; an integration of psychiatric concepts with basic experience gained with patients; an ability to analyse observed and interpersonal facts; a habit of discussing and comparing work already carried out or planned for the future; reflection on how one should handle certain particular problems; a greater understanding of patients so that the relationship with them can be used in the best way possible; a more suitable structuring of ways of acting in each case, and a promotion of the potential abilities of individual members of the group.

In particular — since treatment and care of long-standing patients " who do not get better " can demotivate workers because of the apparent immutability of their situation — much space should be given in the training of our workers to reflection and to analysing situations which involve them emotionally and affectively (with a sharpening of capacity for introspection) through training carried out in individual units and by means of training meetings for homogenous professional groups. All this, which involves a reduction of confusion about professional and individual spheres, allows the worker to adapt a more suitable attitude towards the psychotic patient and to tackle the relational tension which derives from this kind of relationship in a more suitable fashion.



3. Basic criteria and models for training in psychiatry

A special characteristic of psychiatry is not being able to act through objectification but having to deal with subjectivity. For this fundamental reason, " technical knowledge " is in itself not enough to support psychiatric action — the problem of training, however, is of prevalent importance. In this case, man is, in fact, the very instrument of his own action, and he must therefore be " trained " " adapted " and " made suitable " in relation to his task.

In my opinion psychiatric work is based on three cardinal elements:

understanding,

making oneself understood,

and motivating oneself to embrace change.

By understanding is meant Jaspers' " genetic comprehension, " that is to say, that immediate obviousness — which cannot be diluted in any way — of being face to face with " the truth " or even the simple " truth of the other person. "

This latter form of comprehension is what is usually involved in psychiatry, and contrary to what might be thought requires special training and preparation.

Indeed, we are instinctively led not to accept the world of the other person as such but to assimilate him to our world, thereby denying authenticity to what does not correspond to us.

Our understanding is always distorted by a series of " but — yes — buts. "

On the other hand, the drama of the psychiatric patient is precisely that of having gone through experiences which are not shared by the community and which are often actually egodystonic, and he thereby easily runs the risk of feeling walled

up inside his own incomprehensibility.

In order to develop the ability to understand — in the etymological sense of the word — we should create a situation in which the psychiatric worker can experience this possibility without dangers, without fears, and discover how much it can lead to positive appreciation rather than limitation.

The hubris of absolute truth makes us, in competitive fashion, aggressive custodians of our own small truth, while a recognition of the basic partiality of the truth of each person allows a continual widening and enrichening of our cognitive horizons.

To obtain this ability (which seems so simple) long, continual, and repeated exercise is necessary, in a protected situation which allows an easier cession of our own defences.

Such conditions can be offered by small training groups which, in order to distance anxieties connected with self-centredness, should be heterocentric. I mean, in other words, that the text offered for the group's analysis should not be based upon experiences of the participants themselves but upon an external " case " presented by a member of the group.

The study of the text must not be limited to a discovery of a hidden truth which is then revealed, but should involve allowing all members of the group to offer their " comprehension " of what has been related through the game of multiple identifications. These identifications may be seen as an instrument for possibly infinite hermeneutics not directed towards a definitive and annihilating " explanation " but expressing a wish for rich (even if partial) illumination to which everyone offers a contribution which is neither right nor wrong, but only " particular. "

It is much more difficult to reach this " democracy of perspectives " than one imagines, but it is an absolutely propaedeutic moment for the realisation of an affective joint encounter with the psychiatric patient.

In an opposite situation it would be difficult for us to lose our conviction that we have forms of knowledge that should be imposed on others.

" Making oneself understood " has been presented as the second cardinal element of psychiatric operativeness.

This ability, naturally enough, is also based on techniques of communication (of an oral rather that mimed character — being gestural or expressive, and involving such activities as drawing, playing, or singing), but one cannot forget that every form of communication takes place in an " affective " medium which gives the real tone and meaning to what is being communicated.

To pay attention, therefore, not so much to intellective-cognitive interactions, but to emotive exchanges is, once again, an ability which needs to be activated and developed.

In this case, as well, it is unthinkable that this capacity should only be cultivated through work " in the field, " in whatever way it is guided and supervised.

A maturation of this ability through group work which pays as much attention to affective facts as to cognitive facts is less dangerous and more advantageous.

It should not be forgotten that although it is very important to " make oneself understood, " it is no less important to know how to accept the frustration of " not managing to make oneself understood. " The violence of wanting to be understood at any cost is the daughter of the incapacity to tolerate the above-mentioned frustration, and is the mother both of many ill-considered actions " which have a good end in view " and, to put it succinctly, of the defences which our patients very often erect.

The group is a unique gymnasium in which to learn and to accept our not-total communicability as human beings. Within it we can experience how difficult it is at times to be understood by our own colleagues, but it can also show us how we can function well when we accept the partial character of how we understand one another.

In conclusion, motivating oneself to embrace change has been defined as the third cardinal element of psychiatric work. I believe that only by activating love-envy emotions is it possible to motivate the patients, who must, however, find models of possible identification in us.

Once again the group — which allows a joint emphasising and affirmation of the individual personalities involved — more than any other method allows each person to develop a suitable love-esteem for his own individuality — something which is the basis of every chance of being loved and esteemed by other people.

In this sense, the advantaged dual relationship between teacher and pupil, betweeen disciple and guru, can indeed be so inflating as not to allow the necessary possibility of identification on the part of the psychiatric patients themselves.

It is no accident that the most afflicted patients are well known to link themselves more often to the most humble workers, who are unfortunately often the least well prepared.

Technically, four priorities with regard to objectives concerning training can be delineated:

—*Orientation towards the psychiatric sector*: sensitivity towards relational problems with people who are psychically disturbed and the ability to control internal and external dynamics which develop with work.

This training element is indispensable for all workers who enter the psychiatric sector and who do not have a familiarity with mental illness in their basic training. It involves, therefore, all the different types of workers — but not the psychiatrists — and constitutes an, at times, even brief form of training for access to service in the psychiatric sector.

In a deeper and more continuative fashion it also concerns the nurses. They develop a more intense relationship with those undergoing psychiatric care. A greater experience of this element in training should not, however, be applied to social workers. They are, first and foremost, engaged in inter-institutional work. Nor should it concern psychologists. They have to have a more specialist form of training in the realm of psychotherapeutic techniques.

—*Specialisations* with regard to the three important elements in the therapeutic process: pharmacology, psychotherapy, community stimulus and rehabilitation.

These three elements involve spe-

cific roles which emerge with the division of tasks which takes place within the team. As a general rule, pharmacological specialisation is offered to the doctors; psychotherapeutic specialisation is offered to the psychologists and the doctors; specialisation in stimulus and rehabilitation is offered to the psychologists and educators. Pharmacological specialisation requires a training approach which consists of study and research. The other two specialisations, however, must lay stress on a more active approach, on training in the sphere of actual work.

—*Orientation towards collective* work: a willingness to engage in group work; attention to the dynamics which develop in a complex system which has differing roles; acceptance of a quota of organisational work which all workers are asked to perform; a capacity to programme one's own work and to co-ordinate it with other people; ability to evaluate the effects of the work performed and the results of the activities of the service as a whole.

This element is required for all workers and its collective assimilation is of utility. It is developed with two training modalities: at a primary level it allows a theoretical-practical approach (lessons and drill-lessons), at a deeper and more continuative level it needs training in the work field (for example — a continuative supervision of the working and activity of the team).

— *Specialisation of those engaged in coordination*: an ability to evaluate and understand the working and activity of the psychiatric unit with the help of an organisational approach; the analysis of work systems; variables to be observed and controlled; instruments for the negotiation of resources; styles for the management of human resources; instruments of research and for the evaluation of work.

4. Training for the pastoral reception of psychiatric patients

I cannot fail to conclude my paper on training for those working in psychiatry without an invocation made in my name, that of the mentally ill, and the very many workers engaged in their care and treatment.

We ask for a new and specific form of training for pastoral workers who are engaged in psychiatric rehabilitation to be studied.

The recent document of the Italian Bishops' Conference on Pastoral Care for the Sick has given unequivocal illumination on what the tasks are of the Christian community as regards pastoral care in hospitals. But this does not take anything away from the specific role of the person who is directly engaged in a spiritual accompanying of a person afflicted with mental illness.

We dream of a person who is an active and stimulating force: an integral part of the therapeutic teams, scientifically informed, sensitive to the very great religious problems of the mentally ill (feelings of guilt, delusions of grandeur, wish for sacrificial salvation). Only in this way will such a figure be able to conceive of, and to create, "models" of religious education and of the care of souls which amount to more than useless ritual formalisms.

Because it is a mistake to assume that they — the mad — do not understand anything!

Our rationalist model is inadequate for an understanding of their madness — something which in every individual person deserves other logical forms for it to be heard and interpreted.

Every approach — including the pastoral one — must have a rehabilitational effect, and must seek to do this by activating those residual potentialities which are dormant in the mind of every mentally ill person.

This role could be performed by the liturgy: a moment of interest for the encouragement of hope; the presentation of models of salvation; and the re-giving of life and of an authentic sense of the divine — something which inveterate habits have obscured.

The mentally ill require different forms of liturgical action which are more suited to them and their needs. The Gospels should also be presented to them in a different way. They need, therefore, new men who are not themselves wounded in their souls, demotivated, or accustomed to seeing too many patients die in dementia.

We are thinking of an extension of the Camillianum programmes which would involve obligatory specialisation for those who work in the field of psychiatric pastoral care. But first and foremost we have projects in mind which would involve action after five or six years and which would have the aim of diminishing the phenomenon of burn-out and allowing authentic evaluation and examination of the pastoral care worker.

In this field we need open and creative men who know how to set in motion those processes of "interior healing" which theologians talk about, and of which even the seriously psychotic person seems to be capable when given the necessary support and help.

An evident pre-condition is that we believe and bear witness to the love of Christ, which produces "health-salvation," even in the most serious situations of ill-being.

The moment has come for us to evoke all the force and strength of the ethical commitment which is at the root of pastoral care.

Pastoral care which is dedicated to man in his entirety and with his limits: care as a moral duty because the other person — whoever he may be — has the right to a dignified existence.

On this frontier the ethical credibility — and therefore the therapeutic effectiveness — of the pastoral work of the future is at stake.

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TERESA LOPEZ BEORLEGUI

Aspects of Psychiatric Care: Human Problems

1. Introduction

I would like to espress my gratitude and appreciation to the Pontifical Council for Pastoral Assistance to Health Care Workers for inviting me to take part in this important conference on the subject of the human mind. Experience shows us how we should consider these questions from more than one point of view, and this will undoubtedly lead to a great wealth of different contributions to this conference under a variety of different headings — biology, theology, psychiatry, law, and so forth.

My contribution to this round table on "Aspects of Psychiatric Care" will dwell upon human problems, as is indicated in the programme.

2. Social Changes and a New Psychiatric Population: New Groups at Risk

Social changes, technological innovation, and the crisis of traditional values have had an incisive impact on the mentality and behaviour of modern society. These transformations, at the same time, have generated malfunctions, maladjustments, and psychological crises which have provoked psychiatric illness in categories which only a short time ago were not afflicted by serious problems of mental health. These are new groups at risk which have been born in the circumstances I have just mentioned. At this juncture, because of the short time available to me, the following categories should be briefly described:

a) Youth. Permissivism and the increasing liberalisation of modern-day society have led to a fracture of mechanisms of guidance which traditionally sheltered young people. The consequence of this development is that this section of the population has become a principal protagonist of certain risk factors regarding mental health. For example, the abuse of alchohol and the use of drugs and psychopharmaceuticals have led to forms of behaviour which *bear high risk*, such as dangerous driving and casual sexual habits (a condition conducive to unwanted pregnancies or to contracting HIV) and to violent forms of behaviour with the inevitable results of suicide and attempted suicide.

b) A socially hostile environment. The increase in the number of people who find themselves in a socially hostile environment because of problems relating to language, housing, work, unemployment, etc. Such a situation hinders a normal development of the personality and that minimal quality of life which is necessary for a suitable mental balance and stability. This decline greatly increases mental vulnerability and the level of risk which is present. On this theme we can take note of the weakening and the fracturing of social and family ties; the high level of geographical mobility; long-lasting unemployment, the lack of a social role, and isolation within society; the increase in the number of people without housing; the growing consumption of anxiety-reducing drugs and sleeping pills.

c) Longevity. The increase in the number of elderly people which has resulted from the increase in life expectancy has given rise to an increase in senility-related psychiatric afflictions, and in dementia, in particular.

Life expectancy has also been increased for those who suffer from serious neurological and cerebral damage, especially when such afflictions are of a congenital character. This increase in lifespan is a result of advances achieved in the technological world.

All these circumstances give rise to a considerable increase in psychiatric pathology at a certain age, and this requires suitable special attention.

d) Other factors. Other factors which contribute to the diffusion of psychiatric illnesses or to the appearance of new categories at risk can be added to those mentioned above. For example, the continued presence of traditional psychiatric illnesses, for which we do not expect a diminution in the foreseeable future; the increase in the number of psychic difficulties connected with AIDS; the new role of women in contemporary society (especially in Western society, where she is involved in the world of work but where her traditional duties in the home are not forgotten), which provokes situations of tension for the woman and for family relationships. These are factors which have all been created by these new risk-filled situations which promote the appearance of new forms of mental illness.

3. Mental Health and Human Factors

We cannot in the least conceal

from ourselves the fact that amongst the new factors which create negative effects for mental health are to be found causes and dimensions of a human character — human, social, and psychosocial problems which in prevention as in therapeutic approach require an attention which goes beyond the confines of the psychiatric sphere.

To tackle the problems which come from this new situation interdisciplinary action is necessary. It should involve coordinated solutions so as to avoid, in certain cases, the appearance of illness and, in other cases, to promote and favour the treatment and rehabilitation of the patient.

I. *The Primary Importance and Dignity of the Human Person.* The point of departure for the solving, or at least the alleviating, of the above-mentioned situation is always keeping the dignity and the primary importance of the human person fully at the fore.

This conviction is based upon the Universal Declaration of Human Rights, to cite one instance, which has been signed by governments of most of the world. These governments have committed themselves to the practical application of the rights recognised in such declarations. It is enough to quote, for example, the following texts: " The States which constitute a part of the present treaty recognise the right of all individuals to a standard of life suitable to themselves and their families, to adequate nourishment, clothing and housing, and to a continual improvement of the conditions of their existence. " (*International Treaty on Economic, Social and Cultural Rights*, article, 117).

Further on there is added:

1. The States adhering to this agreement recognise the right of each person to enjoy the highest possible level of *physical and mental health*.

2. Amongst the measures which will be adopted, the States adhering, with the aim of ensuring the full implementation of this right, recognize

a) ... the healthy growth of children.

b) The improvement in hygiene, in work, and environment from all points of view.

c) The prevention and the treatment of epidemic, endemic, professional, and other kinds of diseases; and constant campaigns against these.

d) " The creation of conditions which guarantee everybody medical care when they are ill ". (*International Treaty on Economic, Social and Cultural Rights*, Article 12).

The rights declared in this declaration, as in other international declarations, have been recognised in the constitutions of the most modern states (Spain, Portugal, and Italy) as being fundamental rights of the citizens.

Care for the mentally ill and their needs, in the health, educational, work, and social spheres, constitute, given the articles which are quoted above, a right, and not an act of charity or beneficence. It is a social right of a fundamental character which in the case of invalids, semi-invalids, or mentally ill patients of a chronic nature involves not only the right to health care but also to protection in the world of study and work, to the provision of social security, and to education which is suitable to personal potential.

We can emphasise three special expressions of this right:

a) Right to quality of life. The international recommendations insistently refer to nutrition (worldwide fight against hunger), to housing, to clothing, to work (and to the conditions of workers), to education, to social security, etc.

b) Right to the protection of mental and physical health. The right to medical care and to medical services in times of illness, that is to say, the right to health care which involves both the particular care necessary for the recovery of health, and the adoption of preventive measures to maintain health and avoid the outbreak of pathological disturbances.

c) Right to mental health and denial of liberty. The absolute or partial loss of reason which is frequent in the case of the mentally ill, directly affects the ability of individual self-government, and ultimately, personal freedom. The situation of abandonment or the gravity of the symptoms require, on occasion the adoption of a series of measures which restrict the freedom of the infirm person, but which safeguard, however, his life, his dignity, and his health. These are measures, certainly, which are of a juridical character and in which can be found all the requisites necessary to guarantee the rights of the mentally ill person: incapacitation, custody, hospital care, etc. The protection of mental health as such, requires, in certain occasions, the limiting of freedom.

II. *The Community Aspect.* The recognition that the primary importance and the dignity of the human person is an axiomatic element in the treatment of the mentally ill cannot make us forget the community aspect of the person. " Human freedom often becomes weaker when a man is in a situation of extreme necessity. In the same way, it diminishes when a man, satisfied with a life which is too easy, shuts himself up in a gilded isolation. On the contrary, freedom becomes stronger when a man accepts the inevitable duties of social life and shoulders the manifold responsibilities of human life and undertakes to serve the community in which he lives " (Const. *Gaudium et Spes*, n. 31, of Vatican II).

This dimension of the person — his openness towards the community — commits the community to a reciprocal comitment towards the person. Man must not feel himself to be alone in society, but should see himself as a participant in and object of the common work of that same society. " This solidarity must increase every day until it reaches its maximum point " (*ibidem*, n 32).

The mentally ill person, because of his own limits and needs, must have this solidarity from the community in which he lives. Rather than being subjected to rejection and isolation, the mentally ill person must be helped and integrated in his own environment. Even today there is a tendency towards " community psychiatry " through the integration of services inside and outside the hospital which form a unity in which, besides experts and technical-scientific oppor-

tunities, there are present the human and material resources of the community.

I have here with me a programme for the prevention, the treatment, the rehabilitation, and the social reintegration of the mentally ill person. A community context is at the root of the programmes of mental health, a context where, in addition to the health care facilities — which are necessary for the recovery of health — there are many elements and actions of an interdisciplinary character in which health and voluntary personnel and other factors take part: education, work, culture, social wellbeing, justice, etc.

From this community perspective it is impossible to separate the importance of the family in the carrying out of the treatment and the care of the mentally ill. This participation is especially important in the delicate field of infant psychiatry, in the serious disturbances caused by development (psychotic young people, drug addicts etc), and in the reintegration of the ill person into society.

Let us dwell for a moment on this last particular aspect. Until a short time ago importance was never given to the participation of the family in everything connected with the problems of the mental health of the sick person. Without doubt, in the psychiatric process, the support of the family is one of the possible therapeutic, rehabilitative, and preventive solutions. For this reason it is appropriate to depart with an idea of what it is possible to do and, therefore, to try to assess the possibilities that the family offers. This is because it is the families which receives and will receive the mentally ill, and therefore it is right that they can depend upon the support and the information necessary to fulfill their potential as a primary social support system.

Under this heading, however, we must condemn the lack of sufficient economic assistance to the families which, when they have the burden of such an ill person, need resources suitable to the care which they must provide.

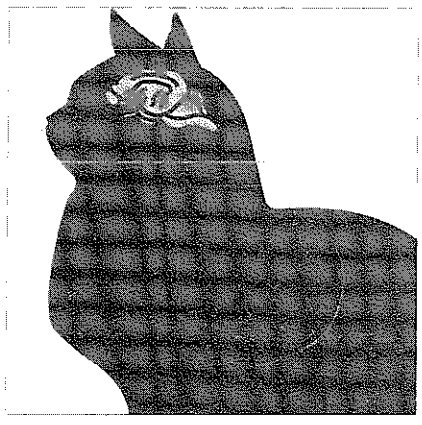
4. Human Aspects of Psychiatric Assistance

The need for a simultaneous tackling of the distinct aspects present in the illness requires that the problems of health be faced up to with an *integral conception* and, as a logical consequence, that the answers to these problems be given in a co-ordinated fashion using interdisciplinary teams.

At the right moment, and taking into consideration the special characteristics of each individual and his role in the community, an *individualised therapeutic* programme needs to be drawn up. In this the healthcare workers should be involved, and the resources of the various relevant sectors should be utilised, so as to consolidate the involvement of the community.

Prevention should be concerned, on the one hand, with health, physical and sports education, and, on the other, with the provision of solutions to general problems which promote the emergence of psychic disturbance — such as unemployment and poverty. It should also pay attention to the practical needs of each individual, to nourishment, housing, clothing, and so forth.

Treatment should begin with the premise that hospitalisation is no longer the only therapeutic remedy available. In addition to these measures of care and treatment — which should be provided preferably in polyclinics, the utmost should be done to promote treatment through mobile clinics or in the home.



The *rehabilitation* of the mentally ill is undoubtedly the measure where there are difficulties. A general system of community support for the rehabilitative treatment of the mentally ill has not yet been established. A good idea would be the opening of suitable centres along the lines of day hospitals, and the creation of work laboratories and programmes of social re-integration.

A serious consequence of this lack of support is the destination of these mentally ill people, after their discharge from hospital, given that they are either established in provisional accomodation or abandoned to themselves.

There certainly exists an attitude of rejection on the part of relatives and by local associations to the creation of these centres. As a result, there has been an attempt to make the public services responsible — something which, in essential terms, makes the social integration of the mentally ill even more difficult.

During this brief survey of the aspects of care as applied to mental health we would not like to forget the contribution made by nongovernmental social organisations to these needs and tasks. Although in certain countries there has been little development, these organisations have been especially important and of great impact in co-operating in the development of most programmes involving mental health. Their participation has been practically indispensable in programmes of rehabilitation, for dementia, for the new chronically ill, for domestic care, etc, and this is because it would be very difficult for health care and social support to be responsible for all the programmes involved.

The role of voluntary workers and organisations has proved to be decisive in many European countries in the implementation and effectiveness of psychiatric reforms. Such reforms, without the co-operation of the voluntary effort, often would not be fully carried into effect.

On the other hand, the increase in the help given to community organisations with a social purpose enables us to envisage a progressive increase in the affirmation and consolidation of these organisations.

5. Conclusion - Summary

The considerations which I have hitherto offered on the human aspects of psychiatric care centre around two axes whose illumination seems to me to be fundamental.

1) The primary importance and the dignity of the human person, which have as immediate consequences, on the one hand, the conclusion that psychiatric care is a fundamental right of the mentally ill and not an act of charity or beneficence, and, on the other, the judgment that psychiatric care — taking into account the singularity of each individual — must involve a personalised therapeutic programme.

2) The community dimension to each person implies social solidarity and a consequent participation of the community in the programmes of mental health. From prevention — creating conditions of life which are suitable for the elimination of risk factors of mental infirmity — to rehabilitation and re-integration into society, where the co-operation of the community and, in particular, of the family is fundamental. But here there should be no forgetting kinds of treatment involving action in connection with which community psychiatry has highlighted the need for a common exploitation of resources inside and outside the hospitals. All this should be done trusting to the necessary participation and suitable coordination of multidisciplinary groups.

In this task, which is really burdensome, the public health system must take advantage of the co-operation of nongovernmental organisations which have a social function, which cannot be disregarded in bringing to fruition programmes directed towards mental health.

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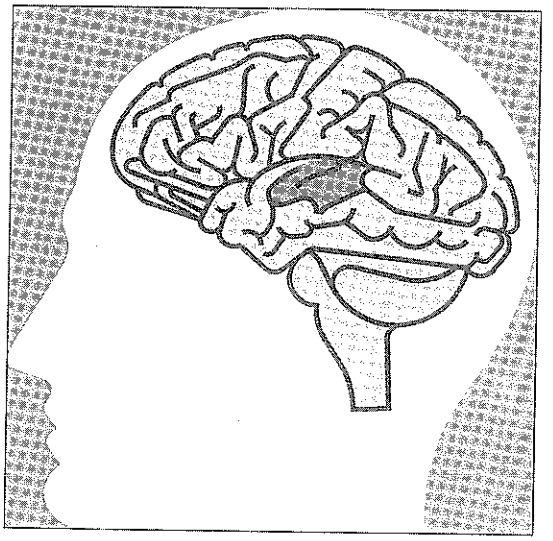

DOMENICO CASERA

Ethical-Pastoral Aspects of Caring for the Mentally Ill

1) Care of formerly institutionalised mental patients is one of the new frontiers of pastoral work and is similar to that which concerns drug addicts or people from the third world. Formerly institutionalised mental patients, following Law 180 in Italy and after similar legislation in other countries, are now a part of the living and suffering tissue of our parishes.

2) Pastoral action is modelled upon the pastoral action of Jesus. The envangelists give us a picture of a typical day in his life in the following terms: " That evening, at sundown, they brought to him all who were sick or possessed with demons..... And he healed many who were sick with various diseases, and cast out many demons " (*Mk* 1:32, 34). A widespread opinion amongst experts in the field is that the whole range of mental illnesses is meant by " possessed " or " possessed by an evil spirit. " Sometimes such illnesses are described with symptoms that seem to be taken from a text of modern psychiatry (cf *Mk* 9:14ff)

3) The mentally ill strongly reveal the connection between social sin and illness: it is not necessarily a question of voluntary sin. It is the result of the fragility and the incapacity of a person who displays a case condition of separation from the environment, as a result of an unhappy succession of joint causes. These mentally ill people are not able to establish a mature and correct relationship with other people; they isolate themselves emotionally from the group; they close in upon themselves; and at times they become aggressive and do inappropriate things. They are, on the other hand, very sensitive to the fact that society shuts them out. A situation of being unable to communicate becomes established which ends up by crushing them. They suffer and they make other people suffer. Men like them threw themselves at the feet of Jesus and cried: " You are the Son of God! " (*Mk* 3:11), almost as if they were at their last limits. The Canaanite woman who was reduced to a state of desperation by the presence of a serious psychic disturbance within her family was in the same condition: " Have pity on me, Lord, Thou, son of David. My daughter is cruelly troubled by an evil spirit " (*Mt* 15, 22) These two invocations reverberate in our own pastoral environments and give a measure of a suffering which has no limits, of an intolerable level of distress, and of complete unpreparedness.

4) I would like to offer the following reflections for the benefit of pastoral action in our parish communities.

• Engage in help as if it were a duty of Christian belonging: with sincere participation, with active comprehension, with dedication, but without any illusions. One does not engage in this area of pastoral work because one expects results and successes. We must know how to work and lose (theology of lack of success).

• Acquire knowledge of the inherent dynamics of the various forms of psychic disturbance, the causes which produce it, the movements which provoke relapse, methods of approaching the patient, the therapeutic resources available, and current legislation.

• Overcome prejudices which are widespread amongst people and those who work in this sector, such as: our action will have no effect; there is something wrong with the brain, the psychiatrists will handle it. Identify — through group discussion and by consulting experts — attitudes of approach and strategies of help.

• Coordinate your readiness to help with the professional workers. With them there can be suspicions which are hidden and sometimes not so hidden: the power to establish diagnoses and to prescribe medicines which are not always effective and often have unpleasant side effects; the obscure rites of psychotherapy, which do not solve the situation and when they do, do so only after a long period of time, which also leads these workers to consider themselves a closed corporation, jealous of its own field, prone to mystification, and invasive of the area of conscience. To consider them in this fashion is not honest. Study and experience involve them in treating serious and dangerous cases, and it is natural that their language can seem exotic and complicated.

However, they represent the centrepiece of the entire safety net in the sector and as such they should be accepted and esteemed. In being aware of not being able to do everything, they themselves talk of the need for widespread cooperation and are willing and ready to transmit their naturally-acquired knowledge and attitudes — first and foremost with regard to the methods of establishing a helping relationship

with very difficult patients — to potential collaborators who live in constant contact with the mentally ill. This is also a condition for the capillary structures of psychiatric care to reach a desired level of effectiveness and efficiency.

• Pastoral workers, in turn, should do their best to avoid legitimating the suspicions and the incomprehension that those who actually treat the patients may have towards them, incomprehension which obstructs cooperation between the most active members of the Church, on the one hand, and psychologists and psychiatrists, on the other. These in turn believe that the Church excludes the mentally ill from its activities because they cause difficulties; that the Church is too severe and moralistic; that the Church is simplistic and naive in its belief that these cases can be solved with pious recommendations; that it should led to encourage rather than correct and counterbalance possible pseudo-religious tendencies; and, above all else, that it is superficial and overhasty in its approach. These examples of incomprehension have a long history, and there is even something to justify them. Objective information on the secular presence of the Church side by side with those professionally engaged in the treatment of the mentally ill should overcome these prejudices and lead to friendly opportunities for collaboration and for dialogue.

• The most difficult problem for the pastoral worker is the correct relationship he should have with a mentally ill person. Not everything should be expected from biochemical therapies. These are necessary for the overcoming of acute schizophrenic attacks or manic-depressive disorders, and even for ensuring an adequate functioning. A certain norm is achieved with these therapies in the same way as one lowers high blood pressure or controls diabetes. But the individual remains fragile, exposed to a gradual and persistent atrophy concerning attitudes to be developed during the events of the day, in decisions to be made, in the forms of work that he does, in relationships with his relatives, employers, and colleagues, etc. The patient has to experience a great many problems which he cannot solve. He must tolerate very high levels of anxiety; he feels insecure and disoriented, or even worse, not accepted, not loved. Men of the Church must make sure that he has the support of an understanding relationship which is loving and marked by integrity.

• How? It is very necessary to interact with a psychiatric patient, to get involved with his state of mind, and to help him. From some quarters interesting models of how to interact have been presented, and in these the motivation and the creativity of the voluntary workers impart warmth and vigour. These models have as their clinical point of departure the idea that psychosis compromises the entire net of interpersonal relationships of which life is made up. These models have a common denominator: they seek to make relationships normal and good-humoured, to achieve a resocialisation, to insert elements of reconciliation with the surrounding environment and with God into the tissue of prejudices, fixations, and fears. It is a work which involves the reconstruction of the personality, in which a lack of affection in early childhood and failures in life organisation have led to complete disorientation and disassociation. In such painful existential contexts the older pastoral workers represent a maternal or paternal figure — a figure which is well received and beneficial to the person who owes his disturbance to the absence of such meaningful figures in his childhood. The younger workers appear as quasi-sisters or big brothers, or teachers, understanding colleagues, true friends, as people who are able to listen, to recognise, to understand, to please, and to support. All members of the parish are invited to treat these sick people with spontaneity, respect, and with fraternal spirit. In a great many cases the success obtained is relative: the reconstruction of a personality affected by psychic disturbance requires a long time and lacks any guarantee against relapse or regression. Very often we have to be content with a unidirectional relationship (pastoral worker-patient) because the attitude of mentally ill people is so strongly rooted in aggression and rejection. But a spiral of reciprocity can come about — if they manage to smile, or if they manage to show a little warmth when we meet them, or if they demonstrate interest in us as people, it means that something is beginning to give in their castle of defences, and that a process of resocialisation is under way. An opening towards even one person is already a victory — it is something destined to make other openings possible, in the same way as a stone skipping across water creates ever larger ripples until the whole surface is covered (the whole area of life and social relationships).

• Thus do we find ourselves on the most important path to follow. But in the Gospel it is expressed more truthfully and authentically: "This is my commandment, that you should love one another" (*Jn* 15: 13-14). It is a grave mistake to think that the patient does not have his own affective life, enclosed as he is in the labyrinth of his fixations. Only love can awaken him and lead him to reconstruct better interpersonal relationships.

• It would also be a mistake to direct discussion immediately onto religious subjects, in the name of a spiritual evangelism which would not be pertinent. Such an attempt would not find an affective base for such an opening. In his ego there is established a false "ego" which blocks the acceptance of elements which it considers abstract or insignificant. A judicious religious sensibility is not always inopportune. But there is a primary need for a sound offer of friendship, a presence perceived as having the sincerity of a kindly parent, brother, or older sister, a friend of the family, a mature and involved member of the comunity. The attitudes associated with this type of relationship are characterised by good common sense, spontaneity, steadfastness, rather than specific and detailed knowledge. Pastoral workers must be internally free from fear and constraints, and must relate to the mentally ill in the same way as they relate to other people who need to be accepted and supported.

• It is obvious that pastoral work must be expressed in concrete ac-

tions. For example: a woman who has to be often hospitalised must be guaranteed a continual presence, and must be considered as being a full-time member of the Church. Another kind of woman must be accorded the rights regarding care which the law envisages but which it is unable to provide. A third kind of woman will need decent living accommodation or a rest holiday. It is important that the ill person feels himself surrounded by acceptance and a readiness to help. Material help cannot go beyond certain limits, which must be clearly established by those who are involved, so that those engaged are not replaced by the pastoral worker but involved in finding a solution to the problems that present themselves.

• The psychiatric patient is forced to live in relation to (and depends upon) a system of care and provision which is fragmentary, full of gaps, and at times bureaucratic and contradictory. All these are elements which reduce the possibility of using this system and using it to good effect, if the help of the Christian community is not present.

• Psychiatric workers should be present as voluntary collaborators outside their normal working hours. They constitute a qualified support and a secure guide. During periodic meetings of voluntary workers they are able to give information about the most frequent manifestations of psychic disturbance and to propose appropriate responses. They reassure voluntary workers when these are faced by confused or stressing situations. They suggest the presentation of realistic objectives which are appropriate to the resources available with the aim of improving the ability to listen and to understand, of comprehending the irrational dynamics behind such manifestations, and of tackling unexpected and dangerous developments.

• But sociopastoral action on the part of the parish community cannot be limited solely to the mentally ill themselves — it must be extended to their families. The family also finds itself disorientated and ill-equipped. It must be supported with a constant and discrete presence, and led to adopt forms of behaviour which can avoid tensions and prevent relapse. The family must also be helped with the resources available so that the difficult handling of the situation can be made less burdensome and more tolerable.

• As can be seen, a field of pastoral action which is new and difficult has been found for priests and the most active and helpful members of the parish community. It is a field which well judges if faith is kept with the pastoral models of the Gospels.

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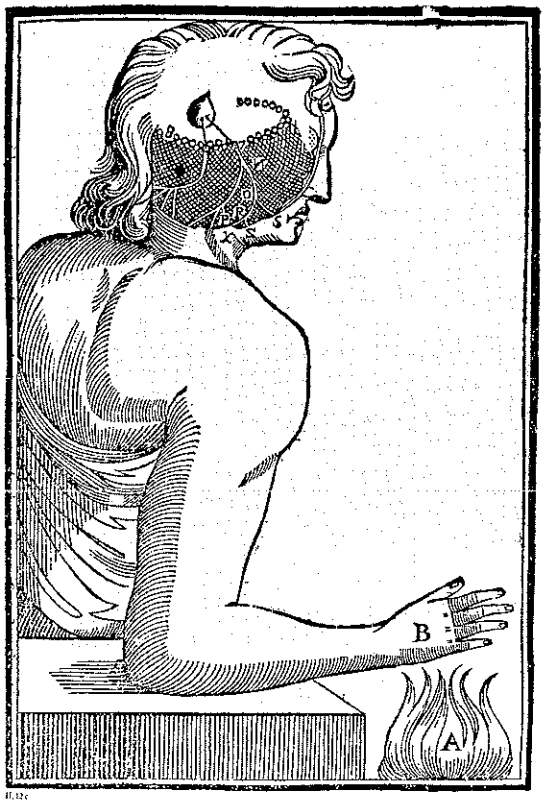

risonanza nel mondo

L'OSSERVATORE ROMANO giovedì 15 novembre 1990

PONTIFICIO CONSIGLIO DELLA PASTORALE PER GLI OPERATORI SANITARI

Dedicata alla mente umana la V conferenza internazionale

MARIO PONZI

Ire Premi Nobel, numerosi scienziati eminenti studiosi e numerose semblea. I traguardi raggiunti in questi ultimi anni dalla neurochimica, dalla psicosomatica e dalla nuova era della psiconeuro-endocrinologia pongono infatti non pochi medica si rivolge e si riferisce sempre ad una persona ad una persona che soffre. « E nel malato — ha ricordato Monsignor Angelini — noi vediamo sempre il volto di Cristo

servizio informazione religiosa

sir 7.XI.1990

Conferenza internazionale in Vaticano sulla "mente umana"

Ire scienziati insigniti del Premio Nobel; decine di illustri ricercatori, docenti universitari ed esperti nelle discipline bio-psicologiche e filosofico-morali; una vasta rappresentatività internazionale che spazia dagli Usa all'Urss, dalla Cina Popolare alla Svizzera, dal Senegal al Messico, senza elencare i Paesi europei dell'Ovest e dell'Est; la presenza di rappresentanti dei principali organismi internazionali di studio e ricerca nel campo della fisiologia e patologia della mente umana: è questa la carta da visita della V° Conferenza Internazionale promossa dal Pontificio Consiglio di Pastorale Sanitaria in Vaticano (15-17 novembre prossimo) sul tema: «*La mente umana*»

LA CROIX 17 novembre 1990

5e SYMPOSIUM SUR LA PASTORALE DE SANTÉ

« L'ESPRIT HUMAIN » À LA LOUPE

Réunis au Vatican, des prix Nobel, généticiens, théologiens, psychiatres, paléontologistes et psychologues du monde entier confrontent leurs savoirs

De notre envoyé spécial permanent à Rome

Sur le thème de « L'esprit humain », 58 scientifiques sont invités au Vatican du 15 au 17 novembre, par le Conseil pontifical pour la pastorale des services de la santé qui organise l'an dernier un colloque similaire sur le sida. Parmi eux, trois prix Nobel : les médecins américains Edelman, neurobiologiste à l'université Rockefeller (New York), et Gajdusek directeur du Laboratoire na- pharmacologue visant la récupération sociale de la schizophrénie. Le généticien n'échange pas seulement avec le psychiatre, le radiologue ou le biologiste spécialiste des neurotransmetteurs, mais aussi avec le théologien, tel le jésuite Gustave Martelet présentant « l'apport de la foi à la santé mentale ».

La vie du cerveau présente aussi des aspects éthico-pastoraux. En ce sens, le Vatican ne boude pas un sujet aussi ardu que « la diversité structurelle » des [illegible]

La mente tra scienza e morale

Anche quest anno si svolge in Vaticano, presso l'Aula del Sinodo, il convegno promosso e organizzato da Monsignor Fiorenzo Angelini (nella foto), presidente del Pontificio consiglio pastorale per gli operatori sanitari.

Il convegno si apre il 15 novembre e durerà fino al 17.

Alla V conferenza internazionale dal titolo «Ad immagine e somiglianza nostra. la mente umana» partecipano numerosi scienziati di fama mondiale. Erminio Costa. Oliver Sacks, Carlo Lorenzo Cazzullo, Corrado Manni, Bruno Silvestrini, Carlo Rubbia, Hiroshi Nakajima direttore generale dell'Oms

«La continua ricerca in questo particolare campo - precisa Monsignor Fiorenzo Angelini - e i risultati ottenuti dalla neurobiologia, dalla neurochimica, dalla nuova psico-neuro-endocrinologia pongono dei problemi molto particolari alla scienza morale, la quale non può prescindere dalla promozione integrale della vita e della sua dignità»

Medical Tribune n. 35 - sabato 10 novembre 1990

IL POPOLO

Sabato, 17 Novembre 1990

Forum scientifico in Vaticano

Saks: la mente è l'immagine dell'anima

Oggi conclusioni con l'intervento del Papa

CITTA DEL VATICANO – «Il ripristino di funzioni neutrali alterate può produrre una sensazione di "venuta alla vita" improvvisa o sensazionale». Lo ha affermato ieri Oliver W. Sacks, professore di clinica neurologica nell'Istituto «Einstein» di New York, intervenendo alla Conferenza ni neurologiche dell'anima, dell'immaginazione, della sensibilità, della volontà, dell'amore e del coraggio in quanto il corpo umano e la sua anima non sono separati, ma immagini l'uomo dell'altro»

Tra gli altri interventi Herbert Leber, condirettore dell'Ufficio [illegible] le malat-

RADIOVATICANA

RADIOGIORNALE

MERCOLEDI' 14 NOVEMBRE 1990

LA MENTE UMANA DA DOMANI, IN VATICANO, ARGOMENTO DI STUDIO DEI MASSIMI SCIENZIATI MONDIALI DEL SETTORE

– Servizio di Paolo Scappucci –

la Repubblica giovedì 15 novembre 1990

In Vaticano gli scienziati si interrogano sulle possibilità e i limiti della ricerca

E il cervello si rigenerò

La Chiesa studia le frontiere della mente

ABC 16 Noviembre 1990

Congreso en el Vaticano sobre la fe y la mente humana

Ciudad del Vaticano **Miguel Castellví**

El congreso que la Santa Sede organiza todos los años sobre cuestiones médicas estará dedicado esta vez a la mente humana. Esta reunión científica empezó ayer en el Vaticano con la asistencia de varios premios Nobel. El Consejo Pontificio para la Pastoral de los Operadores Sanitarios, esa especie de Ministerio de Sanidad del Vaticano que dirige monseñor Angelini, que el año pasado realizó una importante reunión sobre el Sida, ha escogido la mente humana como tema de su V Conferencia Internacional.

También esta vez se ha elegido un tema

Il Messaggero 16 Novembre 1990

Il progetto presentato alla Quinta Conferenza vaticana

«Darwin III», la mappa del cervello

CITTA DEL VATICANO – L'uno per cento della popolazione mondiale è colpito dalla schizofrenia, uno dei disturbi mentali più gravi, di origine genetica, di cui non si conoscono i cromosomi nei quali sono localizzati i geni. Affligge giovani tra i 15 e i 25 anni e costa dallo psichiatra. Lo stress psicomozionale «sta accrescendo la sua forza come sorgente di situazioni di conflitto sociale». Di fronte a questo grave quadro, la scienza mondiale ha avviato un grande progetto, denominato «Darwin III» per creare una nell introduzione monsignor Fiorenzo Angelini- mentre è in crisi l «epoca della ragione», nella quale «la mente umana fu assunta a supremo riferimento ed arbitrio». «Sul piano sociale -ha aggiunto- crollano miti e concezioni che separavano forzatamente il

Avvenire 15 Novembre 1990

Esperti di 90 Paesi da oggi in Vaticano

Scienza e teologia a consulto sul cervello

di FABIO ZAVATTARO

ROMA. Una «decade del cervello», da qui al duemila. La decisione viene dagli Usa: il presidente Bush ha firmato, lo scorso luglio, una risoluzione con la quale prevede, nel decennio 1990-2000, un investimento annuale, per la ricerca nel settore pari a 5 miliardi di dollari. Anche detto che vuole essere occasione per fare il punto della materia, partendo da una impostazione teologica (è la relazione d'apertura del cardinale Joseph Ratzinger), per toccare gli aspetti scientifici del problema ed approdare infine alla regolamentazione giuridica ed alla or- una ricerca sul cervello dei canarini: stimolato dall'impiego di ormoni il cervello dei canarini maschi si rigenera; una ricerca questa che non potrà non avere risvolti interessanti, anche se delicatissimi dal punto di vista morale, per l'uomo. Si è parlato anche di ansia, che, per il professor Costa, è «uno stimolo vitale» fino a

LA NAZIONE 18 novembre 1990

VATICANO

Un appello per i malati di mente

ROMA — Potrebbe essere la «Carta» dei diritti del malato di mente. Concludendo i lavori della Conferenza internazionale sulla «mente umana», tenuta in Vaticano, Giovanni Paolo II ha sollecitato una vasta mobilitazione intesa ad affrontare, in uno spirito di autentica solidarietà, i problemi dei malati mentali. S'è rivolto ai pubblici poteri, agli scienziati ai ricercatori, ai sociologi, a tutti gli uomini di buona volontà. Ha chiesto adeguati provvedimenti legislativi. Ha impegnato l'intera Chiesa e in particolare gli

CORRIERE DELLA SERA 18 Novembre 1990

In Vaticano si è discusso anche sulla legge 180

Il Papa chiede rispetto per i malati della mente

Necessarie «una forte azione preventiva» e considerazione «per l'integrità e la dignità» di chi soffre - Il compito degli assistenti

CITTA' DEL VATICANO — Giovanni Paolo II ha lanciato ieri un vigoroso

numerosi ostacoli si sono frapposti soprattutto nella gestione dell'assistenza

15 Novembre 1990

IL TEMPO

Un convegno sulla mente umana

Scienza di confine tra biologia e filosofia

di PIETRO PRINI

Comincia oggi in Vaticano la V Conferenza Internazionale dedicata a «La mente umana». La conferenza, che si svolge nell'Aula del Sinodo, si concluderà sabato. Dopo una prolusione del cardinale Ratzinger, si susseguiranno nei tre giorni del convegno interventi di medici, scienziati e filosofi provenienti da 90 paesi, che analizzeranno la mente umana nei suoi differenti aspetti. A conclusione dei lavori un discorso del Pontefice. Qui di seguito pubblichiamo l'intervento del professor Pietro Prini su «Intelligenza artificiale e intelligenza contemplativa»

EIR December 21, 1990

Vatican by Maria Cristina Fiocchi

Ratzinger on the human mind

Progress in treating mental illness must begin by defining how man differs from all other living creatures

From Nov. 14 to 16 scientists, researchers, and scholars from 90 countries participated at the Vatican in the Fifth International Conference of the Pontifical Pastoral Council for Health Care Workers.

The theme of the meeting was "The Human Mind," as the synthesis of the human and the divine. As it was defined by Msgr. Fiorenzo Angelini the chairman of the Pontifical Council, it is "the expression of what distinatric, psychological, and cognitive disorders, but also fertility and infertility, infectious, parasitical and cardiovascular diseases, AIDS, auto-immune diseases and drug dependencies.

Joseph Cardinal Ratzinger Prefect of the Congregation for the Doctrine of the Faith, opened the sessions of this important conference with a report on the "mystery which is man" in the light of Biblical revelation.

IL MATTINO 16 Novembre 1990

VATICANO

I misteri del cervello: studiosi a confronto

CITTA' DEL VATICANO - Le nuove tecniche per l'analisi sperimentale permettono di affermare che il cervello umano non può essere visto come un computer. Lo ha ha detto il premio Nobel Gerald Edelman, neurobiologo, intervenuto ieri alla conferenza internazionale sulla mente umana inaugurata in Vaticano. La mente e il suo funzionamento restano insomma un terreno da esplorare. Non a caso il cardinale Ratzinger ha parlato del mistero della mente umana definita, con Sant'Agostino, «il grande abisso». Immagine di Dio, la mente dell'uomo è «capace di infinito»