

REALITY

by

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B.A. Bowdoin College  
1975

Submitted in Partial Fulfillment  
of the requirements for the  
Degree of

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Reality

ii

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Submitted to the Department of Architecture on January 16, 1981, in partial fulfillment of the requirements for the degree of Master of Science in Visual Studies.

ABSTRACT

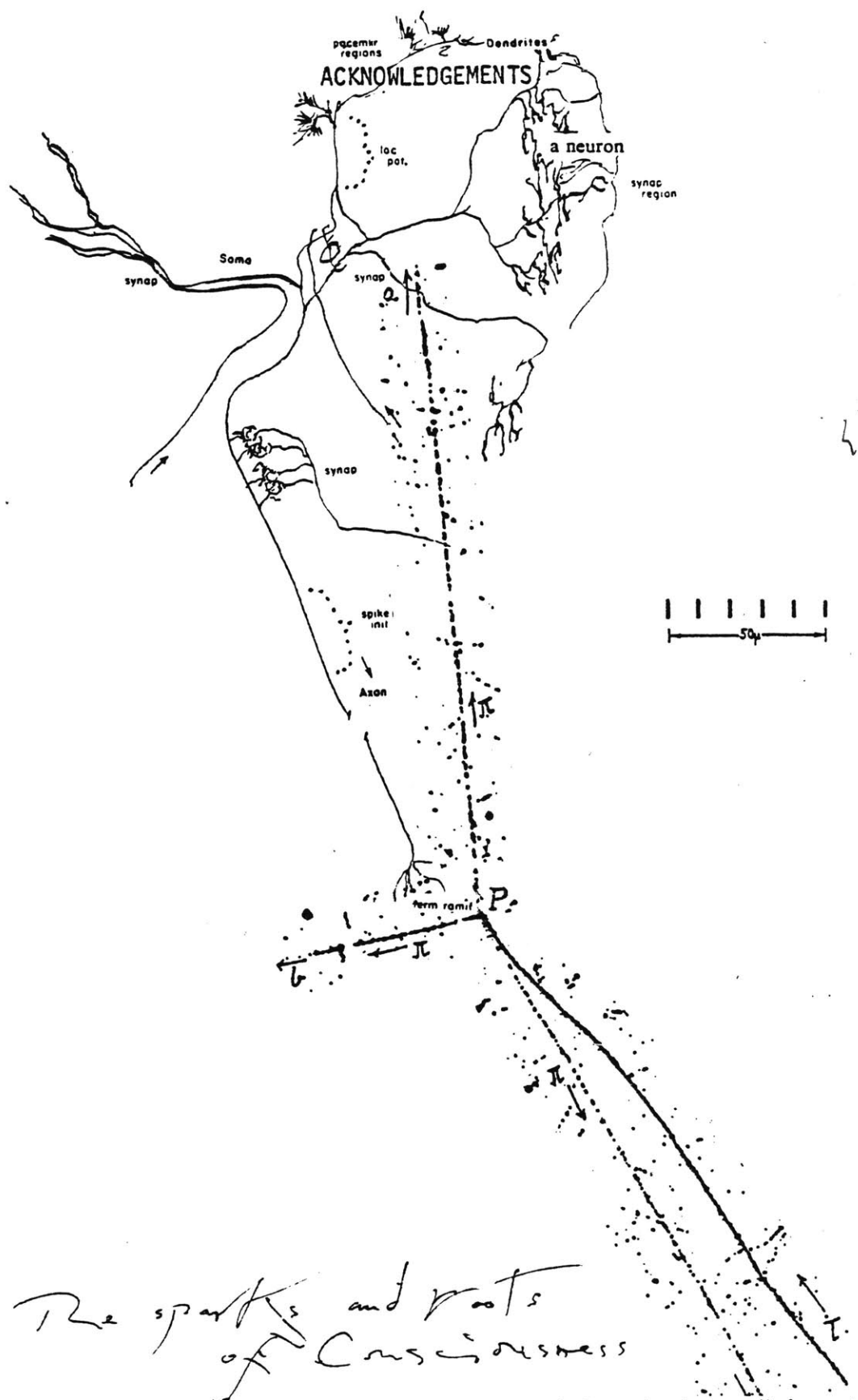
When the Universe first exploded it also imploded simultaneously. In that eternal instance the values of mass and energy were set in some perpetual equilibrium, determining the symmetries of nature. In effect, all that exploded was physical (p), comprising the particle-wavelike nature of matter. In fact, all that imploded was nonphysical (np), making up the virtual particle-wavelike nature of nonmatter.

Billions of years later, the substance of nonmatter corresponds to the structures and forces of the human mind. In this stage of our mental evolution, it seems apparent the uniqueness of this np-reality may only be sensed and grasped or known through intuition as interpreted by the arts of the unconscious mind; while the p-reality may only be seen and understood through reason as illustrated or explained by the sciences of the conscious mind. Both forms of consciousness are reflections of the brain functions which appear to be influenced by the one-to-one correspondence of matter and nonmatter. The thought processes and behavior of the human organism, as an extension or a continuum of this correspondence, have evolved with the Universe since its original explosion-implosion event.

My intentions are to investigate the p and np realities of the brain and mind, suggesting how certain symmetries such as mirror reflection affect the nature of thought.

Thesis Supervisor: Otto Piene

Title: Director of Center for Advanced Visual Studies



*The sparks and roots  
of Consciousness*

PLATE IV. At the point P a slow charged kaon (marked  $\tau$  in the photograph) decays to give three charged pions, all four tracks being recorded (in Ilford G 5 emulsion).



## TABLE OF CONTENTS

Abstract.....	ii
Acknowledgements.....	iii
1. Introduction.....	1
Mirror and NonMirror Interface Models.....	3
Matter And NonMatter.....	13
Brain And Mind.....	24
Biomirrors of the Central Nervous System.....	41
(Bio-electro-magnetic-chemical Mirror(s) with nongeometric symmetry)	
Applied And Pure, Science And Art.....	63
"Cerebreactors": Fact And Fiction.....	86
Cognitive Fusion and Cognitive Fission.....	123
(comparison of the processes and energies of Intuition $\approx$ nuclear fusion and Reason $\approx$ nuclear fission)	
Summary.....	135
The End.....	140
References.....	141
Bibliography.....	144

## INTRODUCTION

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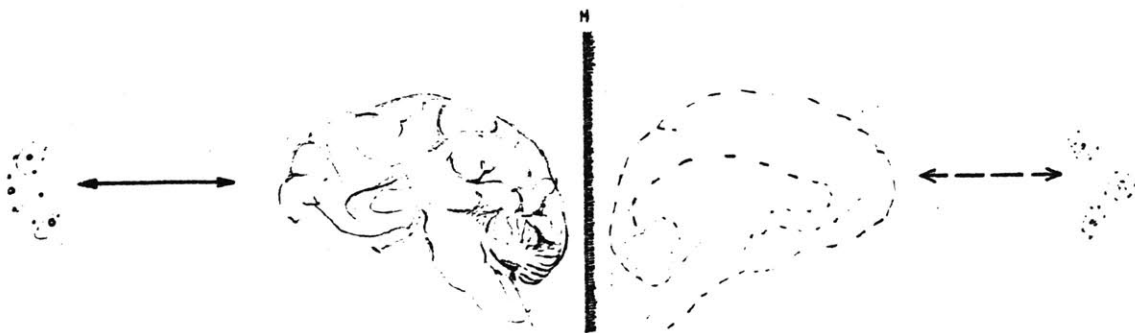
The associated relationships of Matter And NonMatter, Brain And Mind, applied and pure Science And Art represent to me a "complete" Reality. In my thesis, the elements of these relationships are described according to the symmetries of nature, specifically mirror reflection. The word "And" signifies the mirror conjunction by which one domain remains independent from and dependent on the other simultaneously. This implies, Science And Art are as inseparable as Brain And Mind or physical objects and their nonphysical images - all of which comprise Reality in fact and in effect. The process of separating and integrating things I interpret as being one and the same action, in the context of the plane mirror. It is possible this process marks the interchange of p and np realities.

In investigating this phenomenon of interchanging realities, I hope to understand more fully the interactions of the brain and mind; in particular how our physical perceptions of "concrete objects" correspond to our mental perceptions of "abstract concepts."

Currently, I am using theoretical mirror constructs to differentiate the material (or nonimaginary) and nonmaterial (or imaginary) aspects of the three relationships. I consider a definition of Reality "complete" only when it explains and shows both aspects of either Matter And Non-Matter, Brain And Mind, or Science And Art - at best, tying them all together intuitively and logically.

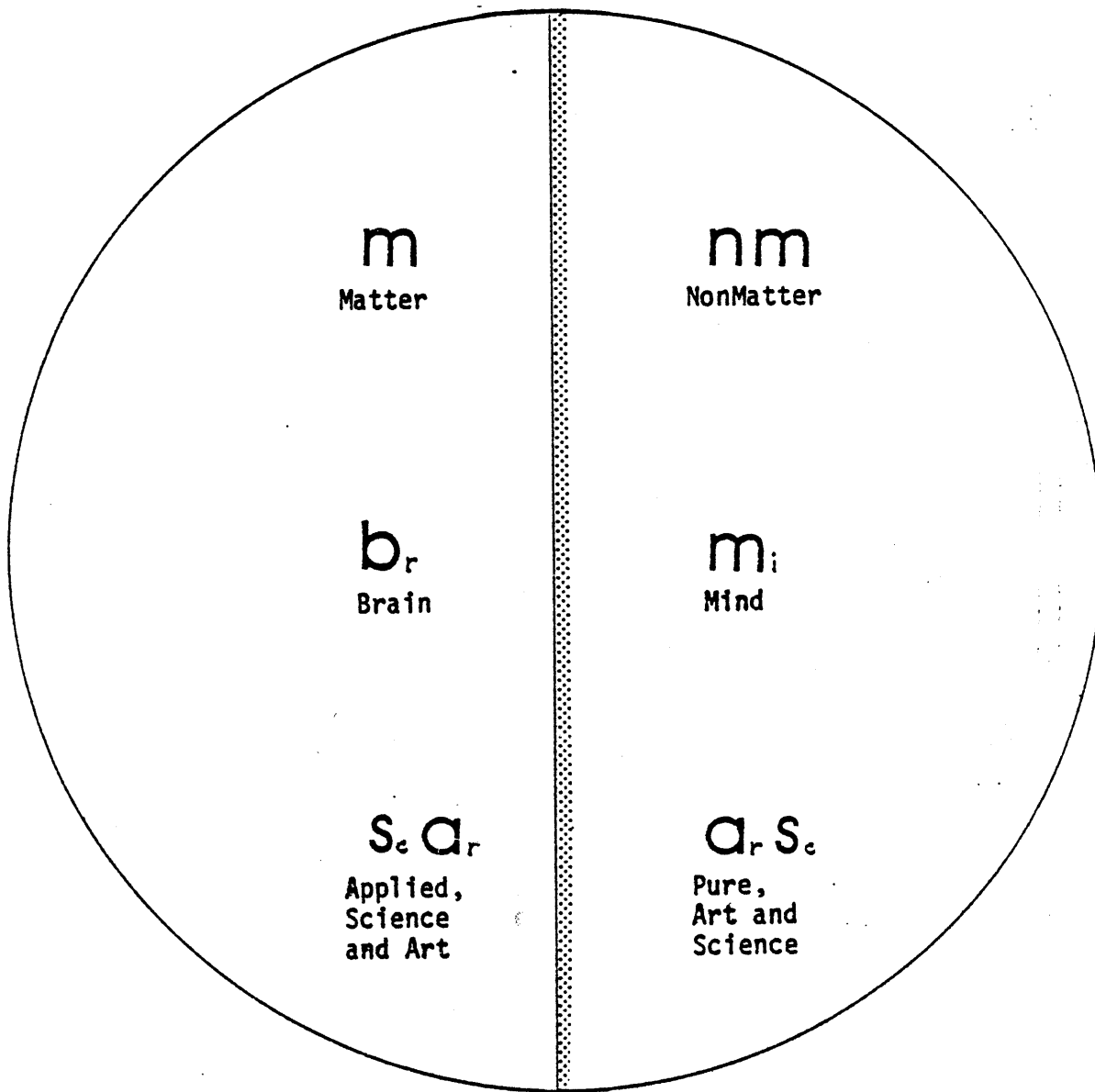
My models consist of statement-pictures and picture-statements.

One format conforms to a scientific method of explaining and illustrating the laws of physical phenomena. The other adheres to an artistic method of interpreting the same phenomena. Rom Harré, a philosopher of science, concludes that a scientific explanation is one of a 'statement-picture' consisting of three major parts. "First, there are sentences describing the puzzling phenomena needing to be explained. Second, there are sentences creating a model which might explain these phenomena; and thirdly, there are sentences belonging to other nonproblematic disciplines or subdisciplines or even areas of common experience from which the model is drawn".<sup>1</sup> In order to fill in the tableau, I believe an artistic explanation is necessary in addition. By substituting the word 'pictures' (implying drawings, schematics, or photocreations) for the words 'sentences' and 'explanations', the concept of picture-statements is formed. The pictures serve as paradigms showing how, for example, the human brain becomes the mind and vice versa, in passing from neurophysiological to neuropsychological states manifest as behavior.



Matter makes up the Brain 'becoming' the Mind which reflects Matter.

MIRROR REFLECTION



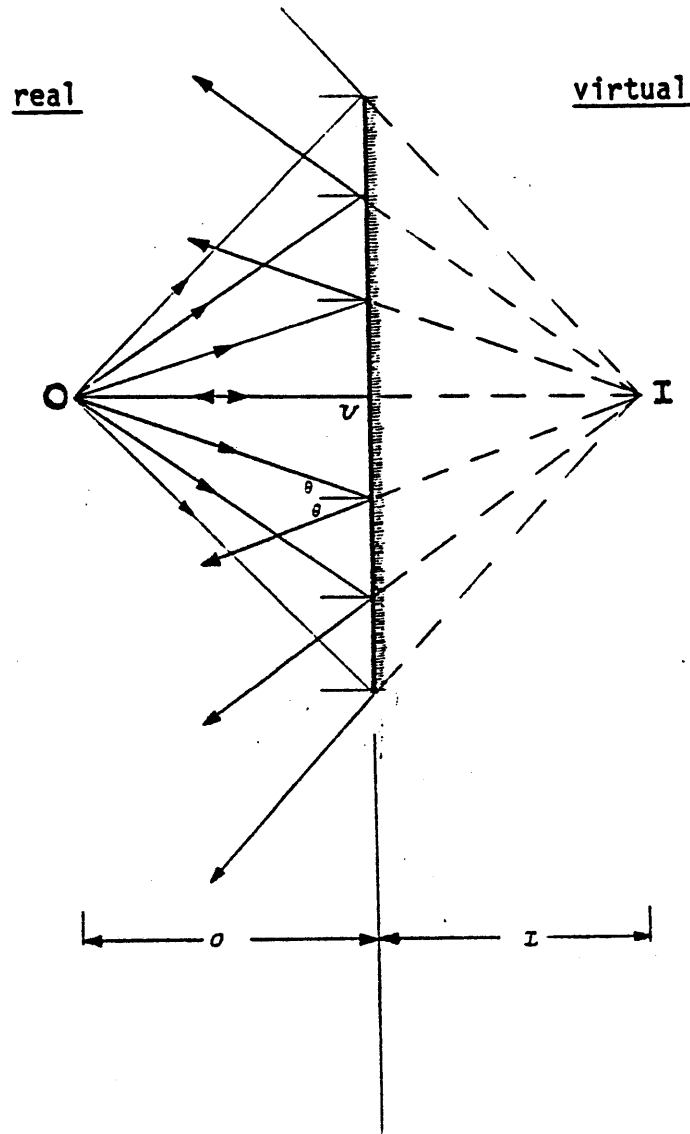


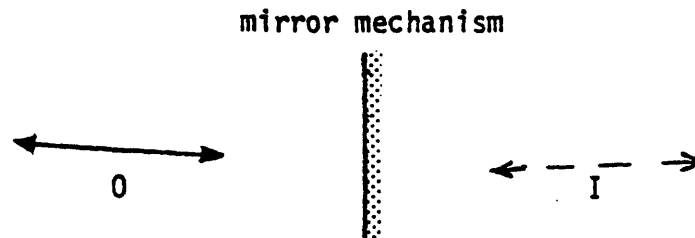
Figure 1 shows a point source of light  $O$ , the *object*, placed a distance  $o$  in front of a plane mirror. The light falls on the mirror as a spherical wave represented in the figure by rays emanating from  $O$ . At the point at which each ray strikes the mirror we construct a reflected ray. If the reflected rays are extended backward, they intersect in a point  $I$  which is the same distance behind the mirror that the object  $O$  is in front of it;  $I$  is called the *image* of  $O$ .

Images may be *real* or *virtual*. In a real image light energy actually passes through the image point; in a virtual image the light behaves as though it diverges from the image point, although, in fact, it does not pass through this point.

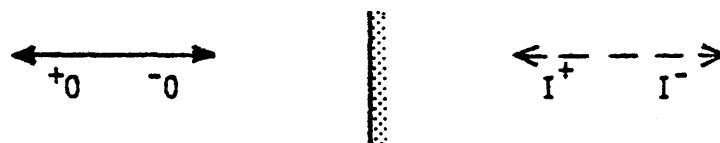
Images in plane mirrors are always virtual.<sup>2</sup>

In describing the differences of the Mirror and the NonMirror Interface, I consider two forms of reflection (with spatial or geometric type symmetry) as they relate to human perception or vision. The first form is as external and obvious as the plane mirror each of us uses everyday.

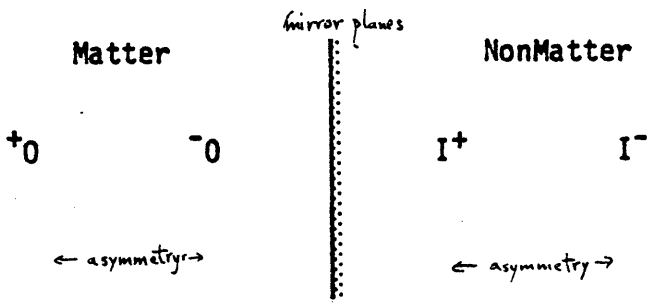
In my mirror interface model, the object is referred to as 0 and the image or virtual image is referred to as I.



If I were to organize the 0 and I variables into some figure-ground or positive-negative relation, describing their common boundaries would warrant using the term "nonmirror interface or interface" which includes the conditions of asymmetry, nonreflection, or refraction. For example, when determining the presence or weight of an object's form and movement (or its space with respect to its surrounding environment), it cannot be said that some symmetry is preserved between the elements that make up the object and those that appear to make up the environment. There is no apparent symmetric processing of form, movement or space, as imagined in the more general classification of 0 and I relationships such as Matter And NonMatter. Similarly, in defining the abstract qualities of such things as amounts of thought or numbers and differences of mental images, concepts of 'boundary' must be used in place of the physics involving plane mirror reflections. The mental asymmetry between two intangibles is symbolized here by the real (continuous) and virtual (broken) lines with the arrows (= processes) of each indicating this nonreflection interface within both domains.



In my nonmirror interface model, I refer to the object as positive  $+0$ . Everything that is not the object, that is, the environment surrounding the object, is referred to as negative  $-0$ . Similarly, the virtual image I is referred to as positive  $I^+$  and everything that is not the reflected object, that is, the environment surrounding the object reflected, is referred to as negative  $I^-$ . Together, these variables  $+0, -0$  and  $I^+, I^-$  represent the realm of Matter which includes the material objects and products of applied Science And Art.



Key:

- ◻,  $+0$ , object
- ◼,  $-0$ , environment

Given:  $I = I^+ + I^-$   
 $0 = +0 + -0$

Represents whole domain of 0:  
 $+0, -0$

Where,  $I^+, I^-$  represents whole domain of I

Represents whole reflection:  
 $+0, -0 + I^+, I^-$  or  
 $+0, I^+ + -0, I^-$

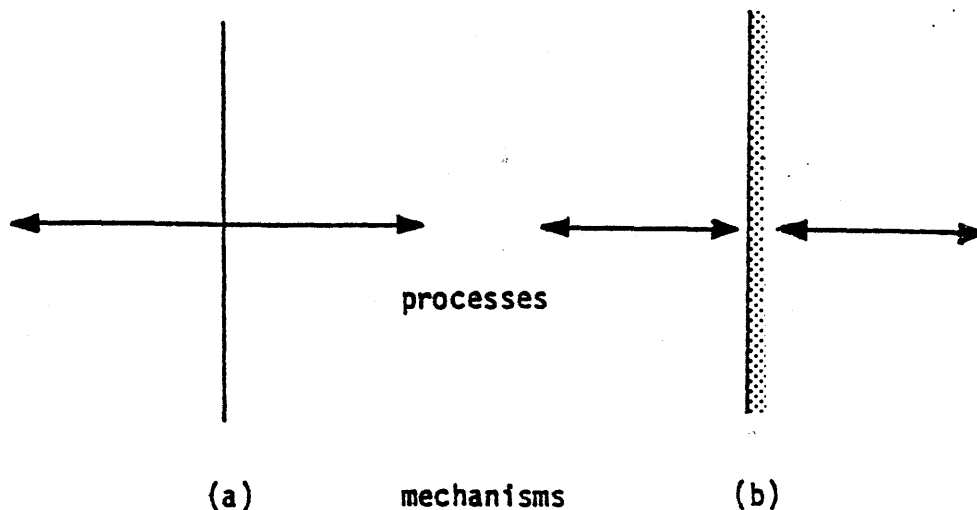
Assuming: NonMatter= V  
 Matter= R

These same variables represent the realm of NonMatter which includes the ideal and theoretical constructions of pure Science And Art. The 'constructions' are more often without direct expression or outward communication. Speech too is forgotten in this vacuum silence, when the act of purely perceiving and being hyperconscious is more satisfying than stating many perceptions or celebrating an intuition. These nonmaterial 'constructs'

then, are the substance of imagination; they are mental perceptions or schemata left in their original state of internal realization. Accordingly, the NonMatter realm appears to contain these 'constructs' sculpted from pools of thought alone. Analyzing the differences between one perception and another is analogous to defining a figure-ground relation when both the object and its environment are constantly changing. In this sense, there is no constancy of symmetry observable, only unique boundaries between one point of view or form and another. Again, the literal and figurative application of a plane mirror allows you to see and to deduce the effects of symmetry on physical as well as nonphysical 'entities' - assuming their one to one correspondence. And, assuming that NonMatter is in some way connected to 'virtuality' or the state of something being virtual - "existing in essence or effect though not in actual fact or form".<sup>3</sup> Also, it is by means of mirror reflection that the interface model may be conceived for studying the subtleties of this correspondence and for discovering the common boundaries of elements within each domain. The idea of positive and negative quantities in this model is something separate from the concept of matter and antimatter respectively. "Matter is that which occupies space; can be perceived by the senses, and constitutes any physical body or the universe as a whole; it is any entity displaying gravitation and inertia when at rest as well as when in motion."<sup>4</sup> "Antimatter is a hypothetical form of matter consisting of antiparticles and having positron-surrounded nuclei composed of antiprotons and anti-neutrons".<sup>5</sup> The theory of antimatter accounts only for the one-to-one correspondence between actual and potential properties of atomic nuclei. It does not attempt to explain or predict the positive-negative, figure-ground relationship and effect in both real and imagined instances.



It is this relationship and effect that distinguishes the properties of 8 elements of one domain from those of another. When speaking in terms of an 'interface' I am referring to the contact or contiguity of one surface, thing, with another thing, surface (real or ideal). This contact includes anything from the incidence and rebound of light waves to the interaction between cell surfaces when in close apposition. A mirror plane can act as an interface, but an interface cannot function as a plane mirror. Though the 'line' involved in both shares some similarity with respect to contact, the laws of reflection distinguish the two. Perhaps the clearest understanding of an interface may be found in the definition of symmetry. Gerard't Hooft, in an article on "Gauge Theories of the Forces between Elementary Particles", wrote: "Symmetry can be defined as an invariance in the pattern that is observed when some transformation is applied to it".<sup>6</sup> Asymmetry would then imply a variance in the pattern which would include the unequal exchange of energy, forces, or information within any thing and between any two or more things. Note diagrams below showing the differences between the mechanisms and processes of (a) nonmirror and (b) mirror interfaces.

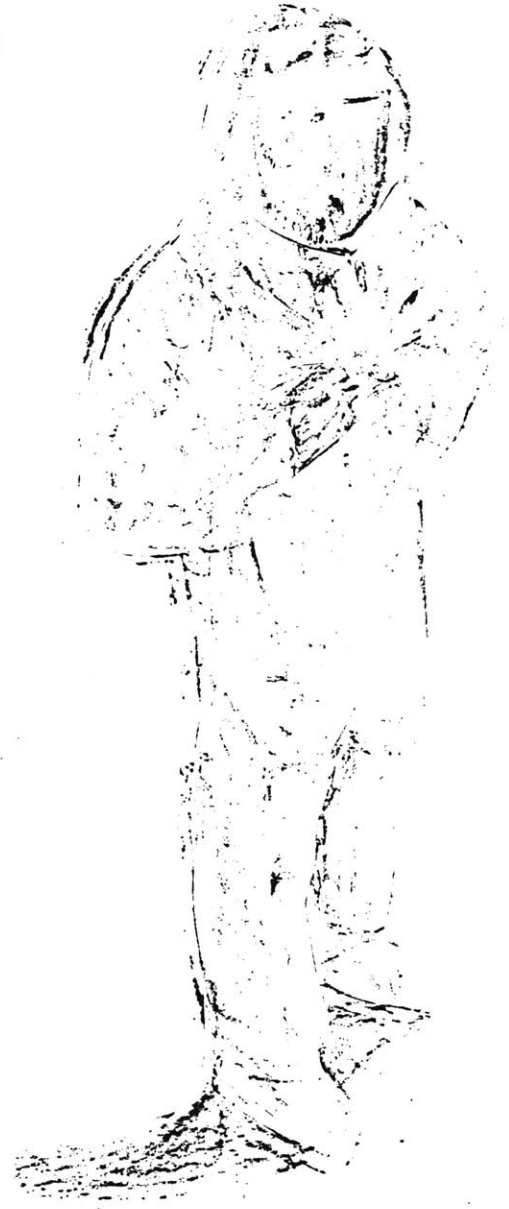


REAL REFLECTION

What is perceived



R real object



V virtual image

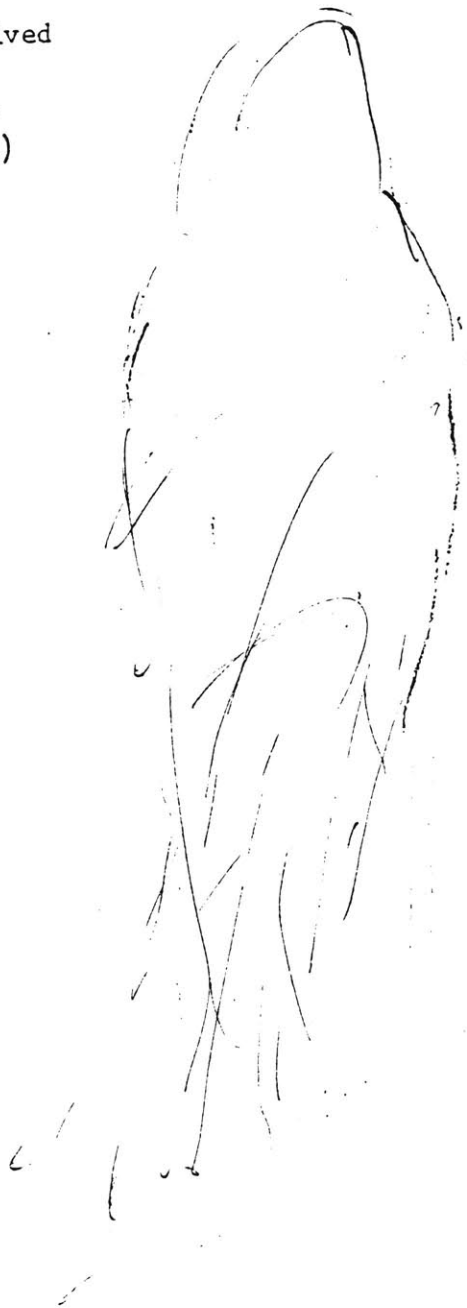
# VIRTUAL REFLECTION

What is perceived  
mentally

(imagined or  
remembered)



O object



I image

Imagine viewing a one-sided, plane mirror from two sides, seeing Outside In and Inside Out. This implies separating the object O (that is you) on the 'Outside' from your reflection on the 'Inside'; given: the real surface facing you represents the material world and the virtual surface facing the side of your reflection represents the non-material world. This literal illustration attempts to show the nonphysical (or imaginary) aspects of one's physical body.

As some peoples believe a man's soul to be in his shadow, so other (or the same) peoples believe it to be in his reflection in water or a mirror. Thus the Andamanese 'do not regard their shadows but their reflections (in any mirror) as their souls.' When the Motumotu of New Guinea first saw their likenesses in a looking-glass, they thought that their reflections were their souls. In New Caledonia the old men are of the opinion that a person's reflection in water or a mirror is his soul. 7

If I were to remove this actual mirror and be asked to recall at once what my reflection looks like from a purely imaginary, nonperceptual 'point of view', I could not see the exact translation of myself. The mental image I have of myself would appear undefinable and infinite dimensionally. The boundaries between it, the object, and the space, environment, surrounding it would seem to disappear or become so diffuse as to be indistinguishable. The difference between the virtual image as imagined (in a figurative model of a plane mirror) and that as perceived directly (in a literal mirror model) is the clarity of details and definition of forms. Not only are imagined forms too difficult to define but they are even more difficult to perceive mentally; thus the idea of a symmetry (related to thoughts or cognition) is not practical. It is for this reason that I am concerned with the character of the interface itself.

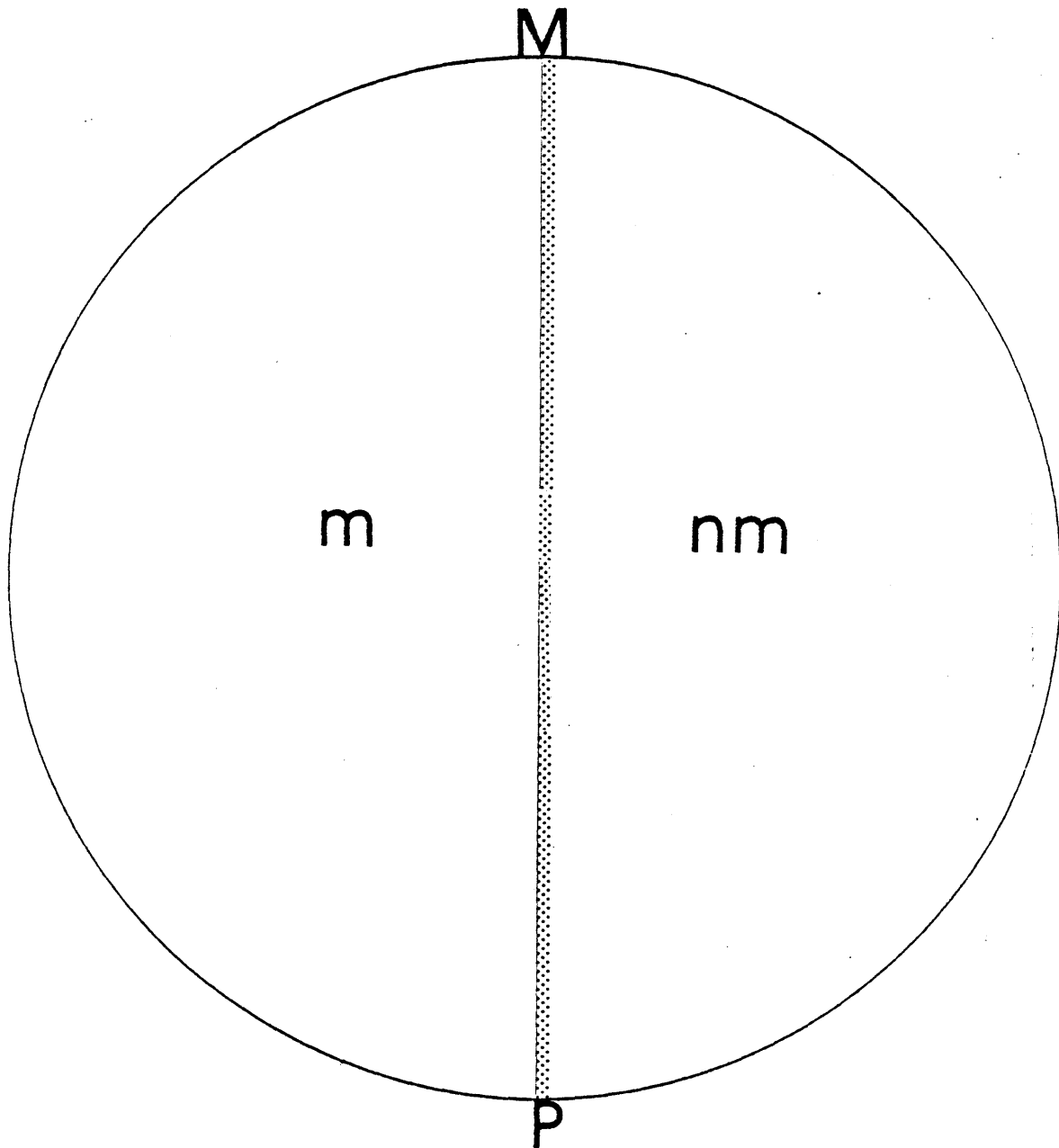
# proved in applications like these



As Perceived

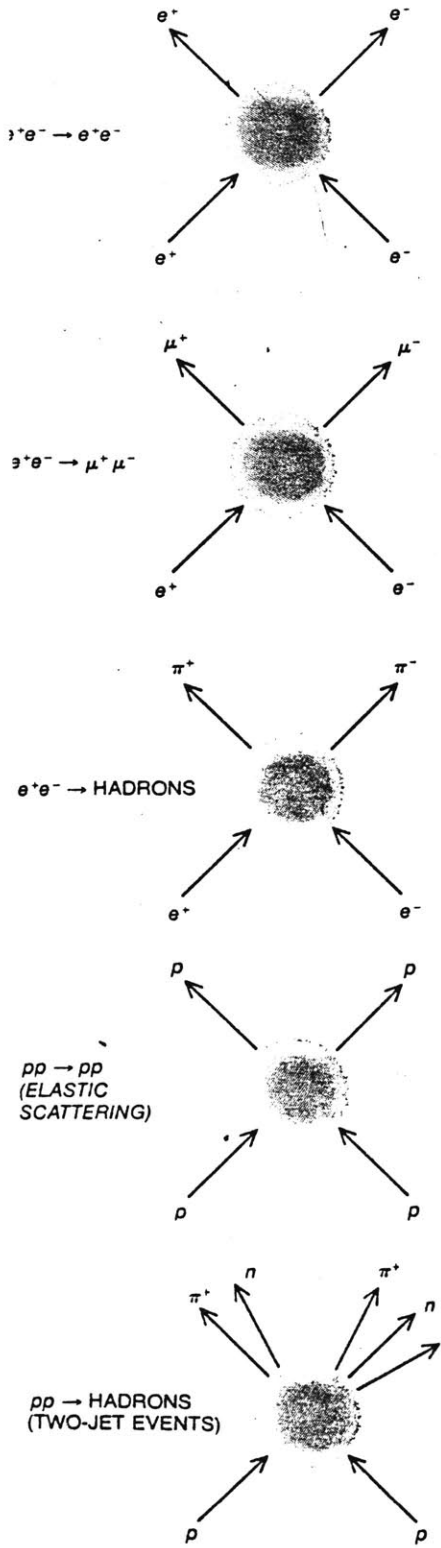


As Remembered  
or Imagined

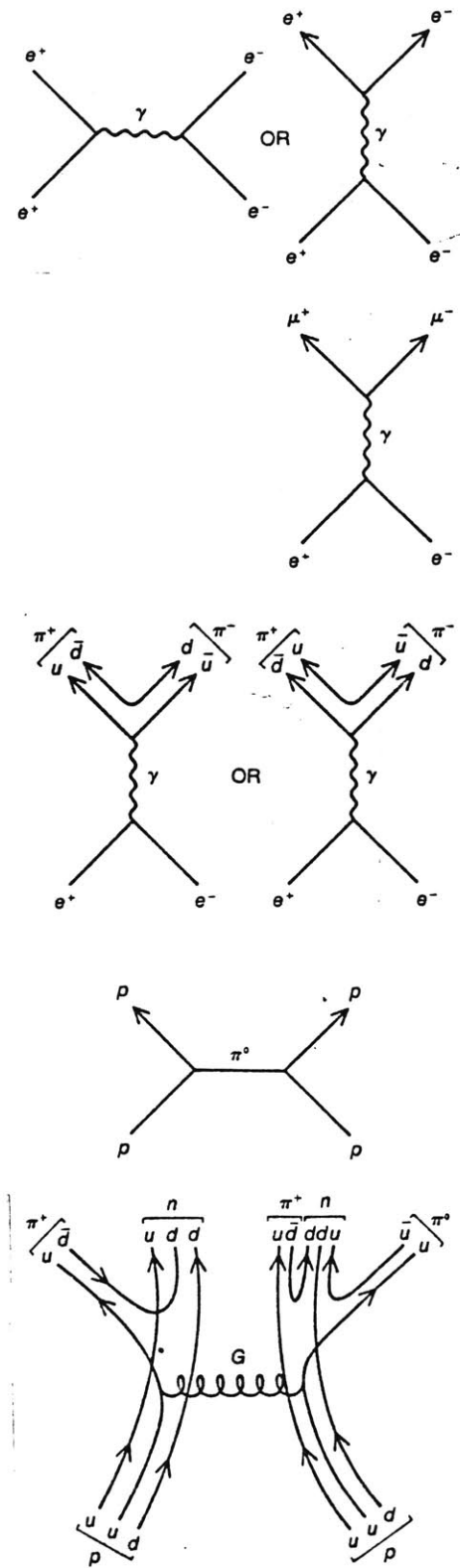


In Nuclear Physics, two perspectives A. and B. make up the search for the forces between elementary particles. The researchers with A. Perspective tend to separate their analyses of matter from the analyses of non-matter, disconnecting all nonmaterial aspects of material processes. The concept of "virtual particles" and the quantum field theories, 'making visible' their existence, are looked upon with skepticism by this scientific group, and justifiably so; direct observation of the exchange of a massless, "virtual particle" between (real) particles, such as an electron and positron, has not yet been possible. Similarly, the isolation of a quark through the collisions of hadrons, such as the proton and neutron, has not yet happened. Only mathematical forms as rendered by the local gauge theories have "shown" the exchange of this third particle whose 'virtuality' is as real as a reflection is. This analogous relation of mirror imagery is frustrating to these researchers in particular, because invariably they must trust the nonliteral, abstract aspects of reflection. This is necessary in order to grasp the 'physical' structure of a quark. Trusting abstract evidence is like believing in the world of the mind and imagination. I reserve this comment for the experimental psychologists as well who insist on 'making visible' the substance of mental perception. This sense of belief is most apparent in theoretical physics when, for example, scientists presuppose the existence of some process or force which cannot be seen by any means. One way of making more concrete abstract evidence is through the use of mathematics and schematics. Observe examples O and I.

OBSERVATION



CONJECTURED PROCESS

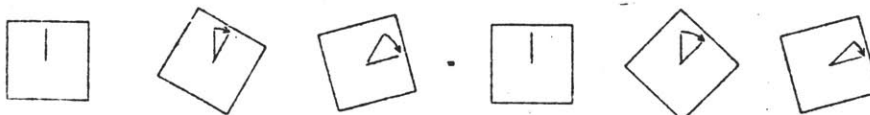




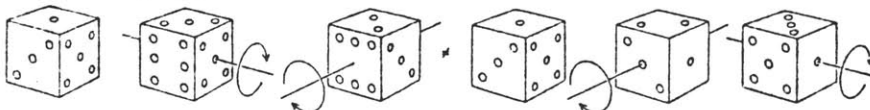
By contrast, the researchers with B. Perspective tend to consider the correspondence of the hadrons (strong forces) to quark combinations as real and physical. They think of the "virtual particles" and other particles of matter as being 'one and the same thing', though respecting the fact that they have different properties. These researchers are like the holists of physicists. They have one great goal as the scientific writer, Gerard't Hooft, describes in the following passage.

A long-standing ambition of physicists is to construct a single master theory that would incorporate all the known forces. One imagines that such a theory would reveal some deep connection between the various forces while accounting for their apparent diversity... The weak force and electromagnetism can now be understood in the context of a single theory. Although the two forces remain distinct, in the theory they become mathematically intertwined. What may ultimately prove more important, all four forces are now described by means of theories that have the same general form. Thus if physicists have yet to find a single key that fits all the known locks, at least all the needed keys can be cut from the same blank. The theories in this single favored class are formally designated non-Abelian gauge theories with local symmetry. ¶

ABELIAN TRANSFORMATION



NON-ABELIAN TRANSFORMATION



**EFFECTS OF REPEATED TRANSFORMATIONS** distinguish quantum electrodynamics, which is an Abelian theory, from the Yang-Mills theory, which is non-Abelian. An Abelian transformation is commutative: if two transformations are applied in succession, the outcome is the same no matter which sequence is chosen. An example is rotation in two dimensions. Non-Abelian transformations are not commutative, so that two transformations will generally yield differ-

ent results if their sequence is reversed. Rotations in three dimensions exhibit this dependence on sequence. Quantum electrodynamics is Abelian in that successive phase shifts can be applied to an electron field without regard to the sequence. The Yang-Mills theory is non-Abelian because the net effect of two isotopic-spin rotations is generally different if the sequence of rotations is reversed. One sequence might yield a proton and the opposite sequence a neutron.

These researchers concentrate on the continuous instances in which particles penetrate or interact with each other exchanging "virtual particles", such as photons and gravitons. Their belief and persistence allows them to master the art of making something concrete from something abstract and nonphysical by nature. The vision of quarks, gluons, and other 'invisible entities' exemplifies this. Regarding the literal mirror model, researchers with B. Perspective freely correlate the reality of the object - in this application, particles of matter - with the reality of the object's reflection - the "virtual particles" or forces.

Would these same scientists be inclined to accept a modified doctrine of monism which asserts that Mind mirrors Matter? Would they be receptive to the literal model which accordingly could predict or at least explain the behavior of thought or mental perception as it relates to the forces of matter? In which case, would a thought in some way reflect or share a one-to-one correspondence with the basic interactive forces of our universe? A thought is even too large, perhaps. It is the components of a thought, the individual details or processes, that reflect the strong, electromagnetic, weak, and gravitational forces. If this is so, could the neurophysiological details of perception be described in terms of local gauge theories which unfold mathematically the exchanged quantum of the field between two particles? Particles of thought? "This quantum", as Hooft explains, "has only an ephemeral existence".<sup>11</sup> I think of this ephemerality as being a fact of the nonphysical world - a fact whose origin is - like the point of intersection of coordinate axes - attached to the virtual image, I, in plane mirror reflection.

This fact links the various types, strengths, and interactions of thought to the properties of nongeometric symmetries and asymmetries. An example of a nongeometric symmetry is the charge symmetry of electromagnetism.

“Suppose a number of electrically charged particles have been set out in some definite configuration and all the forces acting between pairs of particles have been measured. If the polarity of all the charges is then reversed, the forces remain unchanged”<sup>12</sup>. The same rotations and transformations in 'abstract internal space' of charge and isotopic-spin symmetries may be applied to the behavior of mental processes of thought in relation to matter. “All the symmetries discussed... can be characterized as global symmetries; in this context the word global means ‘happening everywhere at once’. A global symmetry states that some law of physics remains invariant when the same transformation is applied everywhere at once... A ‘Local’ symmetry states that the convention can be decided independently at every point in space and at every moment in time... Gauge theories can be constructed with either a global or a local symmetry (or both)...”<sup>13</sup> The Brain And Mind relationship may eventually be charted by these theories, providing people remain sensitive and flexible without desiring ‘to search for ultimate truths’.

One implication of the mirror model is that research regarding nuclear fission and nuclear fusion can be successfully applied to studies in Neurophysiology and Neuropsychology alike. Given the reductivist proposition: atomic nuclei (composed of neutrons and protons) and the basic interactive forces of nature make up all living and nonliving matter. “For since everything is made of matter, the laws of physics, plus initial conditions and boundary conditions, ought to give us the laws of all systems”<sup>14</sup>.

And antithetically, the mirror model can provide 'comprehensive metaphysics encompassing the antireductivist view'. It can do this by demonstrating the one-to-one correspondence between "eternal objects" (to use Whitehead's phrase) and their present, physical counterparts. The researchers of B. Perspective I believe know this as well but have not responded to the challenge. The challenge includes developing the language and approaches of metaphysics in describing the life of the mind. One result of this development would be the attainment of more precise explanations of how mental language and the processes of communication are reflections of physical phenomena in fact and in effect. Perhaps, it is a problem of model building and source selection. This would account for B.'s unresponsiveness and yet not dismiss their interest to discover the common boundaries between these two domains. One attitude which supports this thought is Ulric Neisser's perspective which states:

There is an important place for eventual neurological interpretations of cognitive processes... but we should strive to establish a mechanism and discover its properties first.<sup>15</sup>

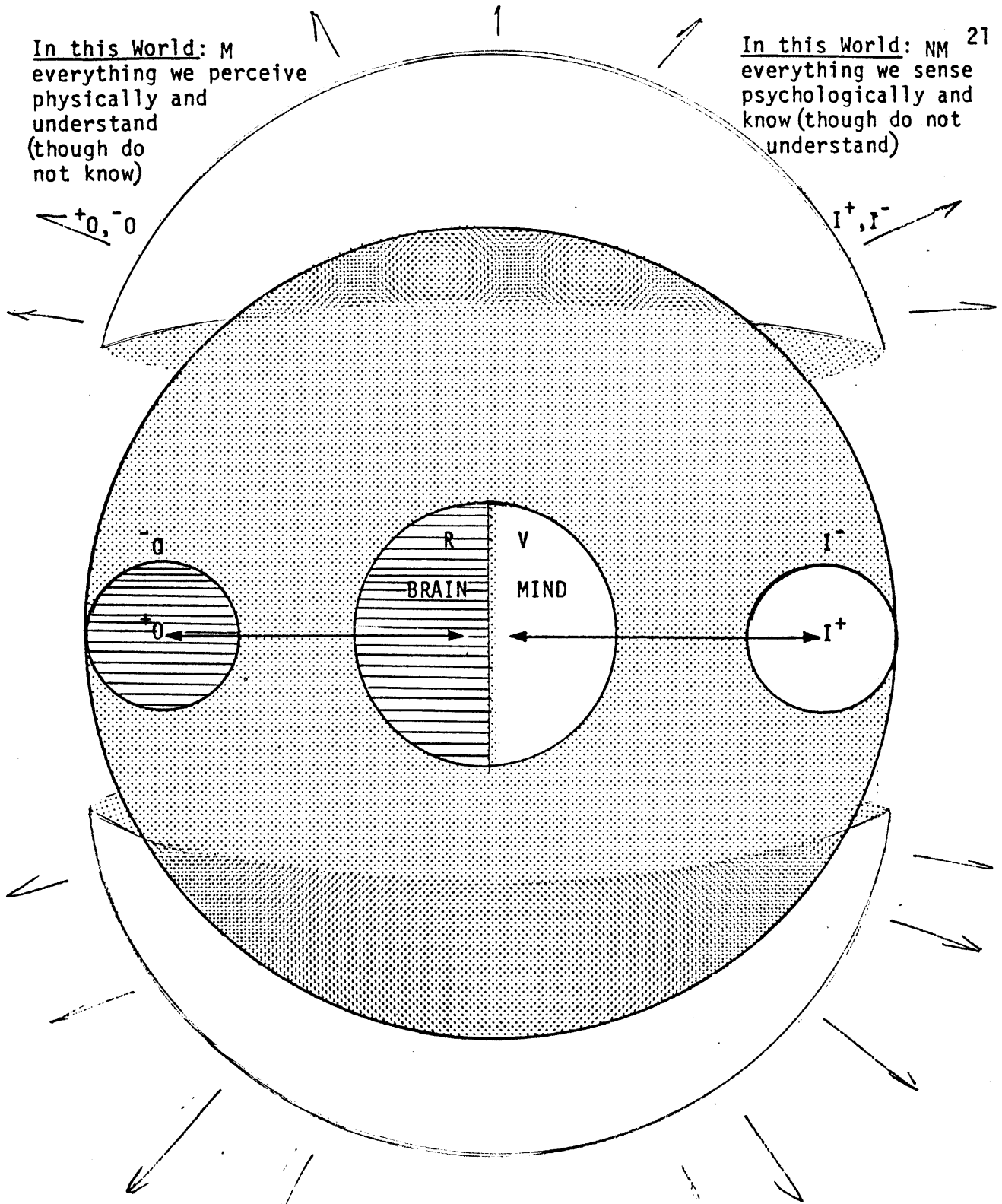
~~What I would like to suggest at this point is that the mirror and interface models represent analogues of possible mechanisms (if not the mechanisms themselves) which control or influence the Brain And Mind complex. Which means that to understand how 'all theories may be reduced to one field' involves studying rigorously the implications of either model. Marjorie Grene, in an article titled, 'Reducibility: Another Side Issue?', writes:~~

The discovery of stable mechanisms in nature, not the summary of one flat level of pure phenomena, is what science is after. The inverse square law, or the

principles of evolutionary theory, or the psychology of association, or the laws of good closure, or the kinetic theory of gases, may embrace a wide range of phenomena in its explanatory scope... A model that modelled just one particular phenomenon would be admittedly of little use. But on the one hand, no such law or theory - and no law or theory - comprehends all the phenomena of every kind that any scientist wants to, or might want to, explain. And on the other hand, the explanation works in each case not just by bringing together many observations into one otherwise meaningless and conventional formula. It works by leading us to see... how in fact those phenomena are produced.<sup>16</sup>

In this World: M  
everything we perceive  
physically and  
understand  
(though do  
not know)

In this World: NM <sup>21</sup>  
everything we sense  
psychologically and  
know (though do not  
understand)



The mirror and the interface -  
evident in both Real-R and  
Virtual-V aspects of the Brain  
And Mind - make up a 'complete'  
Reality.

(One Nucleus Of The Universe)

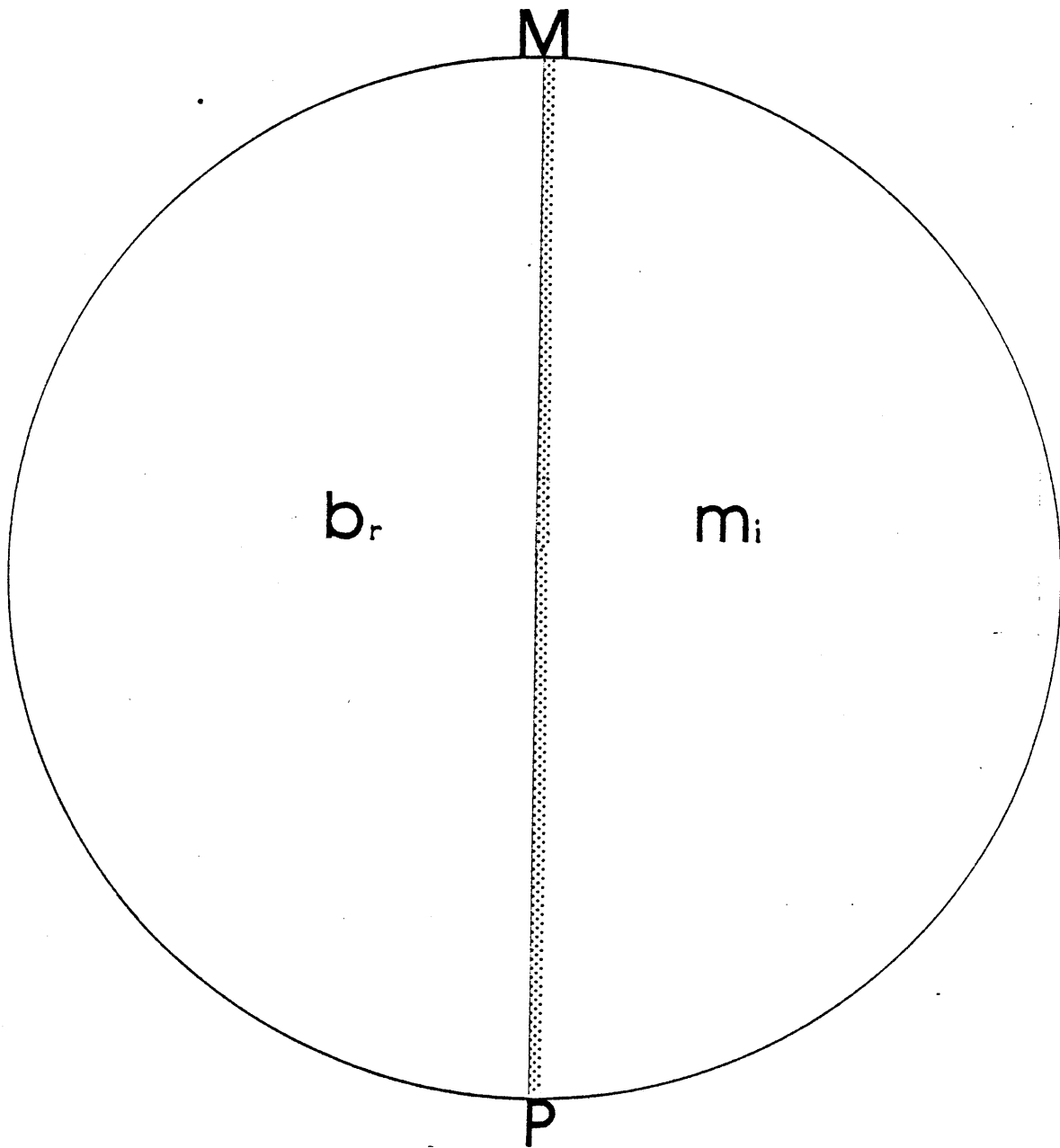
Just as languages were contrived to articulate communication and express imagination, particle accelerators were conceived to 'articulate' the structures and forces of the physical world - first observing and identifying the different species of particulate matter. As I have stated throughout this thesis, the properties of these particles are represented equally in real matter and virtual matter which I refer to as NonMatter. This word is applied to both literal and figurative mirror and interface models. I believe the use of the word "virtual" by researchers of A, Perspective in applied physics is an example of an unconscious influence of 'Matter on Mind'. If it consciously influenced the conception of "virtual particles" it would have been formally acknowledged as having done so. "Virtual particles", as defined in physics, denote the intermediary particles that occur between quarks and other particles. The physicists of Perspective A. continue to conjecture that the reason virtual particles cannot be detected is that they 'cannot survive long enough or travel far enough and so their role must be deduced from the products of the interaction observed at long range'. I feel the reason is related to the fact that the products of the interaction are as tangible as the objects 0 in mirror imagery. Consequently, they belong to the world of real physical matter. The 'virtual particles', obversely, belong to the world of virtual nonphysical matter which is manifest by the object's reflection. The dynamics of virtual matter or NonMatter appear to reflect (in the most literal way) the properties of real Matter - governed by the laws of quantum electrodynamics of charged particles and the mediator, photons. All this means that quarks - like thoughts and feelings - are as real as reflections are real. However, in this nonphysical realm of Reality they can never be "shown" as 'real entities' in themselves but only as mirror-

ing virtual entities such as the 'products of the interaction observed at long range'. In my view, quarks are the fundamental components of virtual matter which make up the substance of hadrons. They are real only insofar as they can be isolated and defined in mathematical notation. In this form they represent the invisible half of all that is visible and tangible.

The real phenomena are the invisible ones demanded by the most unifying and most economical theory, the phenomena I see are only apparent and must be explained away.<sup>17</sup>

"The virtual photon can yield a quark and an antiquark, but unlike the electrons and muons the quarks are never observed at long range. What are seen instead are pions or other hadrons; somehow the quark and antiquark "dress" themselves in other quark-anti-quark pairs".<sup>18</sup> The word "dress" I take to mean 'appear to be reflected'. Using the mirror model we see that electrons and muons (= the objects) and that virtual photons, quarks, and antiquarks (= the reflections of the objects). The "somehow" is the mechanism or "how" of the mirror. And, the act of 'dressing' is the process of the mirror mechanism. I feel that understanding the very basics of this mechanism is that straightforward and comprehensible. I suspect that the sub-atomic dynamics of these intangible, 'virtual' or ideal and tangible, 'real' forces are indicative of the dynamics of the Brain And Mind forces. In light of this reference, quantum electrodynamics could be applied to the brain functions or Neurophysiology and quantum chromodynamics could be applied to the mental processes or Neuropsychology. In effect, the Brain's 'photons' would mirror the Mind's 'gluons'.





In Neurophysiology and Neuropsychology, two perspectives A. and B. make up the search for the key to the Brain And Mind complex. The researchers with A. Perspective tend to separate their analyses of the brain from the analyses of the mind, disconnecting all neurological aspects of mental processes. Categorically, they distinguish between the physical components of the brain - implying the structures, processes and energies - from the nonphysical components of the mind. As scientists they would favor the theory of equivocation which states:

All material systems are governed by the laws of physics.  
As all living systems are material they are governed by  
the laws of physics.<sup>19</sup>

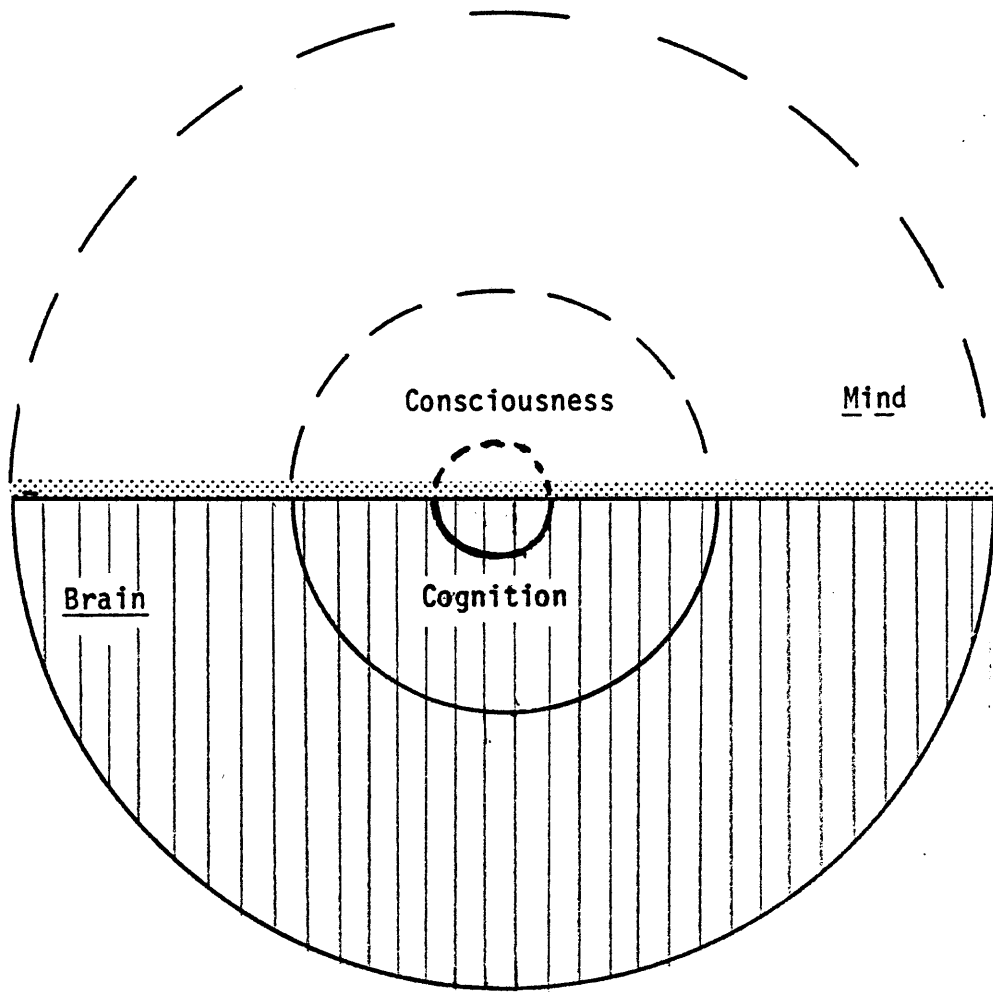
By contrast, the researchers with B. Perspective tend to consider the total integration of the mechanisms of the human brain and the processes of the mind. They may think of them as being 'one and the same', while respecting the fact that they operate differently. Knowing this, these researchers focus on the 'continuous instances' in which the brain seems to become the mind and the reverse. Up until now, their translation of 'becoming' generally implied 'influencing'; meaning the brain seems to influence the mind and the reverse. By concentrating on this continuous process of 'instances', in which information unique to both the brain and the mind is apparently exchanged, they hope to solve this biological riddle. The most sensitive of these scientists, I suspect, do not separate the physical and mental realities - perceiving them monistically; they may imagine a one-to-one, commutative relation between these two domains. This implies that a symmetry may exist which balances the influences of

perception and consciousness. B. researchers might as well ask how the Brain And Mind relationship is consistent (or compatible) with the physics of mirror reflection and other spatial and geometric symmetries. By believing that an object, O, is 'real' and its virtual image, I, is 'unreal' - making up the complete format of a plane mirror reflection - they "see what is" as a fact of tangible reality and "what is not". What physically exists and what only appears to exist. In the context of this mirror analogy, the researchers of A. Perspective would regard the study of 'O' as the study of the human brain mechanisms and of 'I' as the study of the human mind or mental processes. Those of B. Perspective, conversely, would be more likely to regard the format of the plane mirror as the whole relationship of the Brain And Mind. They would correlate the neurophysiology of perception with its complementary study - neuropsychology. This would infer that as they point out the properties of the brain they would also point out the properties of the mind simultaneously. See Diagram O.,I. The terms "cognition" and "consciousness" are used interchangeably by these scientists to describe the physical and nonphysical processes (of the Brain And Mind) mutually involved in perceiving and understanding or knowing something. Literally and figuratively, for them the mind somehow reflects the brain. That is, the mechanisms of Brain are opposite and reverse the processes of Mind, as mental language mirrors neural language. What is seemingly incoherent and structureless - concerning the processing of information in the brain - may actually be structured and coherent in the mind. For example, the statement, "Here I am. There you are", as an expression of the mind may be realized in neural form as:

This is one way, I believe, 'the actions of the nervous system are translated into Consciousness'. Perhaps W.R. Hess would disagree.

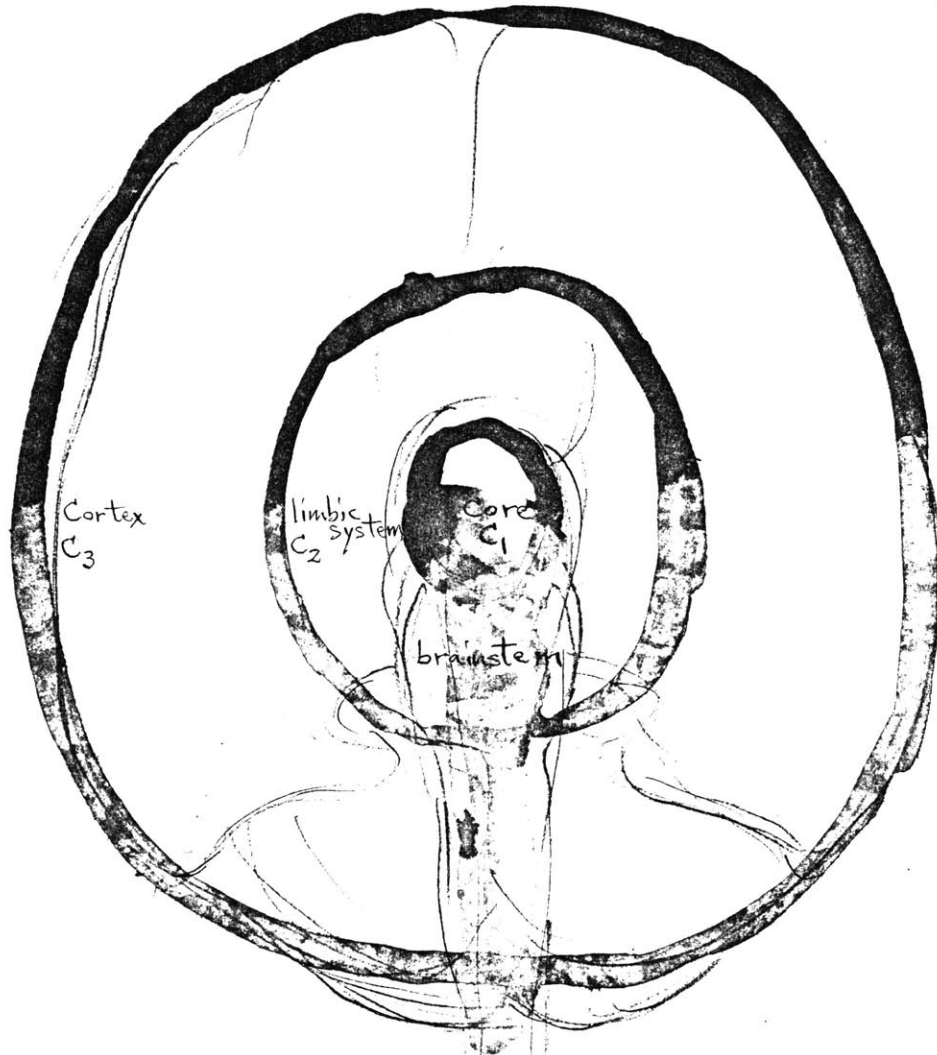
I use the mirror interface model to construct the 'line' between 27  
the States of Brain And Mind, in order to examine the properties of each  
as though they were independent from one another. This 'line' also allows  
me to substitute the concept of 'Cognition' - related to neural processes  
or States of Brain - for the concept of 'Consciousness' - related to  
mental processes or States of Mind - as if the properties of one reflected  
those of the other. In which case, these two concepts are as interchange-  
able as the Brain And Mind complex is inseparable. The term 'States'  
implies a "set of circumstances or conditions as regards structures and  
forms."<sup>20</sup> Associated with the States of Cognition are the specialized  
regions of the brain including the cortex, limbic system, and core or  
brain stem among other related anatomy of the central nervous system.  
As indicated in Diagram Sphere, there is a correspondence between the  
Cognitive States and the functions of these brain regions. These functions  
influence, control, and are influenced and controlled by these States of  
Cognition. This gross simplification suggests that information processing  
in the human brain is in some way analogous to the processing of the  
object-image relation in plane mirror reflection. I feel this simplifica-  
tion is as necessary here as it is in mathematics where, for example,  
numerical symbols are used to define abstract form. As the substance of  
the mind is certainly 'abstract' - in the sense that it is formless and  
seemingly infinite dimensionally - I choose to use ideographic symbols  
to help highlight and structure my speculations. I apologize if these  
speculations eclipse the reality (based on current scientific consensus)  
of the brain and the mind.

Diagram Sphere



# Diagram Sphere

Bottom View



$$C_3 \leftrightarrow C_1 \leftrightarrow C_2$$

$C_2$  = 'mirror conjunction' or  
nonmirror interface

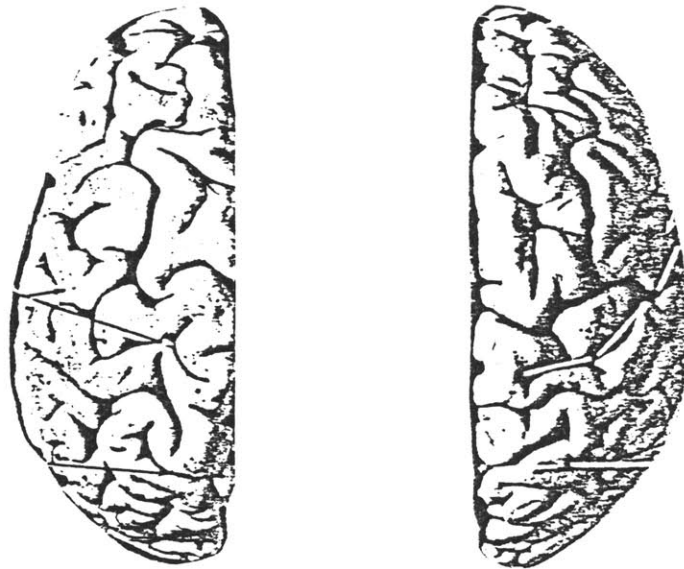
$C_3$  - consciousness  
 $C_2$  - preconsciousness  
 $C_1$  - unconsciousness

} occurring simultaneously,  
at the rate of sensory flow

As indicated, the intensity and type of electrical activity in the human brain is related to the intensity and type of cognitive activity in the human mind. There are several brain centers each of which is controlling a different activity. And, there are several completely specialized and semi-specialized centers; however, many activities particularly of the higher mental states can be carried out in the same center or region(s). It might happen that at certain moments of cognitive activity most of the nervous system including both hemispheres of the brain work together as a single unit or 'sphere' - focusing information. In this instance, all the smaller, local synaptic connections would make up one larger systemic or global connection to produce as a result the highest mental state - Intuition. See Schemes 1. and 2. The 1st State of Cognition then would consist of some sort of 'systemic localization' of electrical activity in which most of the currents and forces in the nervous system would be unified and fused within milliseconds. The internal dynamics of this neural 'fusion' process would no doubt reveal one field of direction re electrical currents and mental concentration. This does not imply, however, that there would be some noticeably different physical sensation accompanying this instance of localization. That is to say, a person would not necessarily feel any differently in instances of Intuition (than in the 3rd Cognitive State) but perhaps they would behave differently. There is definitely a unique mental attitude that makes itself known at that moment; in fact, the 'instance' is usually celebrated with some exclamatory remark:

"I just had an idea!"... "a tremendous insight!"...  
"That's it!"... "I got it!"

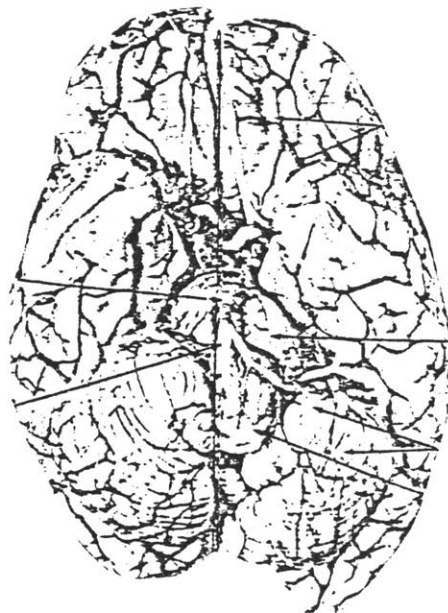
Scheme 2.  
COGNITIVE  
FISSION



Divergence

'Delocalization' Effect  
(exploded view)

Scheme 1.  
COGNITIVE  
FUSION



Convergence

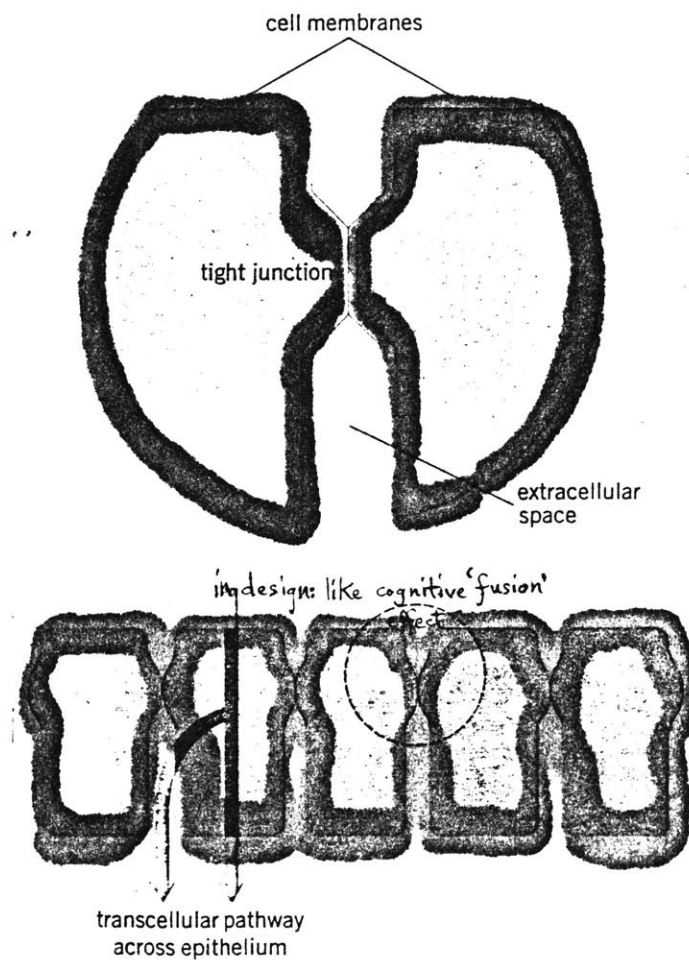
brainstem: bottom view

'Systemic Localization' Effect



Movement of Molecules Across cell Membranes,  
re cognitive processes, implies the functional  
fusing together both hemispheres of the brain  
to form one unit or sphere in which informa-  
tion, like moving molecules, cross between the  
left and right hemispheres to collect in one  
central and specialized region of the brain.

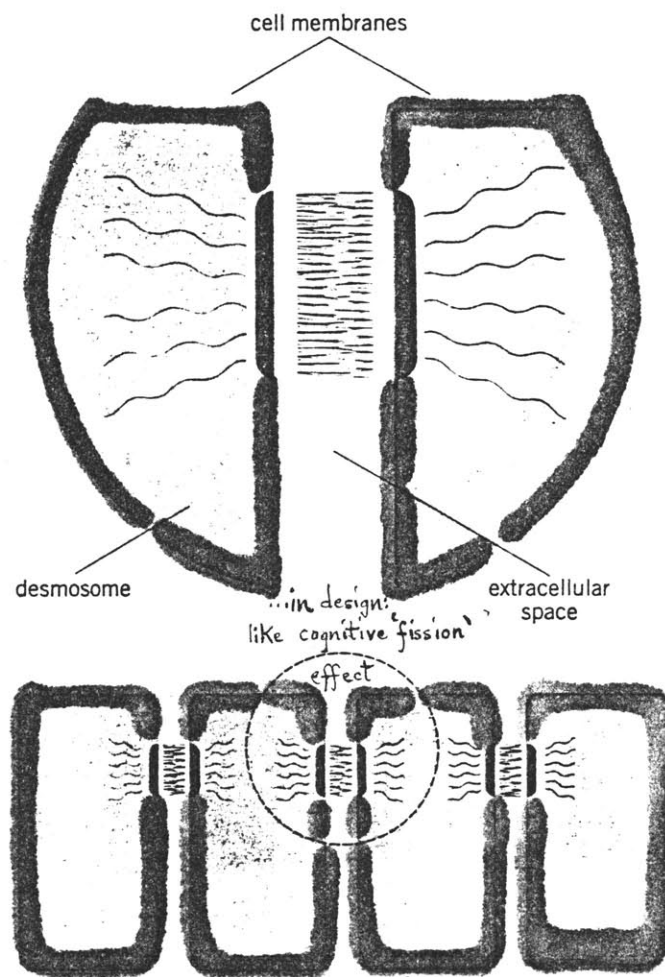
Schematic diagram of structure of tight junctions linking epithelial cells together. The membranes of adjacent cells are in contact forming an impermeable barrier across the epithelial-cell layer...



...tight junctions are an actual fusing of the two adjacent cell membranes so that there is no gap between the adjacent cells in the region of the tight junction. This type of junction extends around the circumference of the cell and effectively closes off the extracellular route for the passage of molecules between epithelial cells.<sup>21</sup>

Basic cell functions in this illustration are drawn like human brain hemispheres. Note: there is a 'likeness' in drawing alone though not in structure or function.

Schematic diagram of desmosome structure linking cells together. Membranes of adjacent cells are not in contact in the region of the desmosomes.



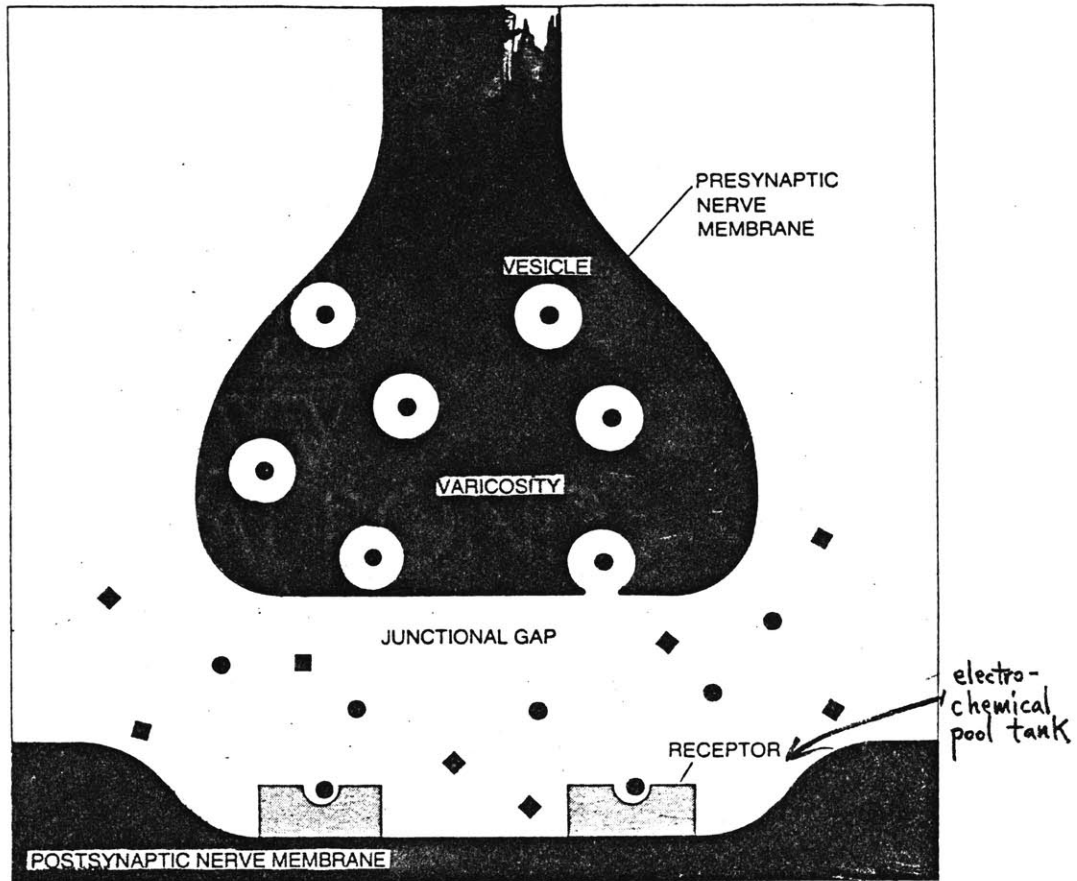
The function of the desmosome appears to be that of holding adjacent cells together in areas that are subject to considerable stretching, such as in the skin and heart muscle. Desmosomes are usually disk-shaped and thus could be likened to rivets or spot-welds as a means of linking cells together. <sup>22</sup>

The idea of 'systemic localization' I distinguish from that of the half/whole "unity" of the hemispheres of the human brain. I use the word "unity" to suggest that even though the two may operate independently from one another they still are encased in one cranial cavity with one capacity. What is worthwhile investigating to me is not whether one hemisphere is opposite another functionally, but whether the phenomenon of an intense, localized electrical activity occurs in the state and in the region(s) or center speculated. Also, what is the likeliness that the speed at which one passes from the 3rd Cognitive State to the 1st determines the suddenness of the realization that one has just experienced an Intuition or the sensation of becoming aware of some previously unconscious thought. Here I think it is important to recognize the action of 'convergence' as it relates to the process of perception. If we regard the 1st State of Cognition as the 'instance' of physical perception, then the 'coordinated movement of the two eyes toward fixation' or 'convergence' on the same sight or sense (like a near fixed point) would immediately affect the States of Consciousness.

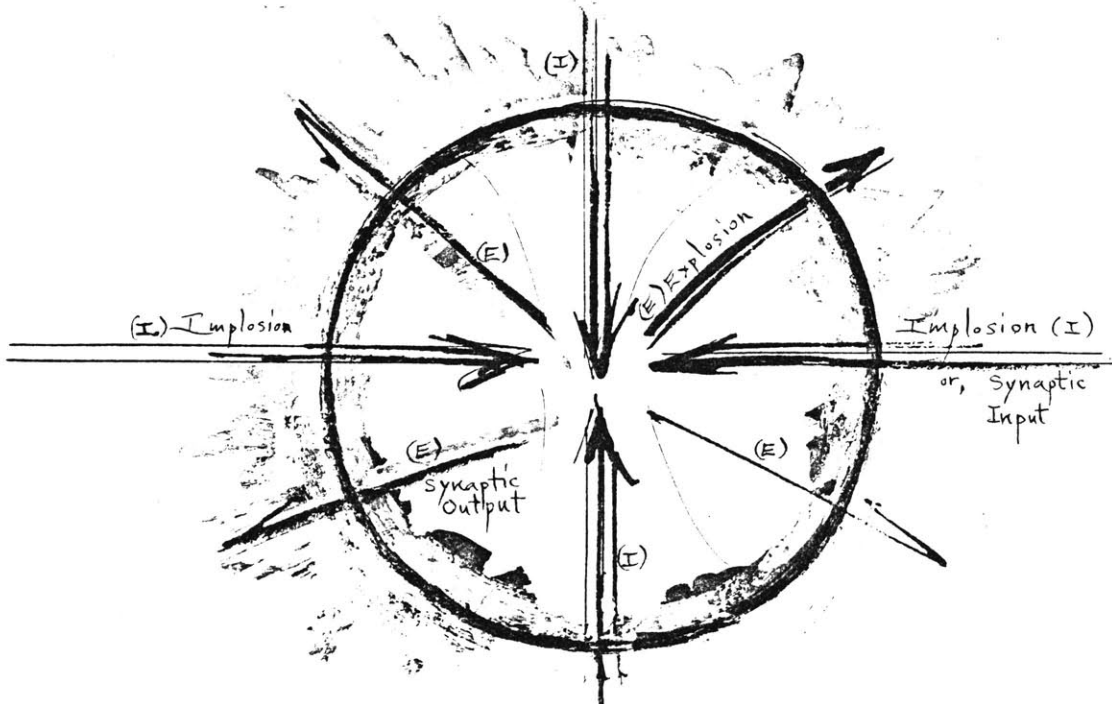
A more explicit event I wish to understand is the sudden sensation and awareness the mind seems to experience in discovering its own mental processes and their relation to the mechanism in the brain which influence these processes. The event is sort of like a child discovering its mirror-image for the first time. I feel it is this discovery of and by the mind which triggers off the sequences of physiological responses. The conditions for these responses are based, as I mentioned before, on the ~~momentary~~ union of hemispheres or 'spherical' effect at which time the primary regions in the brain are combined (review Scheme 1). I would think that interrupting a person exactly in the middle of this complete physiological

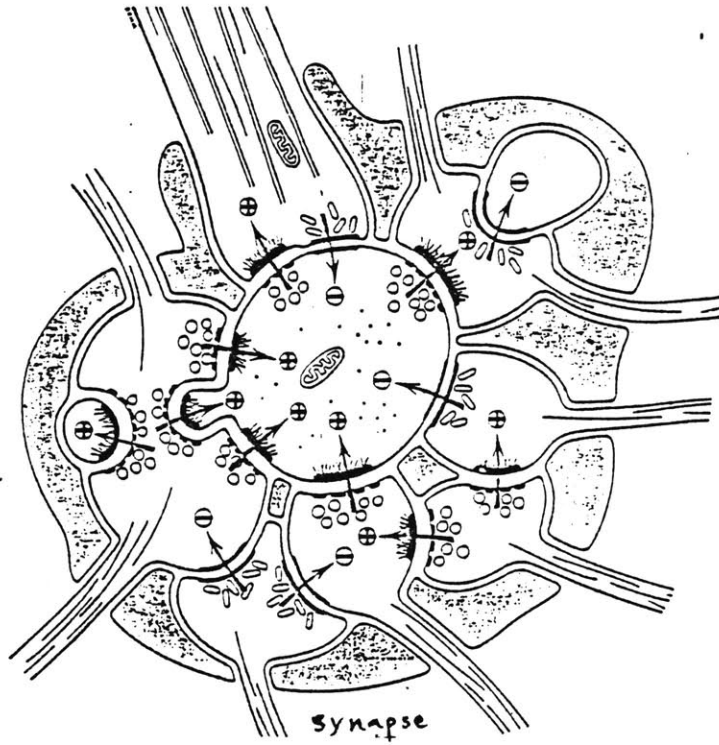
and psychological experience would be like waking someone who is in the midst of REM sleep - physically locked into their body as if paralyzed. One fact seems certain: the Brain And Mind shift from the 3rd Cognitive State to the 1st - from the outer region to the central or center region of the brain - in one movement and with varying degrees of completeness. I suspect that brain waves are thus generated and guided in particular directions by the body's electromagnetic fields.

To study this phenomenon I first observe the structure and function of synapse where (on a relativistic scale) great concentrations of energies occur. Note Synapse Diagram. See all the synaptic contacts discharging their neurotransmitters into some central, electrochemical pool. After which or at which time information of some coded form and order emerges freshly 'coated' in the synaptic pool tank. This 'coating' process I would like to think is one of coding - as for directing neural activity. The action of discharge is analogous to the implosive action that takes place when, for instance, a fuel pellet implodes under the influence of 300<sup>th</sup> Mega power in a laser fusion reaction - producing nuclear plasma. In the context of the Brain And Mind complex, this flash of 'cognitive fusion' represents the State of Intuition. Unlike any reactor in which there is a nearly precise control of variables (ideally, at least); the variables involved in stimulating the brain's 'fusion center' are 100% more vague. To further complicate things, imagine that the various regions of the body through which information is processed affect the actual form and content of the information itself. In this case, you may consider 'information' to be a 'thing' of some n<sup>th</sup> dimensional structure as well as a 'relationship' with the emphasis on 'event'. Two questions follow. Do these other regions



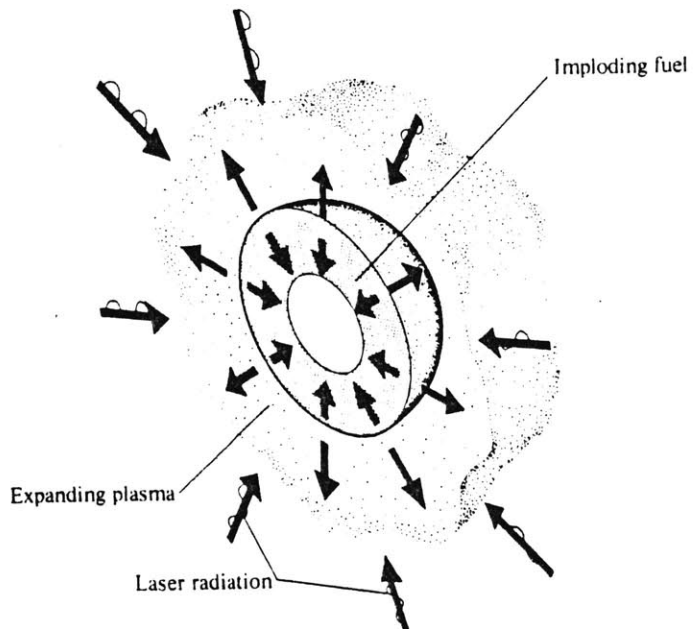
NERVE-CELL COMMUNICATION takes place at synaptic junctions, one of which is depicted schematically here. The nerve cell ends in varicosities, or swellings, that contain packets of a transmitter substance, in this case acetylcholine (*color*). On the arrival of a nerve impulse the acetylcholine is released from the vesicles into the gap between the nerve cell and another cell. Receptors on the membrane of the latter cell bind only the acetylcholine and not any of <sup>23</sup> the other chemical substances (*black squares*) nearby, and the signal is thereby transferred.





24

PRINCIPLES OF ENERGY CONVERSION



25

of the body such as the spinal cord act as a kind of electric wave guide or even as a biological optic system designed to filter and focus the information? And, is this implosive-explosive process occurring continuously in the brain, significant for all neurophysiological events?

Especially, those events involving both localized and delocalized electrical activity? Also, how can it be tested that what occurs in this nanosecond process of implosion and explosion as related to synapses reflects what occurs in the instances of Intuition? Does this process or processes and events mark the moment of 'pure creation'? That is, when the areas or concentration of electrical activity are all localized - confined to a central point... and contained in those areas of specialized functions. Is there a 'physiological implosion' and 'psychological explosion' of information? By 'explosion' I mean the actual dissemination of the information; the state in which information is processed through the neuronal components of the nervous system. It seems likely that such actions determine or rather influence the intensity and States of Cognition. Furthermore, it seems possible that the point of conjunction between the implosive-explosive forces represents the interface or plane of reflection between States of Brain And Mind.

In the microcosm, the collision and fusion of plasma particles results in energy while in the macrocosm the intersection and union of information results in Intuition. As expected, in fusion, two atoms unite but their unions begin independently from one another. While in fission, atoms split apart in close interaction with one another. The microcosmic analogue of the highest Cognitive State (Intuition) then is plasma fusion. It may be that during this State both hemispheres of the brain act as magnetic mirrors which focus and direct information back and forth at such great concentration, confinement, and speed that 'cognitive fusion' occurs. In the Brain And Mind one could imagine that this fusion occurs when electrons (= grammar, syntax) and nuclei (= deep structures, in language, semantics) separate above temperatures of 10,000 degrees (= conditions by which mental language fuses with the neurosphere of sensation, in response to the intensity of cognitive processing). Curiously enough, nuclear plasma is referred to as the fourth state of matter, differing in behavior from solids, liquids, and gases. Whenever I refer to nuclear fusion, I am also referring to Intuition - when both hemispheres unite like two atomic nuclei.



In the 3rd State of Cognition, thoughts are produced by a process whose microcosmic analogue is fission - signifying two separate parts and operations of human brain hemispheres. This difference between fission and fusion with respect to cerebral functions depends upon the bio-mirror itself - whether it is operative or inoperative due to 'broken symmetry'. In this lowest cognitive state the same amount of area in the brain may be used as in the highest state; however, there would be no central connection created by the mechanism of the bio-mirror whose function is to confine and focus information. In effect, the 3rd State has as much potential and actual energy as the 1st State, though it literally and figuratively lacks focus, losing energy like a plasma leak in a fusion reaction.

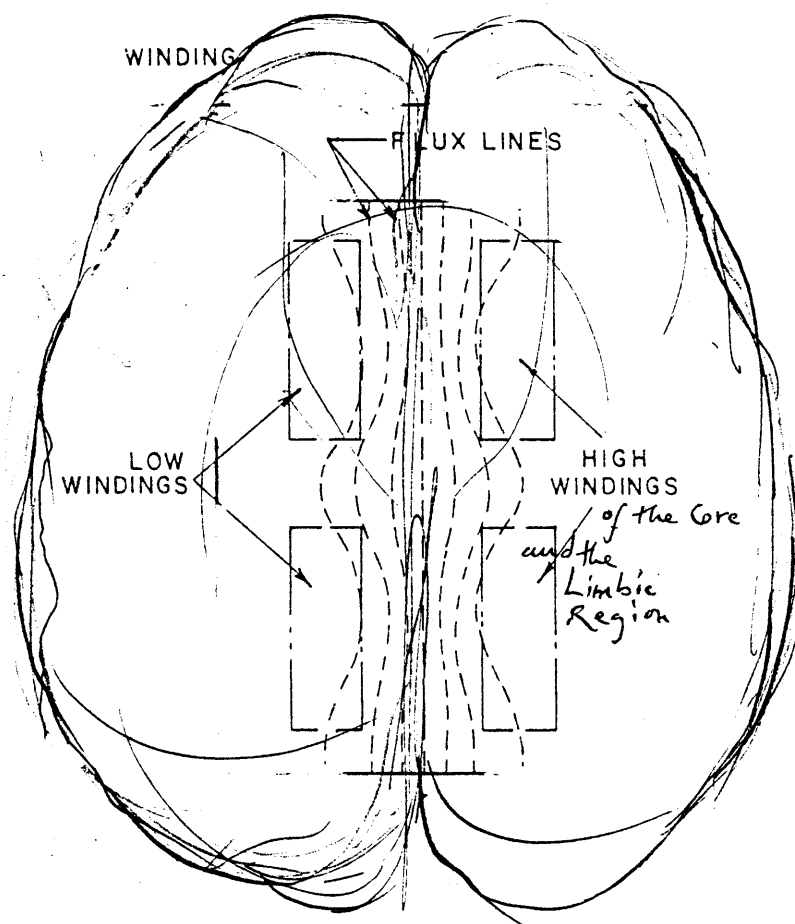
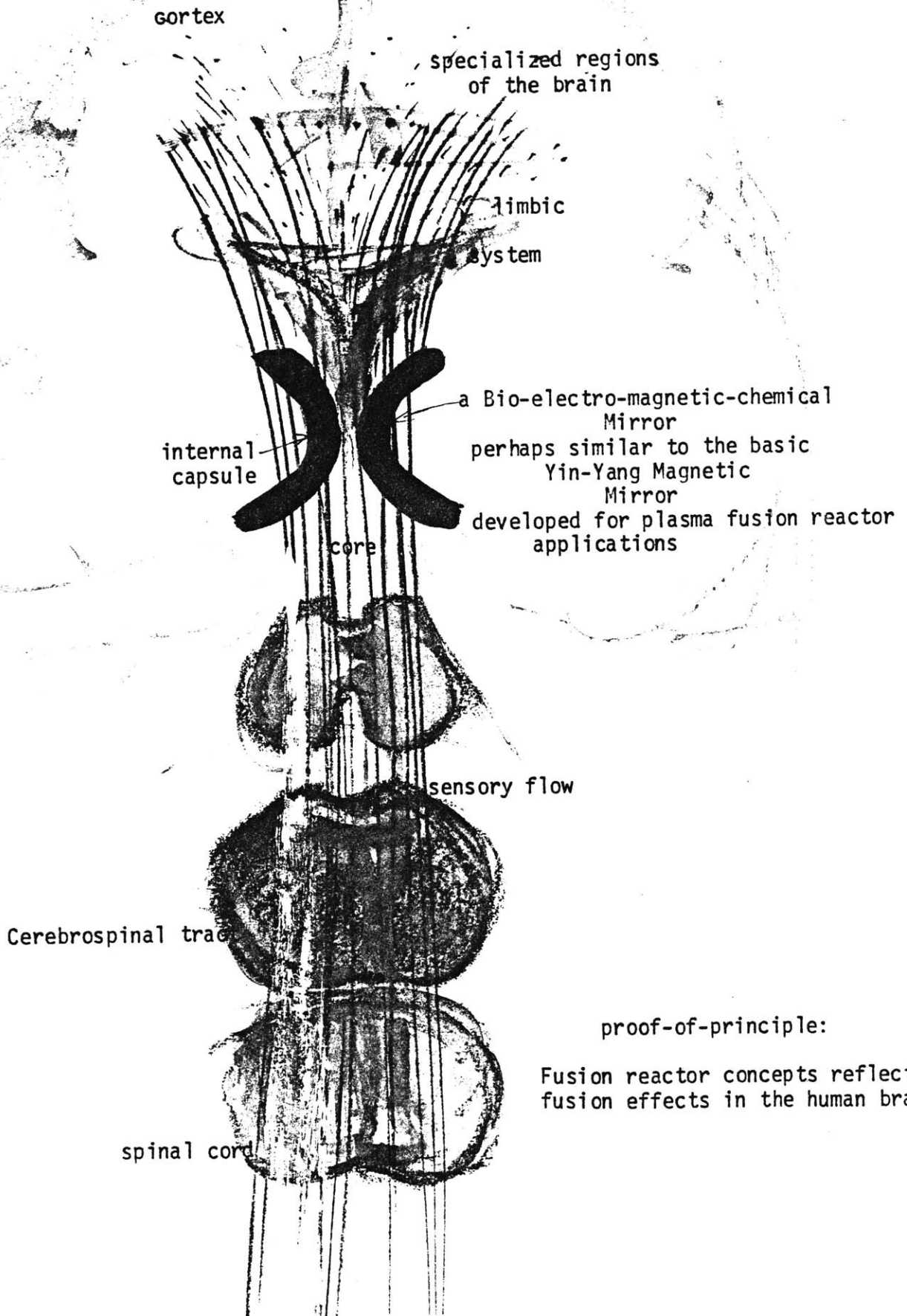


FIG. 1 LEAKAGE FLUX

IN SEARCH OF THE BIOMIRRORS OF THE CENTRAL NERVOUS SYSTEM



nonphysical

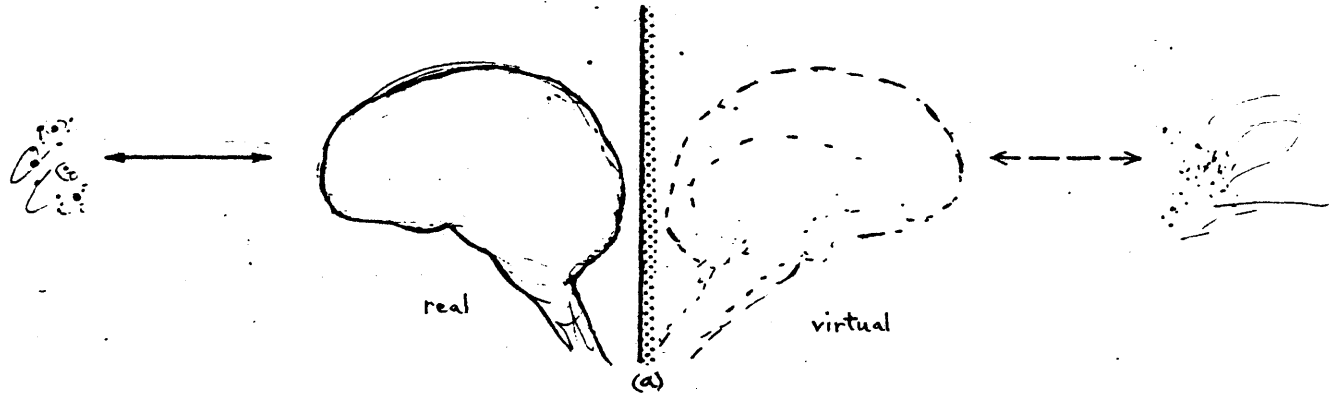
**MIND**

**"abstract concept"**

external relationship

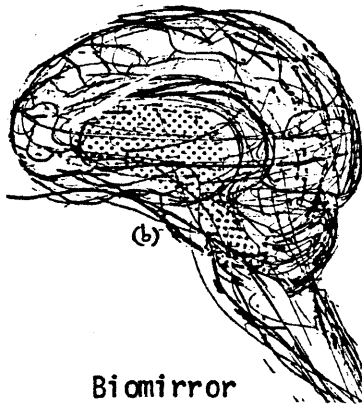
**process**

Mirror Reflection  
(with geometric symmetry)



Matter makes up the Brain 'becoming' the Mind which reflects Matter

MIRROR INTERFACE



Did the Brain And Mind  
invent the mirror in order  
to look at the biomirror  
of the Brain?

Is (a) an isomorph of (b)?

Biomirror  
(Bio-electro-magnetic-chemical mirror  
with nongeometric symmetry)

**mechanism**

**BRAIN**

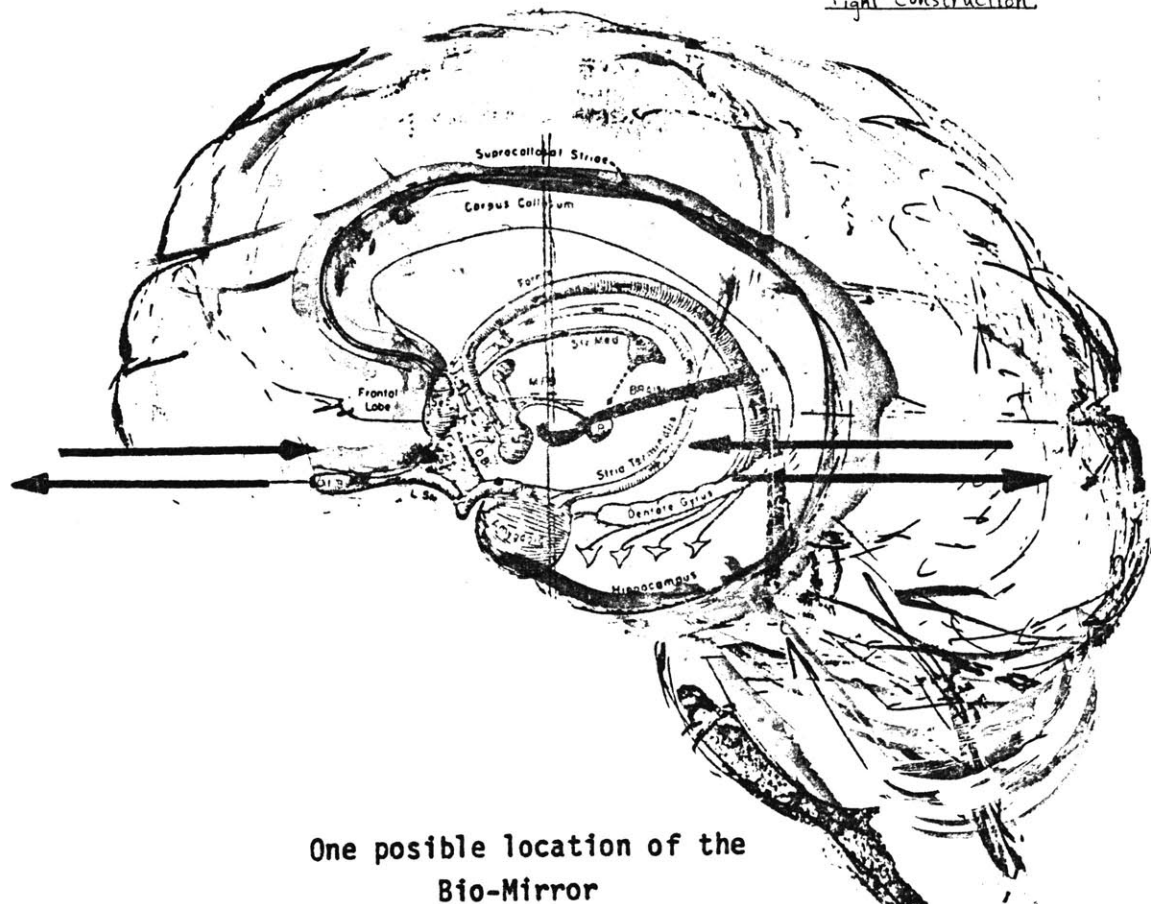
**"concrete object"**

(internal relationship)

**physical**

To present a history of the mirror or even my conception of the interface is not my intention. I prefer to point out some of their implications in the physical and nonphysical world alike. In particular, I want to show how the phenomenon of symmetry and asymmetry influences every-thing and everything we perceive as making up a "complete" Reality. When I describe the Brain And Mind relationship in the context of the mirror, I am no longer talking in terms of a rectilinear plane mirror with geometric type symmetry. Instead, I am referring to a non-geometric form possessing a nongeometric type symmetry. This form, I would like to imagine, functions as an internal, organic, 'bio-mirror' whose physiological optics are not quite as defined as those of the human eye. In the brain the 'bio-mirror' is composed of the Thalamus or Limbic system and Brainstem collectively. This is one conjecture.

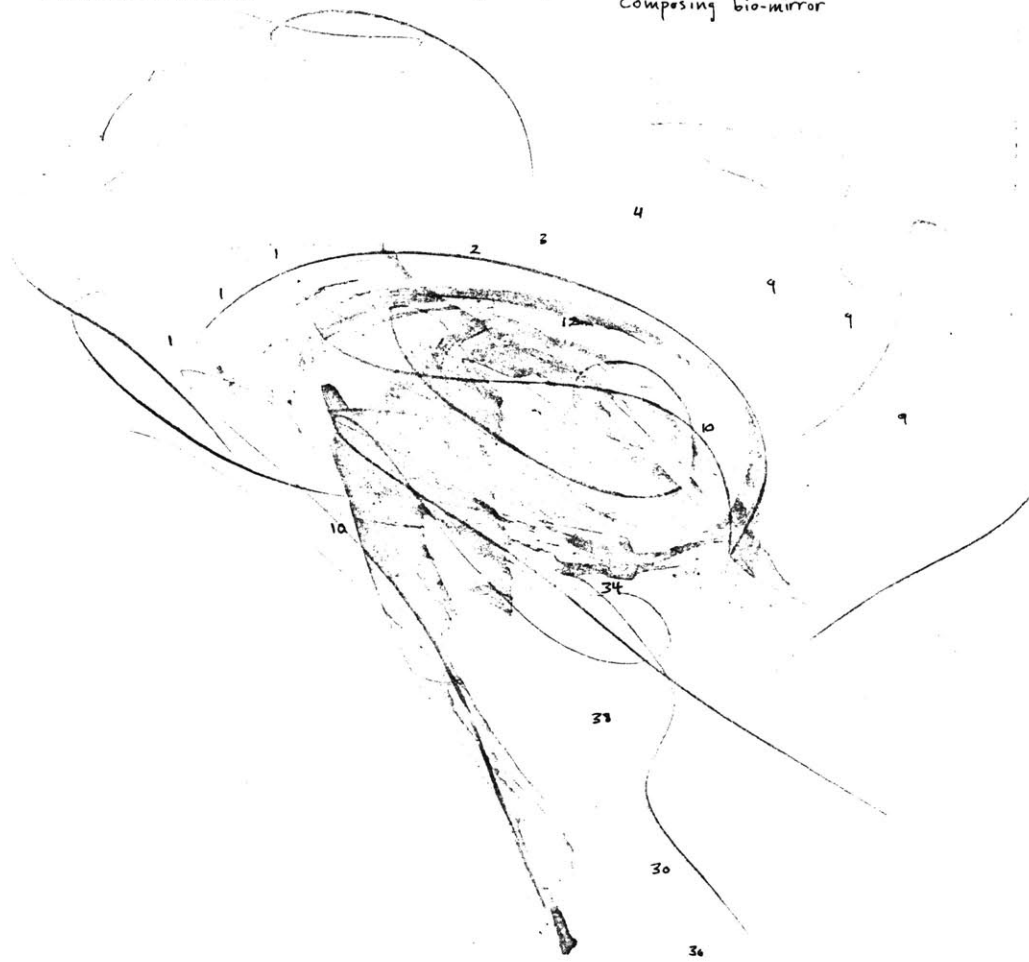
*Tight construction:*



One possible location of the  
Bio-Mirror

General view of the human cerebrum and brainstem.

Loose Construction: numbers indicate parts of the central nervous system  
Composing bio-mirror



Since I am dealing with living tissue and globular masses all of which are obviously nonreflective surfaces, I cannot apply the mirror model literally. I cannot say that some structure and mechanism in the human brain functions as a rectilinear mirror - implying that the bio-mirror exists on one plane bordering the frontal lobe. In my mind this bio-physical mirror possesses 'approximate' properties of reflection. To emphasize this approximity I refer to its reflective qualities as being 'mirror-like'. The mirror mechanism in this case involves nongeometric type symmetries such as those related to the interchanging of electric charges. The fact that some thing behaves 'like' a mirror and yet is not a mirror in all its reflective characteristics is claimed by this thought of mirror-like behavior. My concept of the bio-mirror as an actual thing avoids comparison to its metallic coated, smooth, glassy and stationary counterpart - the plane mirror. For me to propose that this counterpart exists in the brain or in any other organ of the body, human or otherwise, is to recreate or broaden the humunculus model. By thinking in terms of 'likeness', re the lawlike facts of bio-mirror reflection, I hopefully eschew this error.

<sup>1</sup>The distinction between *laws* (law statements) and *lawlike* sentences occurs, e.g., in N. Goodman, *Fact, Fiction, & Forecast* (London: Athlone Press, 1954; Cambridge, Mass.: Harvard University Press, 1955), Chapter i. But whereas Goodman and other authors mean by 'lawlike sentence' any statement having all the attributes of a *universal* law save possibly truth (which laws alone are said to possess), I shall not assign a priori a definite logical form to law statements but shall rather try to find out the possible logical structures of factual propositions that smack of laws, on the rule that the elucidation of terms in current usage is not a matter of arbitrary stipulation but rather the object of an inquiry both analytical and empirical. 26

What remains to be clarified is how the bio-mirror differs in function from the interface and how these differences influence or determine the Brain And Mind relationship.

The frontal lobe may act as a focusing bio-mirror, with the fronto-limbic connection forming the front half of the cerebrum's bio-mirror and the occipital-limbic connection forming the back half.

Each half, if rendered geometrically, would appear as a hemisphere - such that the fronto-limbic-occipital connections would 'divide' equally the superior and inferior portion of the cerebrum and cerebellum.

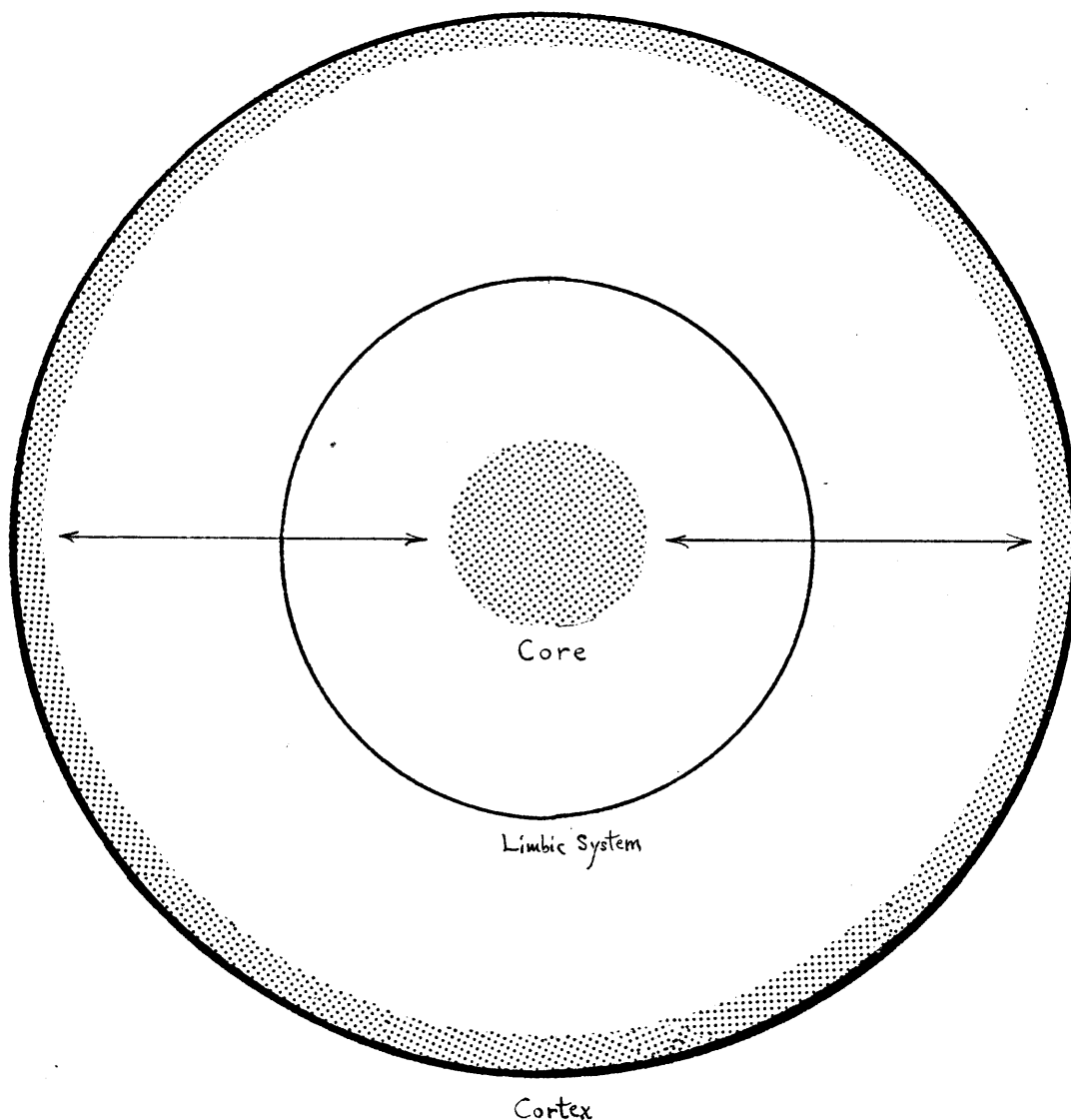
Whether the 'line of division' rotates 360° in any direction, changing shape or reflective characteristics, or whether it has some central axis (about the limbic system), is undetermined as indicated in Diagrams (a,b).

When the information from the fronto-limbic section is synchronized with that of the limbic-occipital section then I would imagine, there is some kind of crossing over or exchange of information (from front to back, and top to bottom, simultaneously) - intuition occurs.

This main bio-mirror interface involves the fronto-hypothalamic-occipital as well as the fronto-mesencephalic-occipital projections of information.

#### Biomirror Details

(magnetic mirror effect of the cortex and core in the brain,  
with the limbic system serving as a nonreflection interface  
between the two regions)

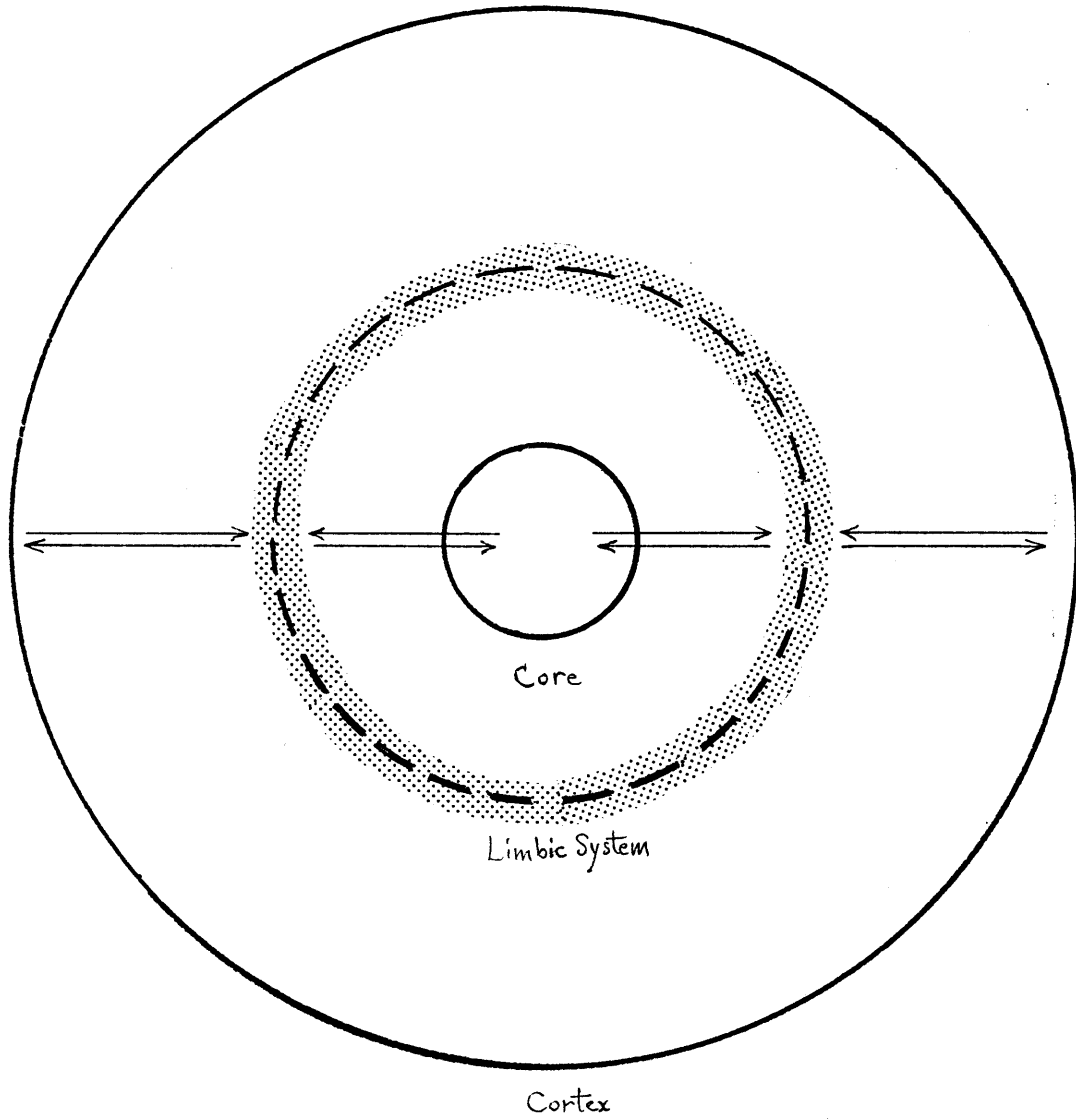


The bio-mirror model may yield some insights into how the specialized regions in the human brain function conjunctively. The insights would help define the similarities and dissimilarities between states of brain (cognition) and states of mind (consciousness).



Diagram (b)

(magnetic mirror effect occurring in the limbic system)



In the gross anatomy of the human cerebral hemispheres the mirror-like mechanism would exist somewhere in between the back portion of the frontal lobe and front portion of the occipital lobe, as indicated in the diagram. On a vertical or y-axis, it would extend from the superior part of the parietal lobe in the encephalon region to the inferior part of the pons in the rhombencephalon. On a horizontal or x-axis, the bio-mirror would exist approximately along the dividing line of the longitudinal fissure and the corpus callosum which connects the two hemispheres.

Within the anatomy of the cerebellum, in the dorsal part of the metencephalon, the bio-mirror would exist along the vertical line of the Central lobule; that is, from the anterior to the posterior cerebellar notch. Or it would extend horizontally from one end of the Primary fissure to the other.

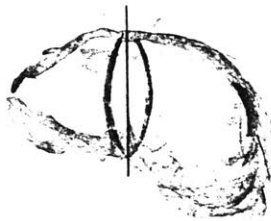
The bio-mirror as it relates to the spinal cord would be situated either between each segment - from the superior cervical to the inferior sacral and coccygeal segments - or between the upper muscles of the vertebral structure and the lower muscles.

The function of the fiber tracts of the spinal cord carrying afferent and efferent impulses would also operate according to the mirror-like mechanism. The position of the bio-mirror is indicated by the horizontal or vertical lines. In each of these drawings I do not mean to suggest that either line represents one optical axis or Meridian Plane.

More Biomirror Details

# 'BIOMIRROR INTERFACES

APPROXIMATE POSITIONS



Lateral view of cerebrum



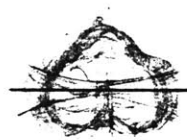
Ventral view



Dorsal view



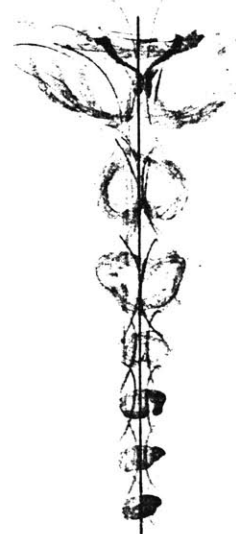
Medial Sagittal Section



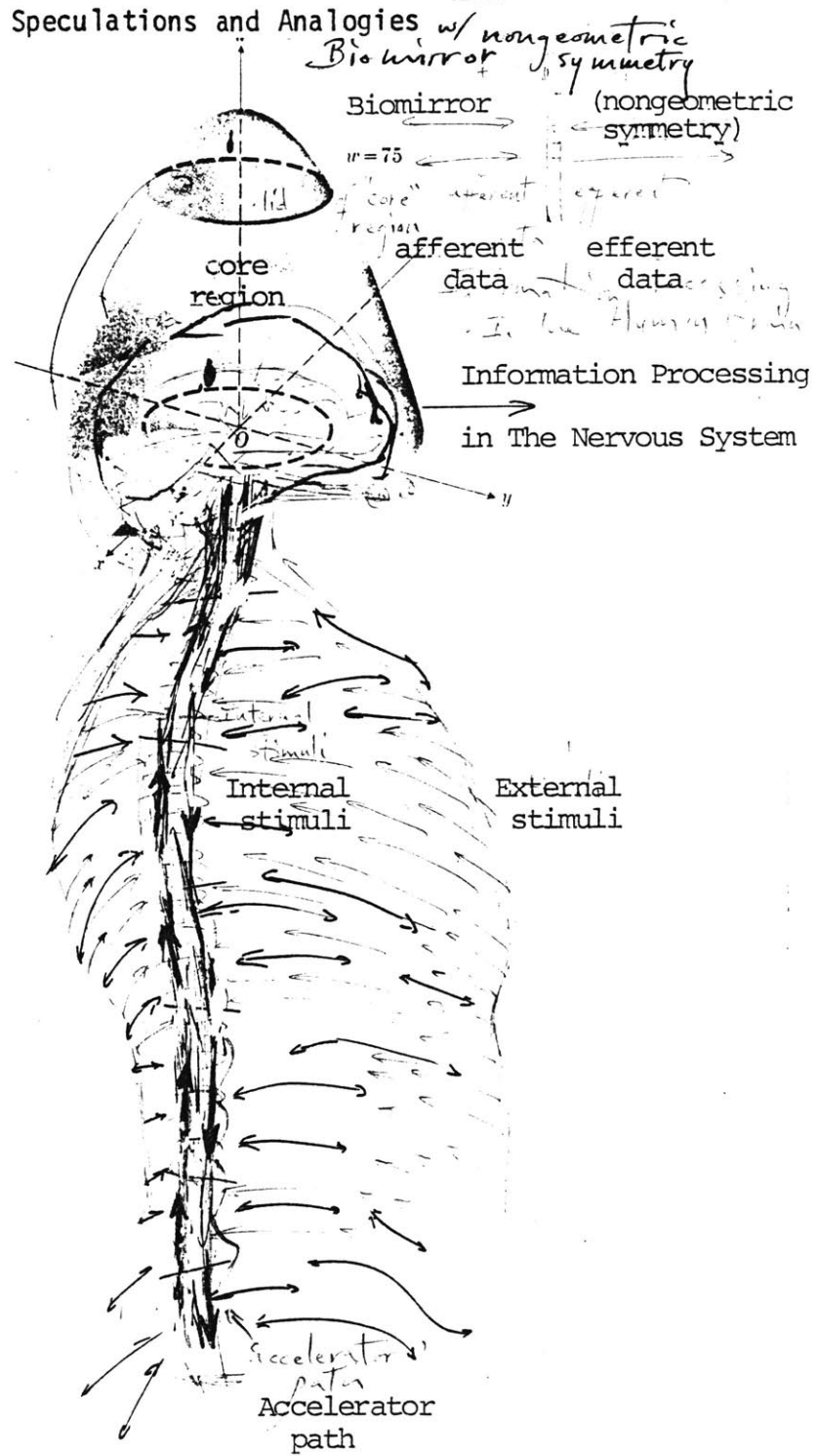
Human cerebellum viewed from above



Human spinal cord



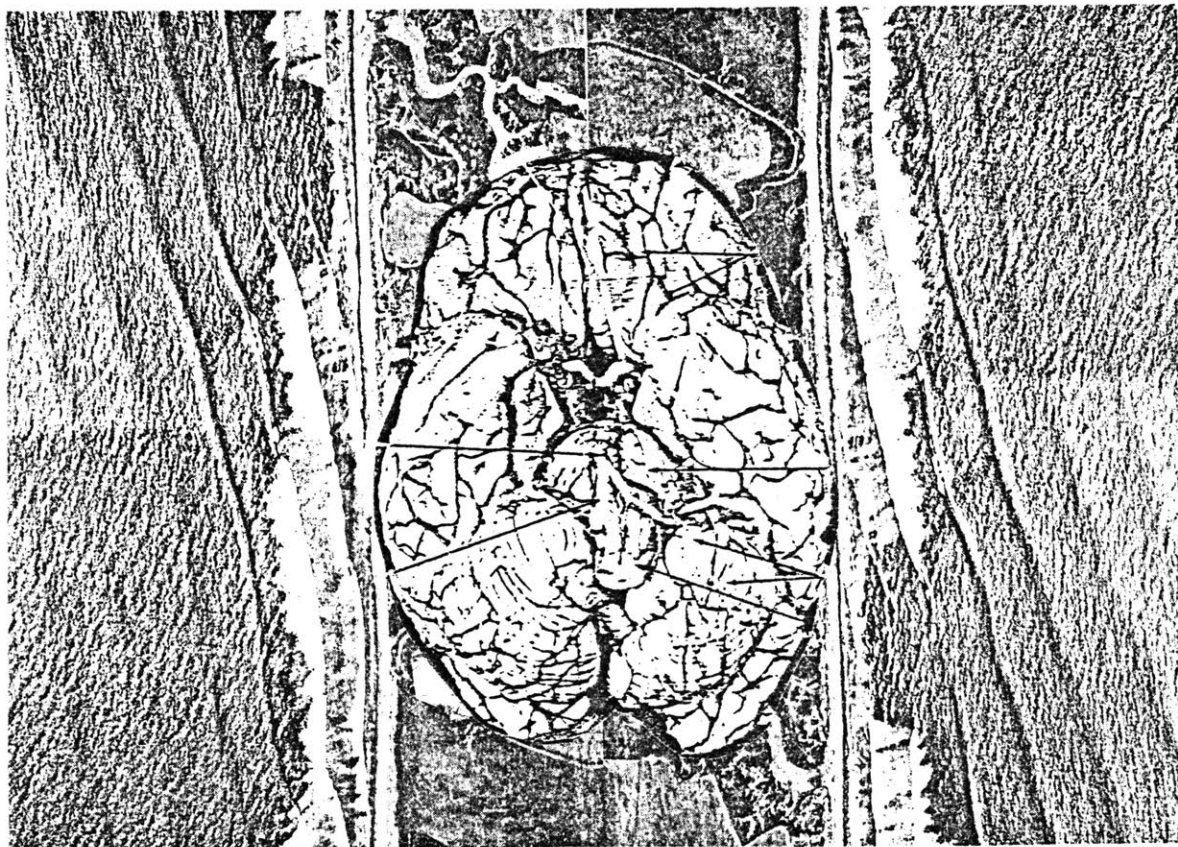
tactile path, pain and temperature sensation, exteroceptive and proprioceptive pathways



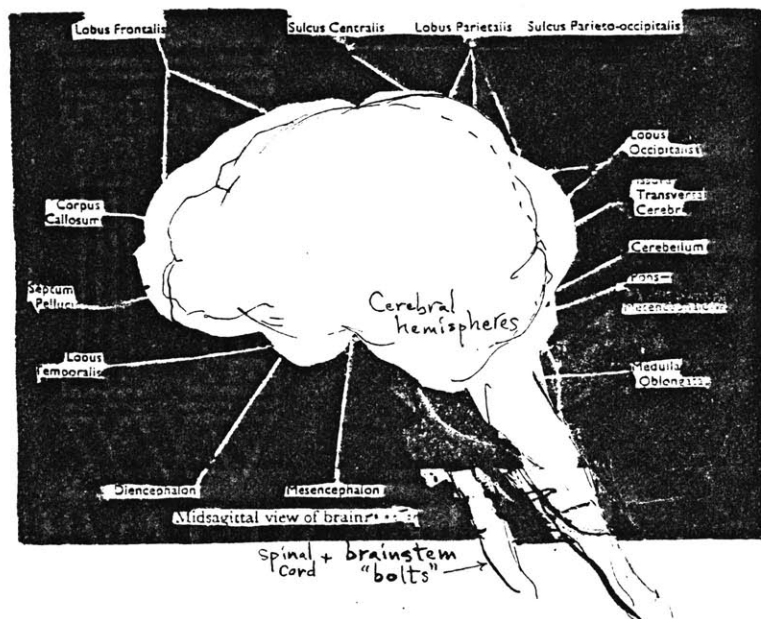
In Speculation 1, I consider the possibility that the specialized regions in the human brain form an integrated complex of 'virtual lens'. These lens have many axes, high and low apertures, projective, magnifying, and condensing powers, and varifocal potentials for directing the electric charges of the entire body. The specialized regions would also act as 'virtual refractive' surfaces. The analogue of different material mediums, in the context of the human nervous system, would be the basal ganglia and gray matter of the brain and spinal cord. Continuing this thought, Snell's Law of Refraction ( $n' \sin I' = n \sin I$ ) would somehow be related to the processing of neural information. Theories of aberrations regarding this organic, optical system would have to be modified before they could be applied, to account for the general asymmetrical operations of the brain. The exact positions of these 'virtual lens' I assume would vary.

In Speculation 2, I consider the phenomena of diffraction and refraction - effects due to the bending of light waves around the edges of opaque obstacles - in relation to the human brain's physiological optics. Firstly, I interpret the internal organs and their related anatomy as being 'obstacles', recognizing their solidity as being 'opaque'. Secondly, I interpret the electrical impulses as being light waves. The word 'being' in this case implies 'behaving as'. Imagine billions of electrochemical 'light' sources in the human body concentrated in particular around the areas where external and internal stimuli are recorded. This means that the afferent data or messages, sent from the outer areas of the nervous system to the Central Nervous System, are brought together in the brain. The brain in turn, being either mirror-like, virtually prismatic, or lens-like, reflects or focuses or disperses the information in the form of efferent data. In this analogy, I think of the brain as a nonisotropic medium; hence, the radiating 'light rays' are not straight lines radiating from the center of a spherical wave surface. On the contrary, they radiate un-uniformly and from a variety of regions with different configurations. Just as fundamental laws of geometric optics can describe the mutual independence of rays of light, I would like to show that the human mind physically exists as one of the substances of light. Isolating this substance and defining its properties in the language of physics proves to be eternally elusive.

In Speculation 3, the rate of afferent (incoming) information from the spinal cord to the brain is assumed to be proportionate to the efferent (outgoing) information traveling from the brain to the spinal cord. Initially, I perceived this afferent-efferent process of information relay (or 'conveyance') as sea waves breaking on a beach. The quantity of information and the rate at which it is conveyed to the Central Nervous System (CNS) determines the intensity of the 'waves' breaking, forming, breaking, perpetually. A 'sensory storm' constitutes a period of great physical activity. Implying, a lot of environmental (external) stimuli would occur all at once or internal (bodily) stimuli or both. At this time, a person may be engaged in some physical exercise in which the air or water temperature, in combination with stress and other factors, creates these 'waves'. BREAKER CHARACTERISTICS

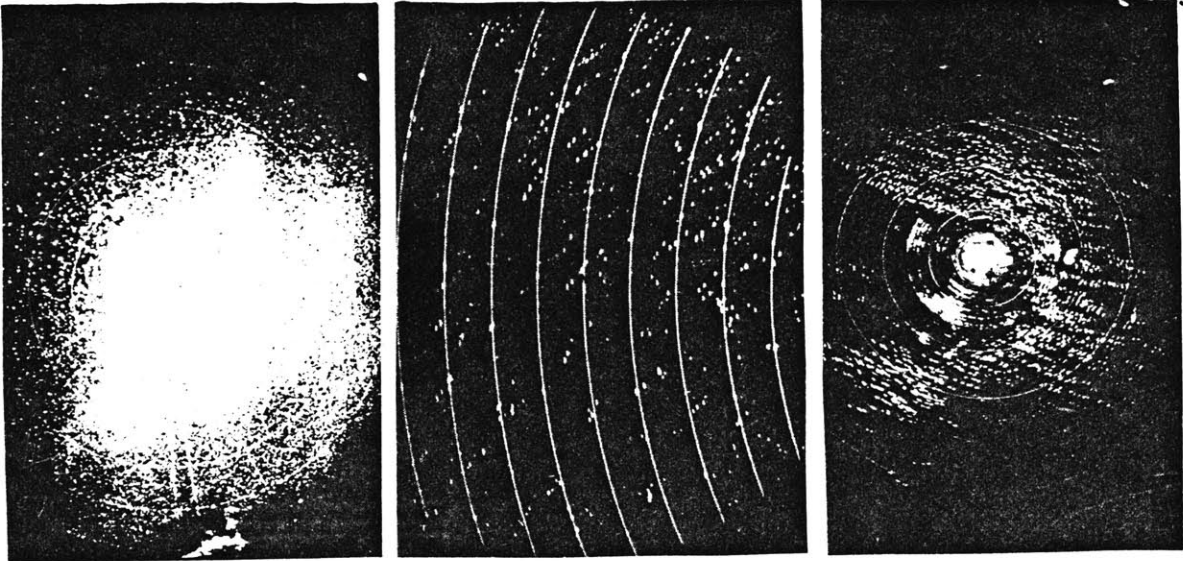


Another description of brain wave 'storms' may be linked to REM sleep. Imagine bolts of electricity snapped from two opposite clouds; the implications of this 'body-lightening', apart from "brainstorming" with respect to dreaming, suggests to me an intense period of electrical activity which corresponds to the clarity of mental imagery.



It would seem that during all other periods, when the body is at rest or relaxed or thoughtless (implying, without being conscious of specific thoughts), this afferent-efferent, input-output, effect would be more uniform and calm. In developing these analogies and in trying to find evidence to support their implications, I went dry. Specifically, my wave conception is useless as it is an analogy and not a proof. It can not predict or even account for what actually happens in the human brain during phases of relaxation or rage. Such analogies are scientific poetry.





Rhythmic radar sweeps can show the direction of migrating birds' flight. After two sweeps, there is a pause before the third. In the picture, the birds are travelling in a northeasterly direction.

Migrating birds literally cover the sky on spring evenings. This radar screen shows between 100,000 and 1,000,000 birds in one sweep.

Tracking radar located in Bermuda uses multiple sweeps to prove that the birds it is tracking are participating in a directed mass migration.

36 · Technology Review, June/July, 1978

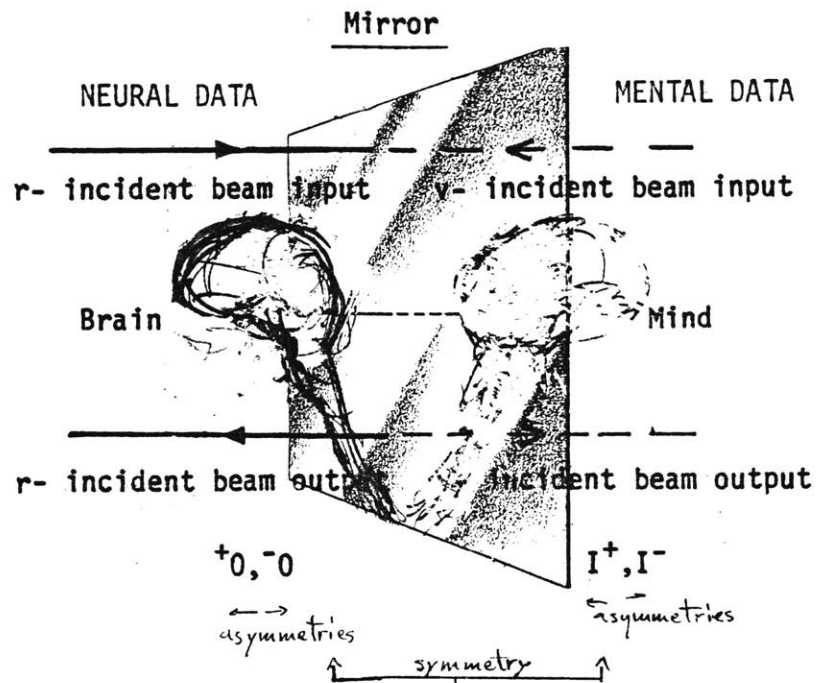
'Thoughts migrating'...  
is a metaphor.

'Thoughts, like birds,  
migrating'... is a  
simile.

'Particles of thought  
in Spring migration'  
is a multiple sweep-  
ing analogy.

"... the laws of special systems cannot as such be universalized. The laws of the nervous system, for example, or of the migration of peoples, cannot as such give us universal laws unless we first break them down into, precisely, initial conditions, boundary conditions and the laws of physics - and then, those laws, the laws of nerve action or of migration, would have disappeared. So if science is to be unified, it is only through the reduction to physics that it can be unified."<sup>27</sup>

What has bloomed from these seeds of analogy are my present ideas about the biomirror(s) of the human nervous system. The models I am now proposing seem more concrete and 'testable'. The first of these biomirror models relates the processes of neural input (going to the brain) and output (away from the brain) to the processes by which an object or thing (such as sensory data) moves towards and away from a mirror - causing invariant and variant changes in States of Mind. I believe this action, involving the virtual invariance of afferent-efferent data subsequent to its phases of transference, is somehow connected with the synchronized action of Brain 'becoming' the Mind and vice versa. One thought of mine is this: each time the sensory data reaches the biomirror in the brain, the mind responds by an inflection of consciousness or unconsciousness.



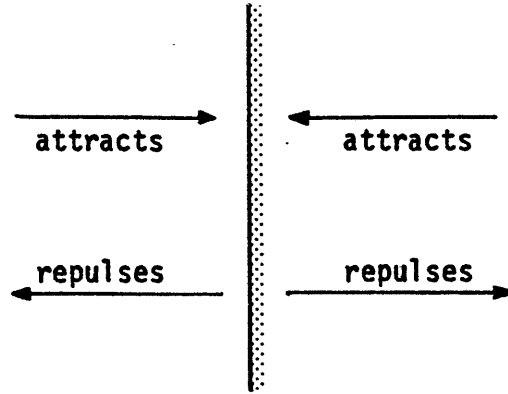
external relationship



(internal relationship)

World of Light

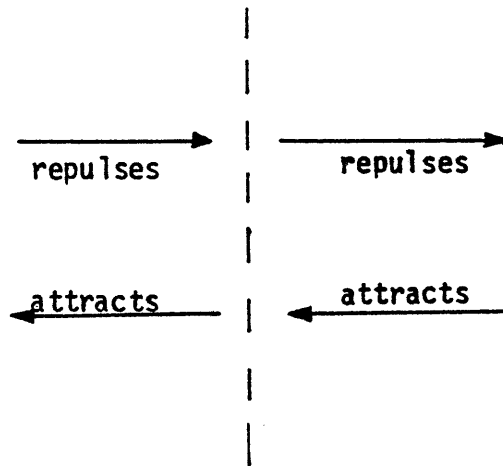
REAL - R



mirror reflection

World of Mind

IDEAL - V



nonmirror reflection

This action of neural data processing is analogous to the forward and backward movement of the object and its reflection in a plane mirror. The rate at which this action occurs is on the order of that of electrical impulses in synapses. What seems apparent is that at no time does the CNS, PNS, and ANS slow down or break this afferent-efferent activity, with the exception of comas or death. Perhaps even in the most severe comas this activity remains consistent; I do not know. The phenomenon I wish to understand is this reciprocal action between the brain and the mind. I mention this no-pause-period for the following reason. I feel it is senseless to assume that a biological system which is changing involuntarily can 'stand still' like some kind of object before a mirror. If cell neurons had voluntary control over their interactions with other neurons, perhaps this 'stillness' would be possible and important. In physical reality, this just is not so. What happens in the mind as a result of this transference or processing is not clear to me. I do know that the properties or substance of Mind cannot be explained systematically like the neurological functions of Brain can eventually be. They can, however, be "shown" in the form of behavior. I believe behavior occurs at the point or moment when efferent data is sent from the brain in response to afferent messages. It may be identified in the mirror model as the point at which the reflection moves symmetrically away from the object of the reflection. Behavior, as a form or manifestation of Mind, is nonphysical; and as a product of Brain, it is physical involving physical operation. If we regard the bio-mirror as being two sided or many sided it would maintain the same balance of neurophysiological and neuropsychological activity

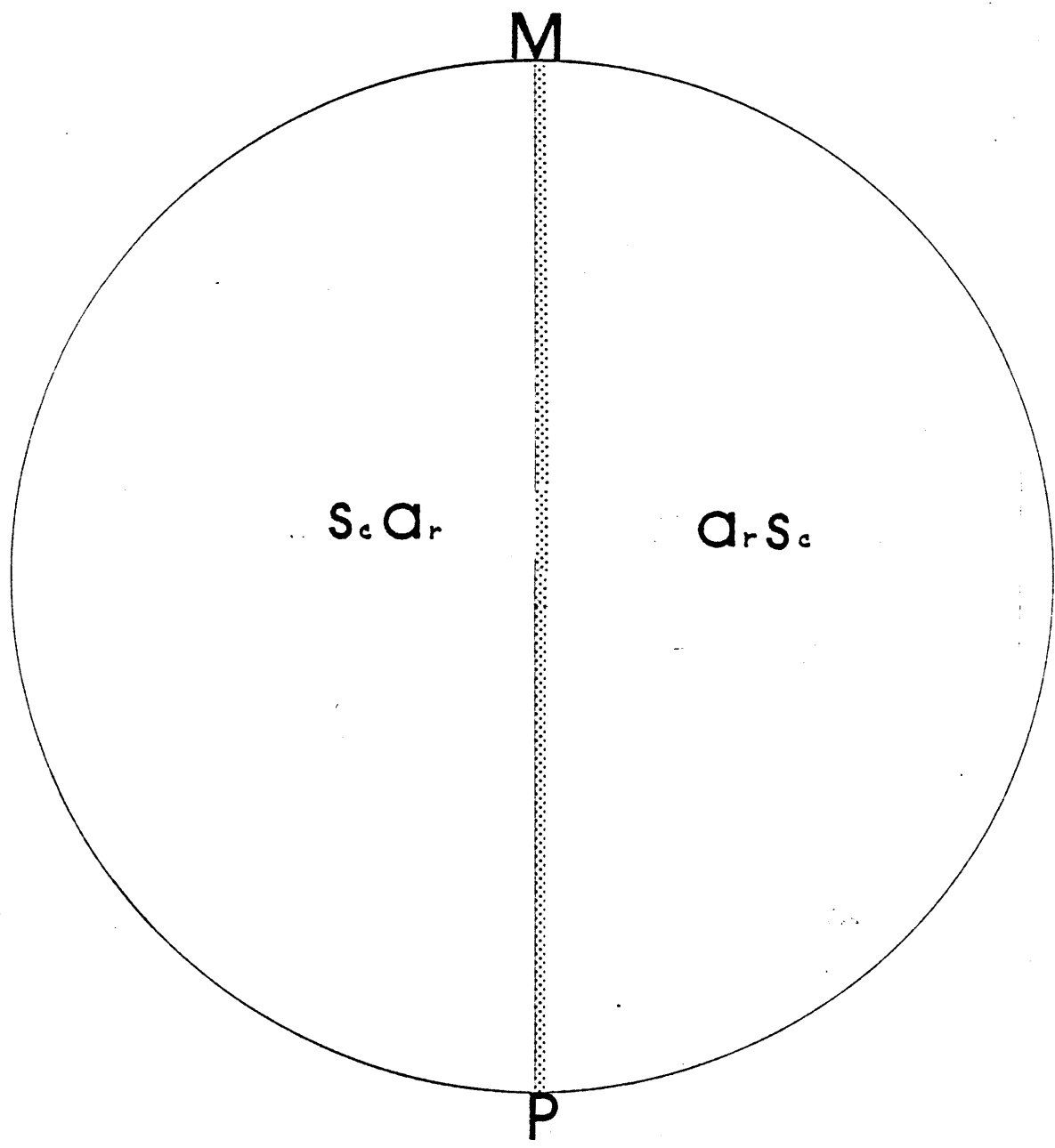
of the Brain And Mind. This fact is inherited with the a fortiori aspects of the symmetries of nature. This implies that the Brain thinks, feels, and acts in correspondence with the Mind and vice versa, at the same time. The movement between the two I regard as behavior. As this behavior is always occurring without interruption, it is difficult to separate the 'non-behavioral' aspects of afferent data from the 'behavioral' aspects of efferent data. Here, there may be some argument over the physiological differences between input and output re afferent and efferent processes.

To call a mode of argumentation or analysis a 'fallacy' is to suggest that people ought to stop using it. Any mode of analysis can be misunderstood or misapplied without itself being fallacious. It is, indeed, difficult to imagine any type of argument that does not run the risk of blocking inquiry by being misused or misdirected, though of course some arguments court more dangers than others. I do not believe that the humunculus metaphor involves a fallacy in the sense that its use exemplifies a demonstrably invalid form of argument. It can, however, mislead the unwary, and Kenny quite properly warns us against the sorts of confusions that may arise from a loose use of the metaphor.

Kenny's discussion of the humunculus fallacy may be understood as a warning or (in its stronger form) as a claim that certain arguments are fallacious. In its weaker form, his warning is that we should not mistake a metaphor for an explanation, not confuse either a mechanistic or a microstructural description of a process with the philosophical or conceptual analysis of that process, not 'reduce' the activities of persons to the states or motions of their physical parts.<sup>28</sup>

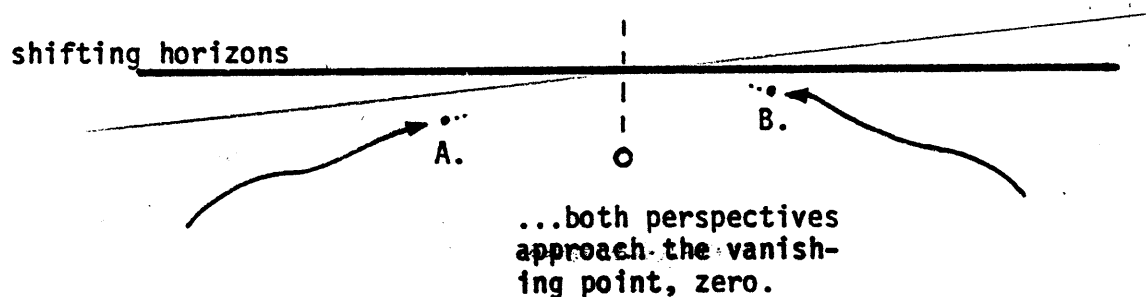
1. 'Materials' ... neural structures and organization of the human nervous system which consists of the brain and spinal cord; the peripheral nervous system which consists of the cranial nerves and spinal nerves; and the autonomic nervous system which consists of the sympathetic and parasympathetic systems.  
Structures
  
2. 'Processes' ... neural mechanisms of the human nervous system: how the nerves, spinal cord and brain receive stimuli (input) process it; and generate behavior (output?).  
Mechanisms
  
3. 'Energies' .... neural-mental energies that determine or influence the manifold boundaries (interfaces) of the biomirror condition involving input-output, stimulus-response, cause-effect relations affecting behavior.  
Principles

All three considerations must be studied before discussing the components and construction of mental language, and before describing the division between the brain and the mind - most importantly, before interpreting the bifurcation of consciousness.





In Philosophy, two perspectives A. and B. check and balance each other on issues dealing with what is apparently real and ideal in Reality. How they illustrate and interpret these issues, that is, how they express their points of view, is determined by the ways in which they ask and answer questions. The conclusions of philosophers of A. are connected to a horizon line which is perceived as existing in the physical world - a fortiori. Conversely, the observations of philosophers of B. Perspective are drawn to a virtual horizon line which is conceived as existing in the nonphysical world - a priori. To me, both 'lines' appear to be 'one and the same thing' occupying one moving plane which is constantly changing.



A. philosophers' question, "What is Everything Made of?", is as polychromatic as B. philosophers' question, "What is Life or Death, Truth and Meaning?". Both seem intent on understanding (which includes being able to explain) some aspect of Reality, whether investigating the phenomenon of radioactivity or how the color "red" is processed neurophysiologically.

The differences between these two perspectives can no longer be discerned in terms of the 'visible language' each uses to communicate. The reason being is that the disciplinary boundaries, like the shells of eggs, have been broken through and new information has been borrowed - altering the original perspective altogether. For example, the study of Psycholinguistics has recently extracted research material from Neurophysiology, in an effort to expand its descriptions of certain cognitive activities. Now, the different vantage points can only be discerned according to what one group accepts by consensus ( as a plausible explanation or interpretation of some aspect of Reality) and what it chooses not to accept. In A. group, intuitions and inferences, expressed as hypotheses or theories, must be proven canonically and presented in "logical form". By contrast, these processes and products of perception constitute sufficient 'evidence' of some thing's existence, in B.'s Perspective. Buckminster Fuller once commented on a similar discussion involving the art of metaphysics. Note:

Some 'educators' have declared intuition to be invalid because it was metaphysical. Thus, they also misidentified metaphysics as being magic. Magic is non-demonstrable by experimental techniques ergo there is no magic with which to identify metaphysics. Metaphysics embraces all the experimentally demonstrable, weightless phenomena such as mathematics and all of thought. Metaphysics is as real as physics and far more durable.<sup>29</sup>

I believe metaphysics is as real as the physical reflection of an object - in this case, "physics" - but the language and form it uses to translate its intuitions are 'extralogical' and thus elusive. It is this fact which deflects the total acceptance and absorption of insights by the philosophers of A. Perspective. And yet, it is generally recognized by both groups that to define the metaphysics of some phenomena such as the mind and the soul is to approach or find its physics - to formalize its mystery.

It can be said that most theories evolve from metaphysical points of view which act as catalysts in the mental construction of the theories. In many ways the theory of the atom or of fundamental particles still contain the remnants of references to invisible or 'virtual' phenomena we are told to accept as being 'real' - though this particular matter can only be revealed through its secondary-effects. "No one has ever really seen the splitting of an atom 'object', an 'object' that scientists first only guessed must exist - because without it there was no way to explain how the earth and all the things on it came to be the way they are."<sup>30</sup> Now, we can explain the properties and behavior of atoms yet we cannot understand the physical aspects of mind except in relation to neurological events. And not even then can scientists prove its existence. The B. philosophers ask: are the functions of the human brain one of the 'secondary-effects' of the mind? Also, are mental processes or thoughts the 'after-images' of neural activities? Stated from another angle: are the brain functions in constant 'simultaneous-contrast' with the processes of cognition? It can be demonstrated that when a person focuses on one saturated color, against a bright white background (for a fixed amount of time), and then the color is removed, an 'after-image' appears which is the complementary color. Could this phenomenon be significant in any way to the Brain And Mind relationship as a whole, are their exchange of forms and information?

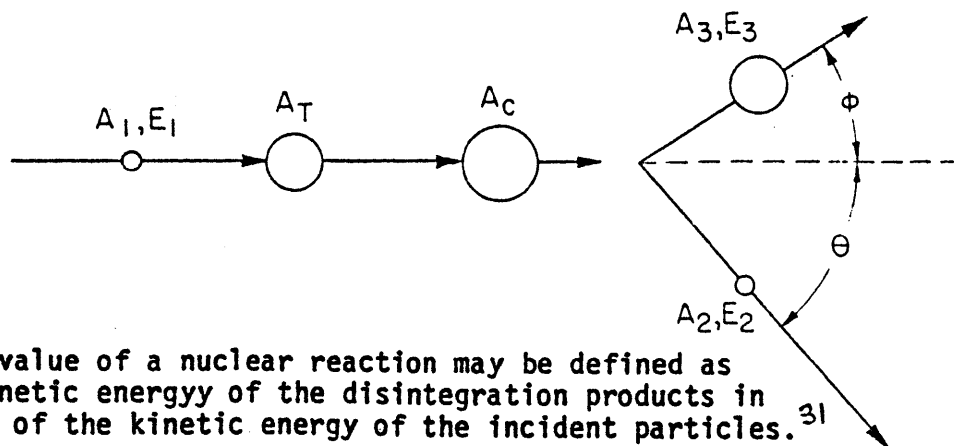
Questions such as these overlap on the horizons of both philosophical perspectives. However, A.'s compulsion to problem solve and proof hunt to produce tangible evidence) and B.'s interest to build the aisthētikos of analogies (without breaking them down analytically to fit a criterion of the physical sciences) prevents the two from truly collaborating.

More critically, their differences of perspectives are more often self-imposed rather than naturally occurring. Which implies that both sides erect arbitrary and artificial boundaries to preserve, what one may call, their idiosyncracies. Meanwhile, innumerable tools and invaluable information are isolated until the revolutionary 'egg breaking' episode is complete. Perhaps, if these two groups of inquisitors were to work together - overlapping their interests and practices - they would have the means to penetrate the essence of the mind and the medium in which thoughts and mental images exist. In this synergism they may solve the mystery of 'mental matter' — the 'virtual energies and forces' of nonphysical reality. Perhaps, they may then discover that the human mind has mass types and nuclear Q values with specific forces which hold the various types of mass together. This idea is less attractive to the philosophers of A.

$A_T, A_C, A_1, A_2, A_3, \equiv$  mass number of target, compound, projectile, product and residue nuclei respectively.

$E_1, E_2, E_3 \equiv$  kinetic energy of projectile, product and residue nuclei respectively.

$M_T, M_1, M_2, M_3 \equiv$  exact masses of target, projectile, product, and residue nuclei respectively.



The Q value of a nuclear reaction may be defined as the kinetic energy of the disintegration products in excess of the kinetic energy of the incident particles. <sup>31</sup>

What may result from this synergism and research is some new found respect for each others perspectives as well as an equal exchange of insights and their presentation. What will no doubt become evermore clear is why Physicists must study Philosophy in order to 1st know what they think they 2nd understand about the substance of physical reality. And, why Philosophers must study Physics in order to 1st understand what they feel they 2nd know about the substance of nonphysical reality. Without this interdisciplinary study, they will only understand  $\frac{1}{2}$  of what they know and will only know  $\frac{1}{2}$  of what they understand. In the context of the mirror model, the processes of knowing and understanding something are mirror opposites of one another (as mentally perceived). In this case, Science signifies the art of Understanding and Art signifies the science of Knowing. To know and understand the implications of the mirror and the nonmirror models is to realize all that Reality is and can be. To know the metaphysics of the mirror without understanding its physics is to sense only  $\frac{1}{2}$  of Reality, that is, the reflection of objects in non-physical, (inner)space. To understand the physics of the mirror without knowing its metaphysics is to see only  $\frac{1}{2}$  of Reality, that is, the objects in physical (outer) space.

With this reference, Aristotle's "Imitation Theory", (mimesis) could be modelled after one plane mirror analogy. The ancients could not understand how the virtual 'becomes' the real; acknowledging that it is so, they assumed the reality that the artist created was a complementary reality. One that is equally 'real' and consistent with nature or the dynamic process of nature creating (reflecting) itself. Similes and metaphoric descriptions of nature were thought to represent Reality itself. When in

fact, both types of descriptions are only reflections or virtual images of nature, in the most literal and figurative sense. They are not the essence of what is 'real'. I often think similes and metaphors, as analogies, are 'virtual' or mental mirrors in which we visualize and interpret one thing as some-thing other than (but essentially comparable to) itself. The reason the ancients did not know this 'mirror fusion' of Reality and the reflection of Reality is that their method was purely logical - implying Socratic dialectic, which forbade the use of intuition. One of the messages of my thesis is that a person needs both logic and intuition to know and understand some-thing in its entirety or at least approach a more "complete" knowledge of the thing or phenomena perceived. Aristotle's conception that "all metaphor is process" is only one half 'complete', presenting only the psychological dimension of perception. There is little recognition or insight into the complementary physiological dimension. Descartes's intuition was more 'complete' in suggesting that a person's perception of Reality, or of what they regard as 'real', involves both physical and mental processes; and, therefore requires reference to the physical and nonphysical aspects of perception collectively. However, his interpretation of his own intuition was incomplete in that he still could not explain exactly how or why the mechanisms of the brain and the processes of the mind become "one and the same thing". For this, he had no model—no literal, tangible model.

In view of a one sided plane mirror, the point or moment at which the 'Brain becomes the Mind' may best be understood as the point at which the eye-vision makes contact (in an imaginary way) with the outer surface of the mirror plane. Simultaneously, the moment or point at which the 'Mind

'becomes the Brain' is the point at which the 'eyes' of the virtual image make contact (in an imaginary way) with the inner surface of the plane mirror. Perhaps what Descartes was metaphorically referring to was some physiological mechanism which, like 'virtual eyes', observes the object (= the brain functions) creating the reflection. The reason why we are still skeptical of this dichotomous 'life', of the object and reflection or the Brain And Mind, is easily enough explained by the following comment. The notion that "the eyes produce pictures in the brain" is only a thought or speculation - some  $\pi$  of imagination - with neither physical proof of its own existence nor evidence of the thing or fact it claims exists, such as "pictures in the brain." A thought, we know, can never be "shown" explicitly or literally without ceasing to be what it is by nature - an 'entity' of nonphysical reality, an element of the ephemeral Mind. The mental language, we can only assume, is the substance or 'virtual content' of the Brain; it remains an invisible thing that appears to be... In the Theory of Propositions, "Tractatus Logico-Philosophicus", Ludwig Wittgenstein describes this phenomenon:

4.12 Propositions can represent the whole of reality, but they cannot represent what they must have in common with reality in order to be able to represent it-logical form.

In order to be able to represent logical form, we should have to be able to station ourselves with propositions somewhere outside logic, that is to say outside the world.

4.121 Propositions cannot represent logical form: it is mirrored in them.

What finds its reflection in language, language cannot represent.

What expresses itself in language, we cannot express by means of language.

Propositions show the logical form of reality.

They display it. <sup>32</sup>

The practices of Science And Art are extensions of A. and B. Perspectives. Their focal points receive parallel rays of Physics and Philosophy which seem to converge and diverge simultaneously on the same horizon line. Both practices deal with propositions of sorts and the presentation of thoughts fabricated into different languages. The manner of the expression reflects the tools with which some-thing is observed and recorded. Languages are records of perceptions which link the mental realm and the physical reality, like propositions and facts. The way in which we use our perceptions to interpret points of views or illustrate facts of natural phenomena reveals the basic differences between artistic and scientific concerns. These differences have less to do with what is seen or sensed and more to do with how some-thing is perceived which in turn directly influences the manner of expression. Artists may study the same phenomena as scientists, using the same hardware and methodology (even stating similar philosophical propositions); however, their translation and presentation of thought processes or language of insight is different, at this time and space in history. By 'processes' I mean: first, how the organization of thoughts, as in the structure of sentences, correspond to the structure of facts; and second, how this 'structure' is represented in mental picture form. Where scientific perspective or philosophy proposes to "logically clarify thoughts", an artistic philosophy or perspective may chose to mystify naturally "opaque and blurred" thoughts - to maintain the peculiar resonance of pictures and their mental reflections.



The one activity which most clearly overlaps both practices is this internal process of translating the mental pictures (of virtual imagery, reflections) into the physical language of form (of objects). In introducing the theory of Symbolism as expressed in Wittgenstein's Tractatus Logico-Philosophicus, Bertrand Russell explains this process beautifully in a paraphrase:

(2.1): "We make to ourselves pictures of facts": A picture, he says, is a model of the reality, and to the objects in the reality correspond the elements of the picture: the picture itself is a fact. The fact that things have a certain relation to each other is represented by the fact that in the picture its elements have a certain relation to one another. "In the picture and the pictured there must be something identical in order that the one can be a picture of the other at all. What the picture must have in common with reality in order to be able to represent it after its manner - rightly or falsely - is its form of representation."

The sentence, "In the picture and the pictured there must be something identical in order that one can be a picture of the other at all", I interpret as meaning; In the world of Matter And NonMatter there exists some symmetry which permits the one to one correspondence between an object and its "representation" or reflection. This fact and interpretation is critical to my mirror construct which proposes that a "complete" Reality consists of an equal proportion of tangible or physical and nonphysical or intangible elements. This implies, beyond an analogy or metaphor is the literal application of the analogy and beyond this application are more analogies and their applications... approaching infinity, like ~~4~~ 90° triptych mirrors creating a hierarchy of reflections which (in our imaginations) seem circuitous and nonhierarchical; it is to be remembered that in each phase of duplication there is always this sustained symmetry between what is real and what appears to be ideal while at the same time there exists a subtle,

natural asymmetry between these two aspects of Reality. The interface model accounts for the conditions of asymmetry when, for instance, the balance is disturbed by accidental or intentional interruptions. An example of an interruption may be the shifting of psychological perspectives or mental perceptions. In particle physics, the term "asymmetry" would refer to the unequal quantities of matter and antimatter in violation of conservation laws. An example of an accidental interruption may best be understood in the context of Probability Theory, where the "frequencies of occurrence" of thoughts are as unpredictable as individual coin tosses rather than the total number of tosses.

## 2.10. PROBABILITIES AND FREQUENCIES

We have adopted a meaning for the term "probability" that is totally independent of any notion of "frequency of occurrence," either imagined or experimental.

If we imagine tossing a coin  $N$  times, we have every right to be interested in the ratio of the number of heads to the total number of tosses. Similarly, if we imagine examining individual molecules in a gas, we could well be interested in the ratio of the number of molecules with a speed between a fixed pair of limits to the total number of molecules we examine.

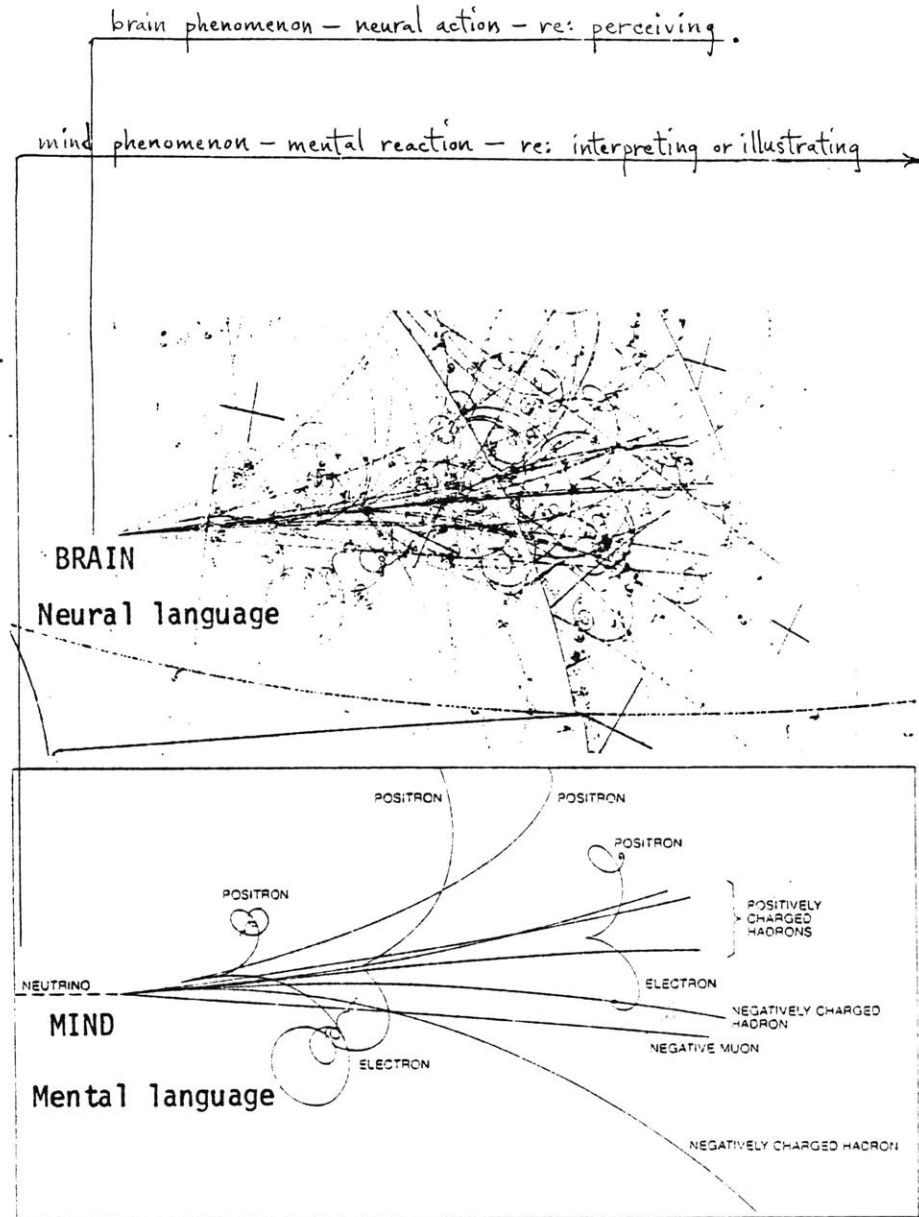
These two examples typify situations in which observations or experiments are repeated many times, and the occurrence or nonoccurrence of some specified property is established for each of those instances. Any one of a variety of numerical values may emerge as the actual ratio of the number of occurrences to the total number of observations. 34

Deciding whether thoughts are products of ratios or asymmetries "between a fixed pair of limits" (within the complex of the brain) is a matter of indifference to me. In discussing the associated relationships of Matter, Body and Mind, I intend to explore some of the implications of symmetry as opposed to describing its mathematical and physical characteristics.

One implication considers the effects of "Mind over Matter".

It suggests that all "absolute" (synthetic) systems, such as radars, computers, and lasers, must be in some way based on or influenced by "physical" (natural) systems, such as the human organism. It appears we are unconsciously deriving concepts of machine systems and their hardware-software from the mechanistic systems of the human brain, for example, and other anatomy-physiology of the body. The conceptual plans and operational techniques of fission and fusion reactors are without exception in this respect. The important question is: how are they influenced in some unforeseen way by the functions of the Brain And Mind relationship - from its neurophysiology and neuropsychology right down to the nuts and bolts of sub-cellular systems and their neuronal organization? Is the ion-injection system in a linear particle accelerator an example of the mind looking inward and in an altered state of consciousness searching internally to produce a structure that could generate energies like those processed from the base of the spinal cord to the brainstem? If the mind is the medium for thought, like a petri dish medium for bacteria or crystals, how are ideas (collected and organized thoughts) grown? How are they transformed into tangible form or manipulated abstractly and arranged in logical language for communication? Does a steel beam or forged iron rod 'communicate' on some level because it was shaped by an idea with an application? Or because it contains in its present form of solid state matter an equal amount of antimatter or NonMatter which includes the domain of Mind? Are thoughts or the properties of thought the nonphysical things which keep all material form 'alive' for us, such that our minds and imaginations believe these forms 'exist'? Or that we think remaining in these forms are the thoughts we used to conceive of them?

# High-energy Thoughts Create Jets of Virtual Particles

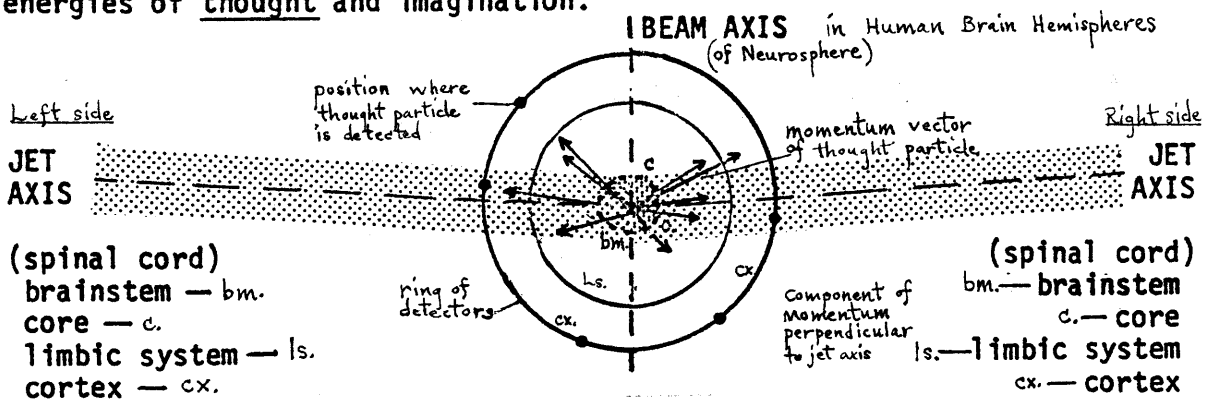


**JET OF PARTICLES** emerges from a proton struck by a high-energy neutrino. The event is recorded in trails of bubbles, which form in superheated hydrogen along the path of a charged particle. The neutrino, which leaves no track because it has no charge, is transformed by the collision into a negatively charged muon, which can be observed. At the same time a stream of particles moves off in another direction. They are hadrons, a class of particles (such as the proton and the pion) that are thought to be made up of the more fundamental entities called quarks. From the curvature of the tracks in the magnetic field that permeates the bubble chamber it can be deduced that three of the hadrons carry a positive charge and two have a negative charge. In addition at least one neutral pion is emitted; it cannot be seen, but the

products of its decay are pairs of electrons and antielectrons, or positrons, which leave distinctive spiral tracks. In the frame of reference in which the neutrino and the target proton collide with equal but opposite momentum, the scattered muon and the jet of hadrons would appear to emerge almost back to back. Such wide-angle scattering signals a violent process. The event can be explained by the hypothesis that the neutrino collides with a hard constituent of the proton, such as a quark; the quark is ejected, but as it escapes several other quarks and antiquarks materialize, creating the jet of hadrons. The photograph was made with the Big European Bubble Chamber at the European Organization for Nuclear Research (CERN) near Geneva. Some of the particle tracks are identified in the map below.

Another implication considers the effects of "Matter over Mind." <sup>76</sup>

It suggests that if there is some kind of symmetric relation between Matter And NonMatter then this relation applies to the Brain And Mind complex as well - influencing all its functions. This notion adheres to the reductivist thesis that all material form is somehow controlled or influenced by the fundamental forces of matter and antimatter. The consequences of this relation (if evaluated literally), regarding the nature of Mind, would include interchanging real and imagined form. Like the object and its virtual image changing sides in a plane mirror reflection, the Brain And Mind would be interchangeable. Thus everything in the universe man knows, perceives and understands through consciousness and investigation (though left physically unrealized) would be as 'real' as material form (objects). Our imaginations would be real and likewise, the objects of our thoughts. The physical forces that formally applied to these objects (only) would affect our thoughts and their mental processes. If there existed a "bootstrapping effect" of energies created by jets of particles, before this transformation of the physical world, by commutation this same effect would be preserved as it relates to the energies of thought and imagination.



JET IS DEFINED in terms of the momentum of the constituent hadrons. If only the directions of the particles were recorded (by noting where they crossed a ring of detectors), they would be widely distributed. The jet becomes more coherent, however, when it is noted that the component of the momentum of a particle perpendicular to the axis of the jet seldom exceeds a threshold. Thus particles with large momentum are always closely aligned with the jet axis.

Is "Mind over Matter" analogous to Mind over Brain or Art over Science? Is the statement, Art of the Mind and Science of the Brain, something more than a metaphor? If a person remarks, My Mind is my Art...My Brain - Science, could it be inferred that the content of the mind represented by mental pictures is the message of art? And the medium in which these pictures are created and realized is the brain? An 'artwork' then would constitute a single mental picture. The term 'working' would imply the interpretation of the interaction between the messages and the media which influences the behavior of a person...in creation of thoughts. What happens at the instant of creation when the brain 'becomes' the mind and vice versa? Are the original 'identities' lost as a result of some transformation, rotation or mirror reflection process involved in this state of interchange? How do these symmetries of nature influence cognition, in this scheme?

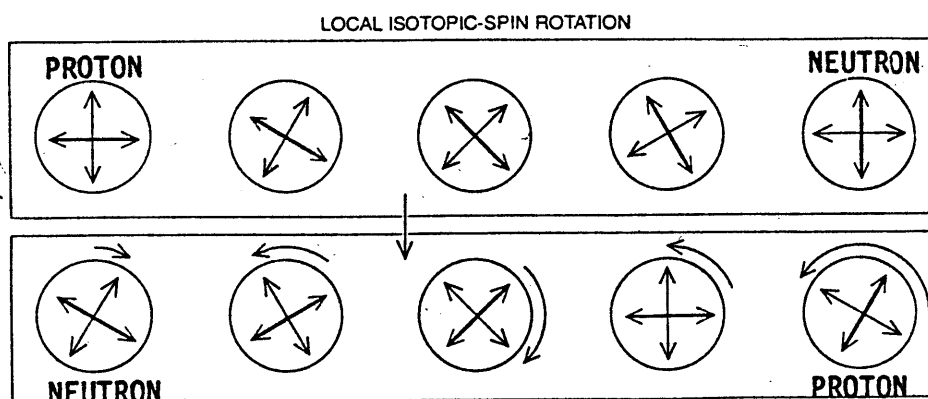
the central problem in cognitive psychology turns out to be what Kant called the problem of "schematism." If concepts are like rules or definitions, we must provide an account of how rules and definitions are employed to organize perception, motor integration, and memory. In the course of his discussion of perception, Kant remarks (1781; in Smith, 1953) that

It is schemata, not images of objects, which underlie our pure sensible concepts. No image could ever be adequate to the concept of a triangle in general. It would never attain that universality of the concept which renders it valid of all triangles, whether right-angled, obtuse-angled, or acute-angled; it would always be limited to a part only of this sphere. The schema of the triangle can exist nowhere but in thought. It is a rule of synthesis of the imagination, in respect to pure figures in space. Still less is an object of experience or its image ever adequate to the empirical concept; for this latter always stands in immediate relation to the schema of imagination, as a rule for the determination of our intuition, in accordance with some specific universal concept. The concept "dog" signifies a rule according to which my imagination can delineate the figure of a four-footed animal in a general manner, without limitation to any single determinate figure such as experience, or any possible image that I can represent *in concreto*, actually presents. This schematism of our understanding, in its application to appearances and their mere form, is an art concealed in the depths of the human soul, whose real modes of activity nature is hardly likely ever to allow us to discover, and to have open to our gaze [pp. 182-183].

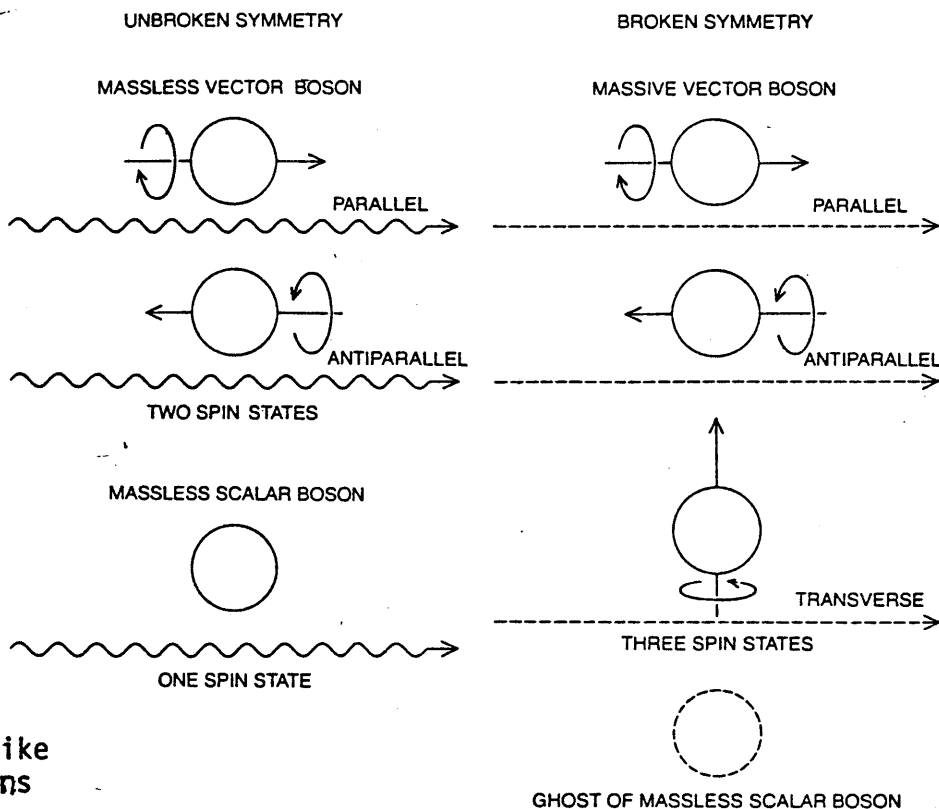
Kant's argument is that concepts must be distinguished from images of the objects that fall under them. What we know about dogs or triangles cannot, in point of logic, be represented by an image of a prototypic triangle or dog; the "universality" of our concepts can be captured only by a theory which represents them as abstract. But, on the other hand, the work our concepts do primarily concerns the recognition and production of the concrete, individual objects to which they apply. It is by exploiting our *abstract* concept of triangle that we manage to recall, recognize, or produce an indefinite variety of *concrete* objects which are triangles. What, then, mediates the application of abstract concepts to their concrete instances? This is the problem whose answer Kant believed to be "concealed in the depths of the human soul."

p.13, The Psychology of Language: An Introduction To Psycholinguistics and Generative Grammar,  
J.A.Fodor, T.G.Bever, M.F.Garrett

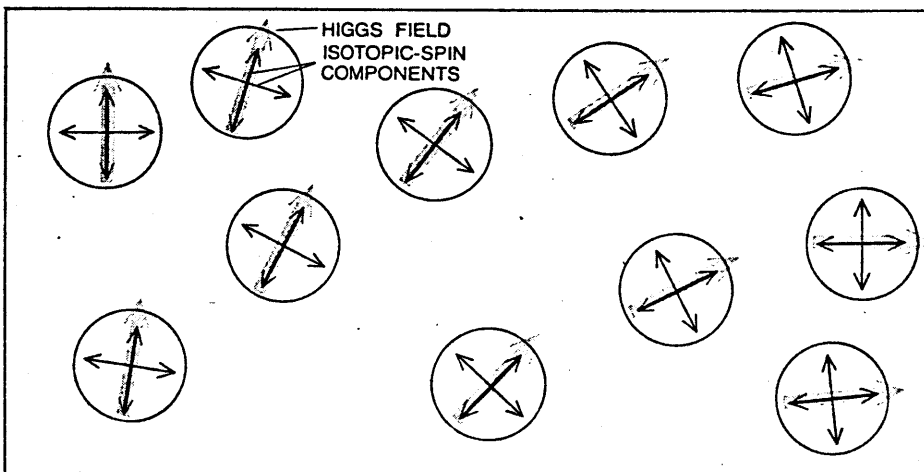
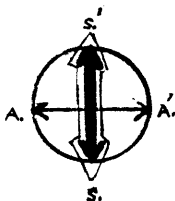
I believe the force or mechanism which "mediates the application of abstract concepts to their concrete instances" is identical to the mechanism which makes geometric and nongeometric type symmetries possible. Thus, I believe, the answer is not "concealed in the depths of the human soul" but rather in the deep and curious process of certain particles of matter 'becoming' "unobservable 'ghosts'". This process may be studied through Gauge Theories of the forces between elementary particles, in particular, those accounting for isotopic-spin symmetry.



ISOTOPIC-SPIN SYMMETRY serves as the basis of another gauge theory, first discussed in 1954 by C. N. Yang and Robert L. Mills. If isotopic-spin symmetry is valid, the choice of which position of the internal arrow indicates a proton and which a neutron is entirely a matter of convention. Global symmetry (*upper diagram*) requires the same convention to be adopted everywhere, and any rotation of the arrow must be made in the same way at every point. In the Yang-Mills theory isotopic spin is made a local symmetry (*lower diagram*), so that the orientation of the arrow is allowed to vary from place to place. In order to preserve the invariance of all observable quantities with respect to such local isotopic-spin transformations it is necessary to introduce at least six fields, corresponding to three massless vector particles, or vector bosons.

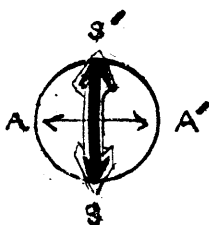


The photonlike vector bosons of the Art of the Mind



**HIGGS MECHANISM** can lend mass to the photonlike vector bosons of the Yang-Mills theory, thereby making the theory more realistic. The massless bosons have three possible spin orientations (parallel, antiparallel and transverse to the direction of motion), but only two of these are observable; the transverse state does not exist, a peculiarity of all massless particles, which move with the speed of light. If the Yang-Mills particles were to acquire a mass, the transverse state would become observable, and this added mode of motion must have some source. In the Higgs mechanism the source is an extra scalar field, corresponding to a massless spin-zero boson. The Yang-Mills particle is said to "eat" the Higgs boson, which thereupon becomes an unobservable "ghost." The Higgs field also provides a frame of reference (gray arrows) in which protons can be distinguished from neutrons. The arrow of the Higgs field rotates along with the other arrows in a gauge transformation, and so there is no absolute orientation, but the relative orientation of the isotopic-spin arrows can be measured with respect to the Higgs arrow. The symmetry of the theory, which without the Higgs mechanism would have abolished all differences between the proton and the neutron, has not been lost but only hidden.





Pure Art ( $A'$ ), Applied (A); Pure Science ( $S'$ ), Applied (S)  
 This symbol shows the relationship of pure and applied,  
 Science And Art. It interprets the Science of Higgs  
 Mechanism and the Art of Yang-Mills particles as they  
 correspond to symmetries of the Brain And Mind complex.

What is indicated in these diagrams of isotopic-spin symmetry is how pure Science And Art, like neutron and proton making up the nucleus of perception, are fundamentally interchangeable within the instance of purely perceiving something either real or imagined. In referring to my 'Art of the Mind, Science of the Brain' example, the process of observing internally the 'creation of Artworks' or mental imagery would reflect this state of isotopic-spin symmetry.

If isotopic-spin symmetry is valid, the choice of which position of the internal arrow indicates a proton and which a neutron is entirely a matter of convention.

There is, however, a difference in the relationship of Science And Art Brain And Mind, when that which is mentally perceived is physically applied.

In the Yang-Mills theory isotopic spin is made a local symmetry, so that the orientation of the arrow is allowed to vary from place to place.

The Yang-Mills particle is said to "eat" the Higgs boson, which thereupon becomes an unobservable "ghost". The Higgs field also provides a frame of reference in which protons can be distinguished from neutrons...

The Higgs mechanism helps to "distinguish the differences between the proton and the neutron" thus clarifying the "symmetry of the theory." The Higgs mechanism (Science) can lend mass to the photonlike vector bosons of Art (the Yang-Mills particles), thereby making the theory ( $A'$ ) more realistic. We see here how Science seems to investigate what Art speculates, perceives.

BRAIN

MIND

APPLIED

PURE

REAL

VIRTUAL

**S** ↔ **A**

SCIENCE

ART

NonMirror  
Interface

**A** ↔ **S**

ART

SCIENCE

NonMirror  
Interface



**M**

mirror  
(mechanism  
and  
process)  
Interface

emphasis

→ **S**

PHYSICAL,  
MATERIAL

emphasis

**a** ←

NONPHYSICAL,  
NONMATERIAL

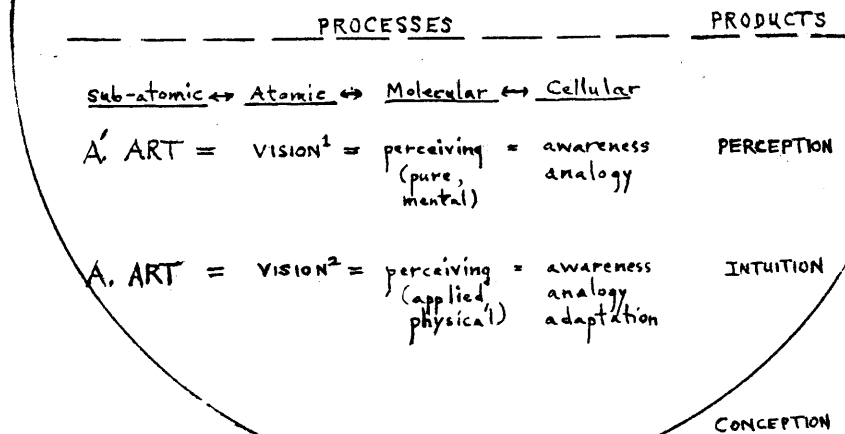
Technology { union of  
A.A.' + S.S.'

Applied Science S.

Applied Art A.

Pure Science S'

Pure Art A'



In the nucleus of intuition or perception it is a matter of convention whether the proton or neutron represents a scientific or an artistic perspective.

At the moment of intuition the two the two perspectives seem to converge, to fuse. In this instant, the Mind as Art and the Brain as Science are indistinguishable.

There exists a point A. and a point B. with some process taking place in between. This process which connects the two also separates them at the same time. Art (A.) - 1st action and 2nd reaction - appears to know intuitively what Science (B.) - reaction 1st and action 2nd - understands logically, validating its insights through reason and applying this reason to empirical research on the processes of perception. According to the mirror relationships outlined in the first quarter of this thesis, the act or experience of perception and intuition (or intuiting something) is opposite and reverse the act of conception and reason (or logicizing). It seems to be that both modes of thinking are divergent when their differences are discernible. This implies that as one uses intuition to know something about logic or reasoning, one uses logic to understand something about intuition - automatically and without introspection. These different modes directly influence both scientific and artistic forms of expression and presentation of insights.

*Coincidence often reaches a long arm into the world of science. It is the process of science—such as Alexander Fleming's chance discovery of penicillin—that makes the experience so compelling, so much like art.*

# Science is this century's art

*The Search For Solutions. A book... a television series... a new way of seeing a world we once thought mysterious and remote. Horace Judson's probing of this special world reveals that the fun of science is in the pursuit of answers.*

What I plan to investigate is the recursion of similarities in both scientific and artistic disciplines which probe the laws of Reality. I feel that what will emerge from these inquiries are some firm answers about the phenomena of the universe and how they are in fact reflected in the "being" of the human. I hope, also, to understand how the 'mathematics and geometry of our mental language' - manifest by our thoughts, feelings, and behavior - mirrors the 'mathematics and geometry of our physical language' - as exemplified by cell communication in neurophysiology and general physiology.

The possibilities of mirror and nonmirror interface models, applied to the physical sciences and philosophy, are as infinite as imagination. Unfortunately, few people can 'get past' the literal aspects of the models (often the problem of traditional scientists) just as few people can 'get past' the metaphoric or figurative aspects (often the problem of traditional artists or poets of paint, marble, and words). Hopefully, the technologists a head of us will develop both of them simultaneously, balancing the artistic or instinctual and scientific or intellectual realms of the mind.

Ultimately, we may learn that the human organism is a model of the Universe or an infinite number of models of the Universe with its infinite universes. The interpretations and meanings attached to these models will be based on one and the same reality - a "complete" Reality - which composes the Brain And Mind relationship as defined by Matter And NonMatter.

"If we know all the facts, we could explain all the behavior."

a fragment from reductivism.

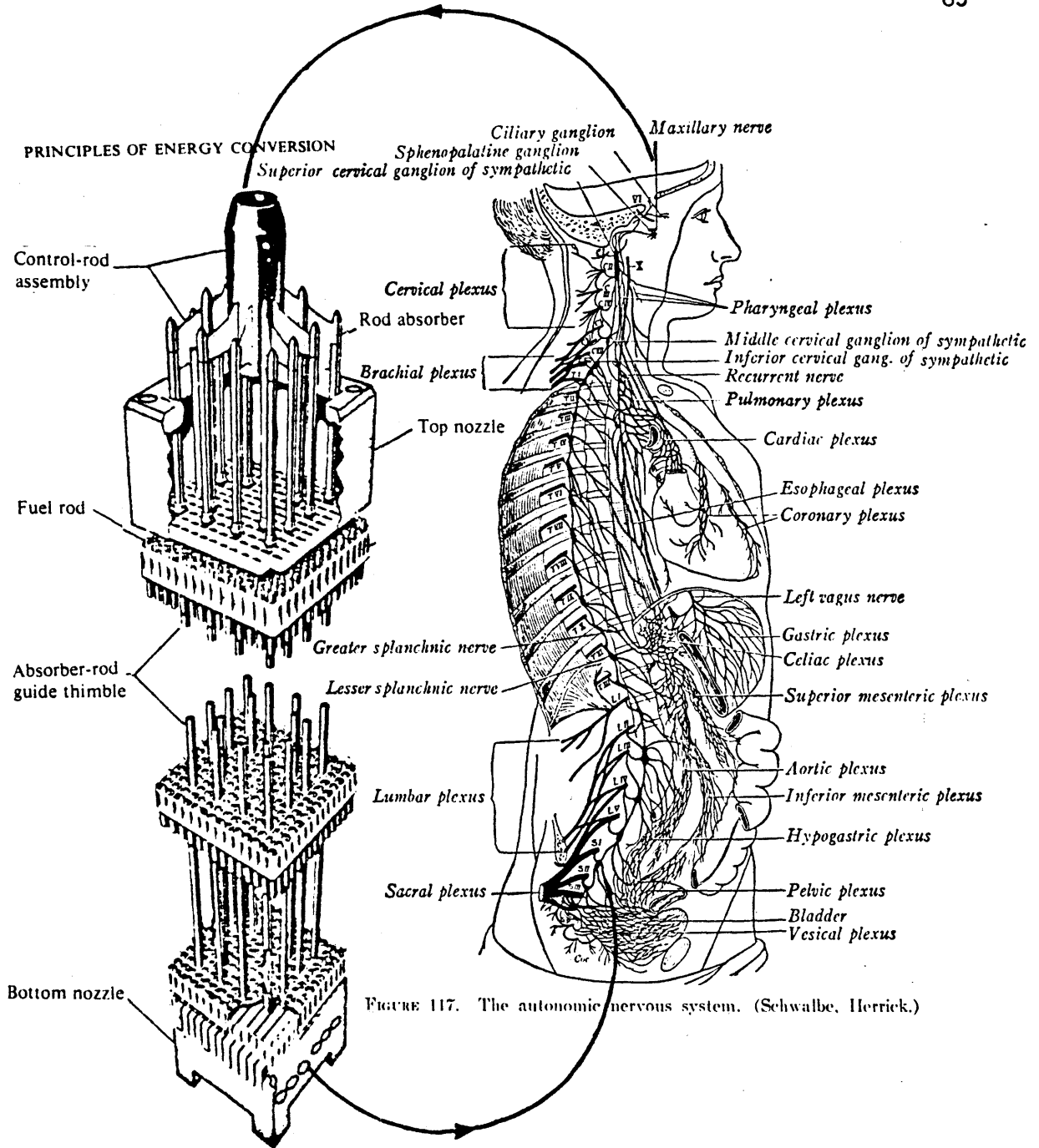


FIGURE 117. The autonomic nervous system. (Schwalbe, Herrick.)

Cutaway of a typical pressurized-water reactor control element assembly (CEA); (Courtesy of Westinghouse Electric Corporation.)

### ORIGIN AND DIRECTION OF INFLUENCE

Did The Inventor - the Brain And Mind - invent the devices in order to look at the dynamics of the Inventor? Are the principles of reactors extensions of the dynamics of the human organism?

"CEREBREACTORS": FACT AND FICTION

The reason why this writer chose to relate fission and fusion reactors to the functions of the human nervous system is that these technologies especially can offer new and critical insights into the Brain And Mind relationship, in particular: the physiological processing of <sup>neur.</sup> data; the propagation of brain waves; and, the detection and measurement of virtual cognitive energies. It appears these research technologies are intuitive links between what is known (observed) about the structures and forces of material reality and what is unknown (unobserved though "felt") about non-material reality as exemplified by the phenomenon of Mind.

The notion that the Brain And Mind can only be explained through neurophysiology and psychology is a «cul de sac». It may just be that the phenomenon of brain wave propagation is best understood in terms of the magnetic fields produced in mirror-type plasma fusion reactors. It is also possible that making visible the events of the Mind will involve re-adapting the techniques of nuclear physics which are designed to observe the particle-wave interactions through their secondary-effects. These technologies can offer methods of research for Mentalists and others interested in comprehending the 'content' and processes of cognition. By demonstrating the reversion effect of nongeometric symmetries such as those involving charges, the likeliness of there existing bio-mirrors that exhibit a similar type of symmetry is evermore.

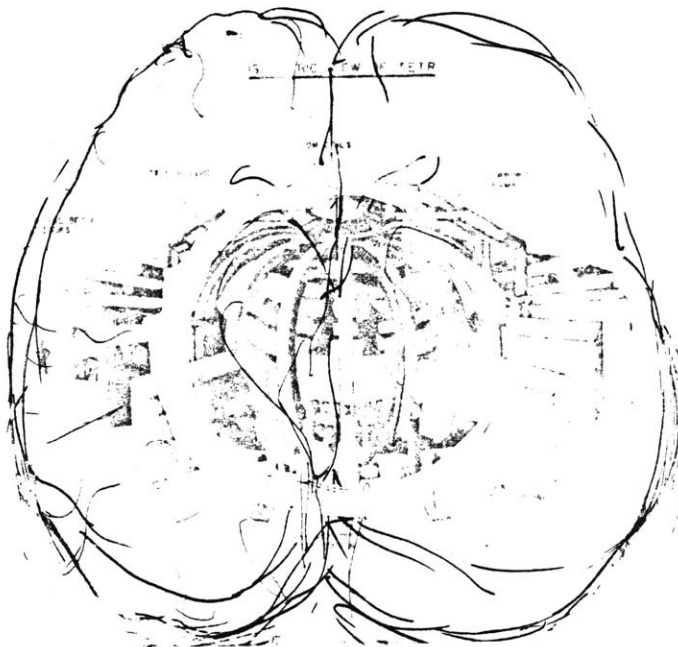
A second reason for relating the human brain to reactors is that the invention of these tools are the most modern examples, most recent evidence,

that Matter does in fact reflect (directly influence) the Mind or Non-Matter - from the purely physiological processes connected with creativity to the psychological implications of 'being creative.'

The "Cerebreactor" project represents the mержence of artistic and scientific aspects of nuclear engineering and neurology. The project utilizes their data in a unique way, creating hybrid organic-inorganic reactors for the production of cognitive energies. The "Cerebreactor" signifies some-thing in the process of forming that will never be formed, yet will determine the form of what will be.

Ecclesiastes Chapter I. no. 9 The Bible

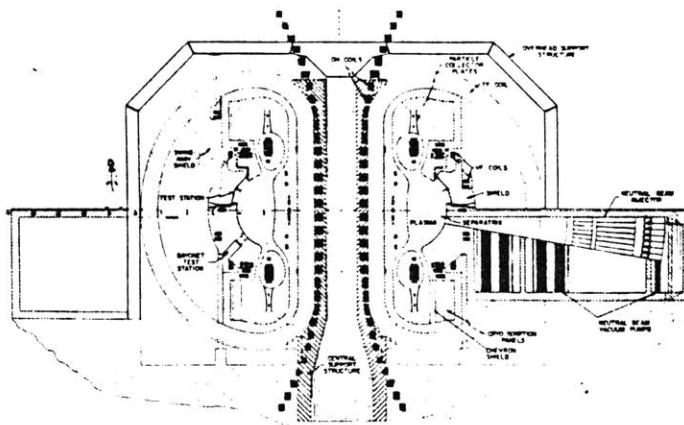
The thing that hath been, it is  
that which shall be; and that which is  
done is that which shall be done: and  
there is no new thing under the sun.





### Cerebreactor



CROSS SECTION VIEW OF TETR



"Cerebreactors" are models I have created that are imaginary particle accelerators, fission and fusion reactor systems designed after the human brain and nervous system. Where these devices are developed to observe and to utilize the nuclear forces of matter, "Cerebreactors" are used to study the structures and forces of nonmatter which comprise the mind.

"Cerebreactors"

- ...interpret the interactions of the brain and mind using the symmetries of nature, specifically mirror reflection, as models
- ...indicate that the physical brain functions reflect the nonphysical functions of the mind in the same way an object-image relation shows a one-to-one correspondence
- ...introduce the idea that nuclear sciences and related technologies, as extensions of the dynamics of the brain and mind, may serve to penetrate and understand these dynamics. This suggests that the principles of reactors are influenced by the physiological processes of the human organism, both by design and unconsciously by imposing their processes on these nuclear devices
- ...study brain functions, applying information from nuclear physics to neurology in an attempt to grasp the properties of the mind
- ...draw comparisons between the mechanisms or reactors and those of the brain that generate and manipulate energies: "Cerebreactors" represent the combination of similarities
- ...show the energies of nuclear forces as being the material counterpart of the mental energies
- ...describe two different processes of thinking in terms of nuclear fusion and fission reactions

"Cerebreactors" make visible the parallels between the processes of intuition  and nuclear fusion, reason  and nuclear fission.

In the former, both hemispheres of the 'brain' function as a single sphere, when focusing and fusing information; for a millisecond or more a symmetry of Brain And Mind occurs at which time neural actions and mental reactions are synchronized. In the latter, one hemisphere is more dominant than the other causing a broken symmetry of functions.

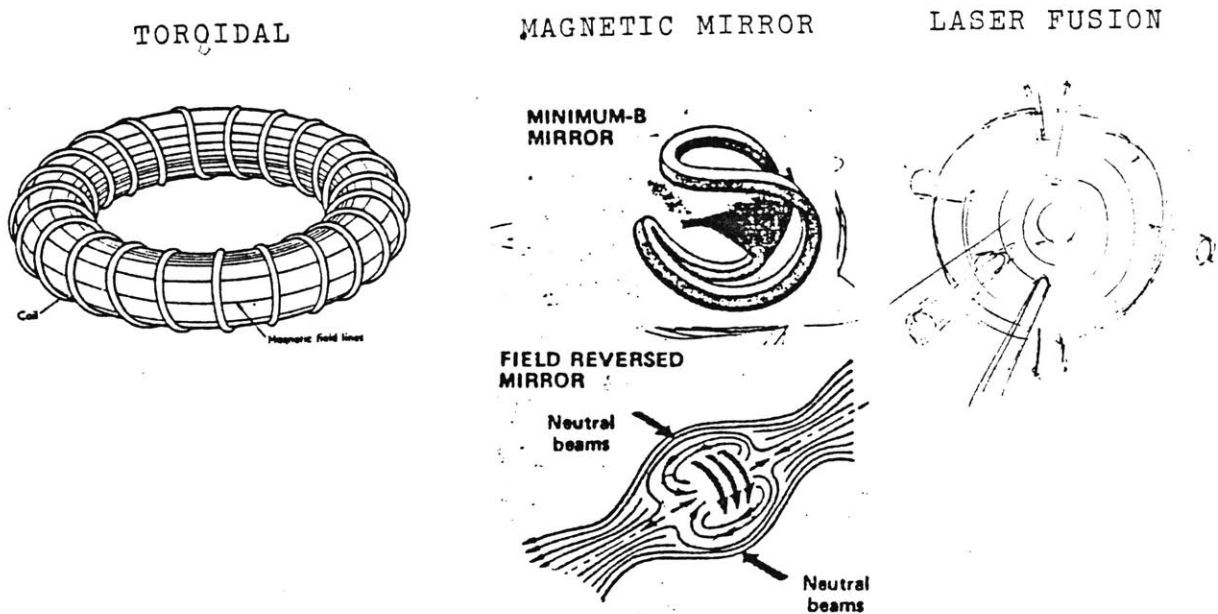
These two conditions I think correspond to two phases of thought:

1) when a person is 'having' or experiencing an intuition, insight or inspiration; and 2) when a person expresses the intuition using either the instinctual or intellectual realm of mind, imagination. Both seem to sustain each other.

The instant of intuition signifies the union or 'fusion' of the cerebral hemispheres like two light atomic nuclei uniting in a great concentration and confinement of temperature. In this instant, two opposite forces such as positive and negative overcome their complementarity, forming one greater force which I refer to as the 'plasma state of the mind' or intuition in a "Cerebreactor". Plasma, representing the 4th state of matter, behaves as neither a solid, liquid or gas; it is an ionized gas whose characteristics are in a category all its own.

Describing an intuition marks the division of the cerebral processes like the nucleus of an atom splitting apart into two nuclei where one is heavier than the other. Where the instant of intuition represents the convergence of artistic and scientific perspectives, the process of description coincides with their divergence.

Fusion reactor concepts reflect  
fusion effects in the human brain.

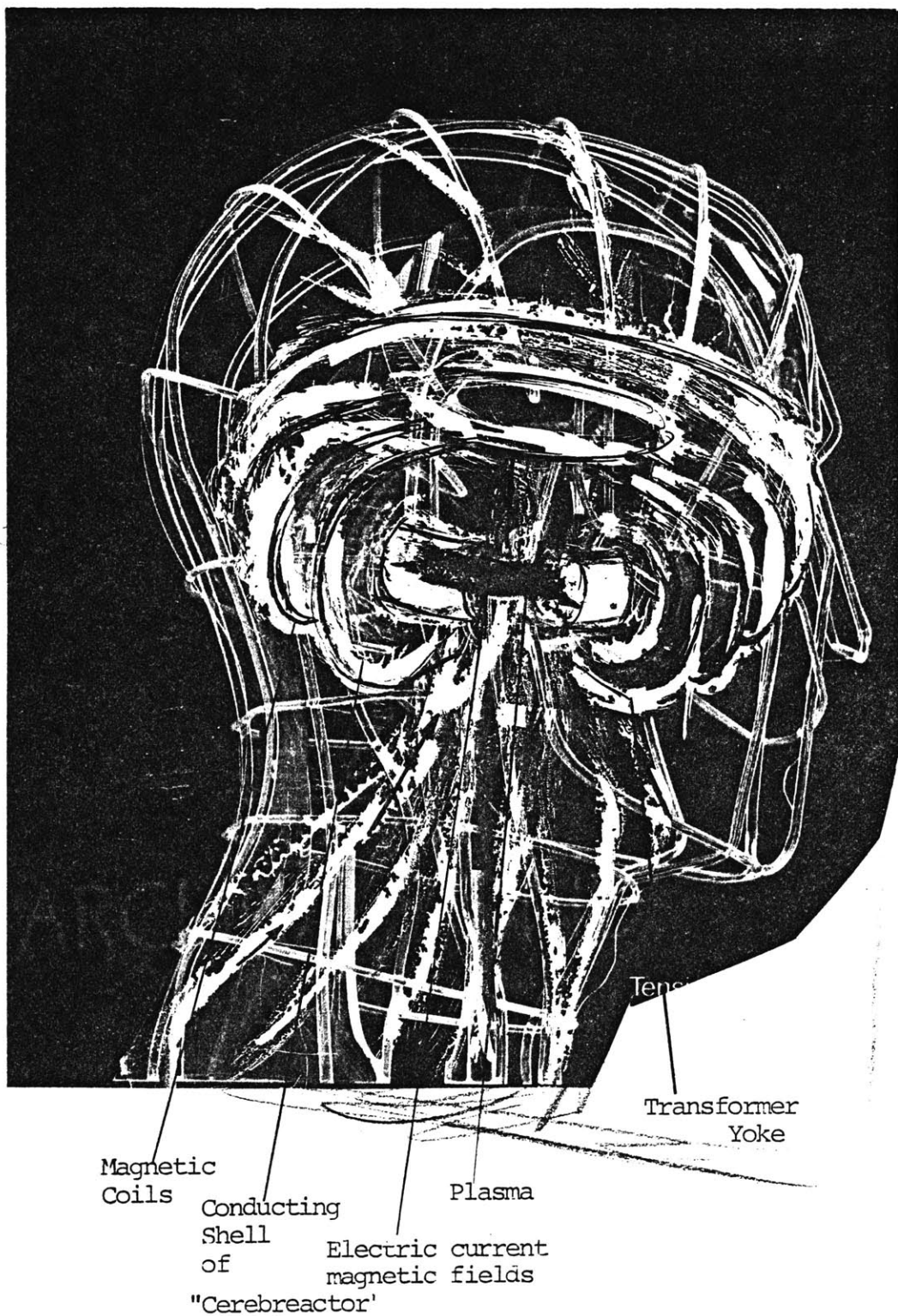


There are fundamental fusion reaction types in the "Cerebreactors" but there are also innumerable variations of these - as many as there are different configurations of energy fields determining the density of the 'plasma fusion state of mind' or intensity of intuition. For example, in one instant a "Cerebreactor" might create a torus-shaped plasma and in the next millisecond produce a field-reversed effect, with each shift affecting the degree of concentration or confinement of the 'cognitive plasma'.

**Considering:** *micro-instabilities* in which the plasma does not move about bodily, but which nevertheless result in a serious loss of energy to the walls of the surrounding vessel.!

"Cerebreactor" models show that the configurations of energy fields in the brain during instances of intuition differ significantly from the currents and energy fields occurring in moments of reasoning.

FUSION REACTOR CONCEPTS REFLECT FUSION EFFECTS



The Intuition of THE TOKAMAK APPROACH

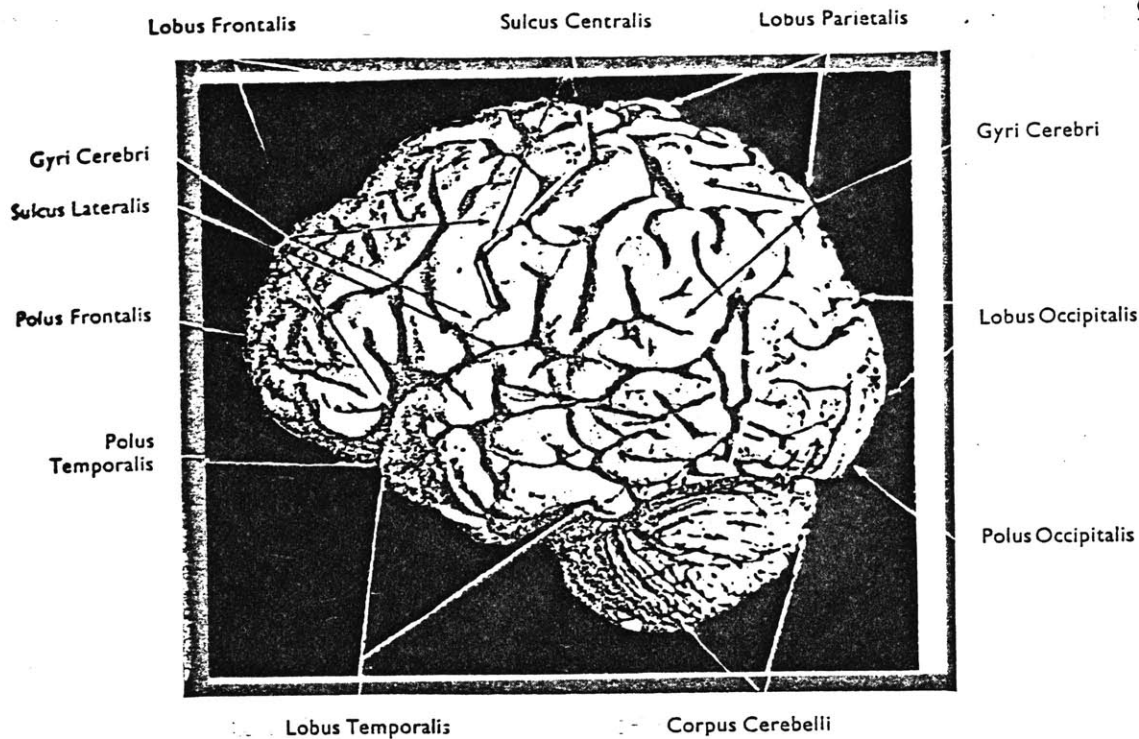
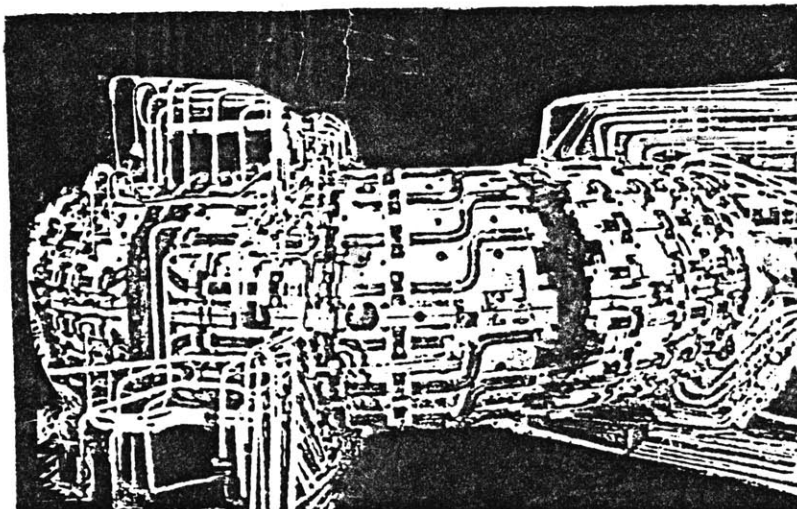


Fig. 7A. Lateral view of brain.

J.P.Schade and Donald H.Ford, Basic Neurology,  
New York: Elsevier Publishing Comp., 1967, p.17

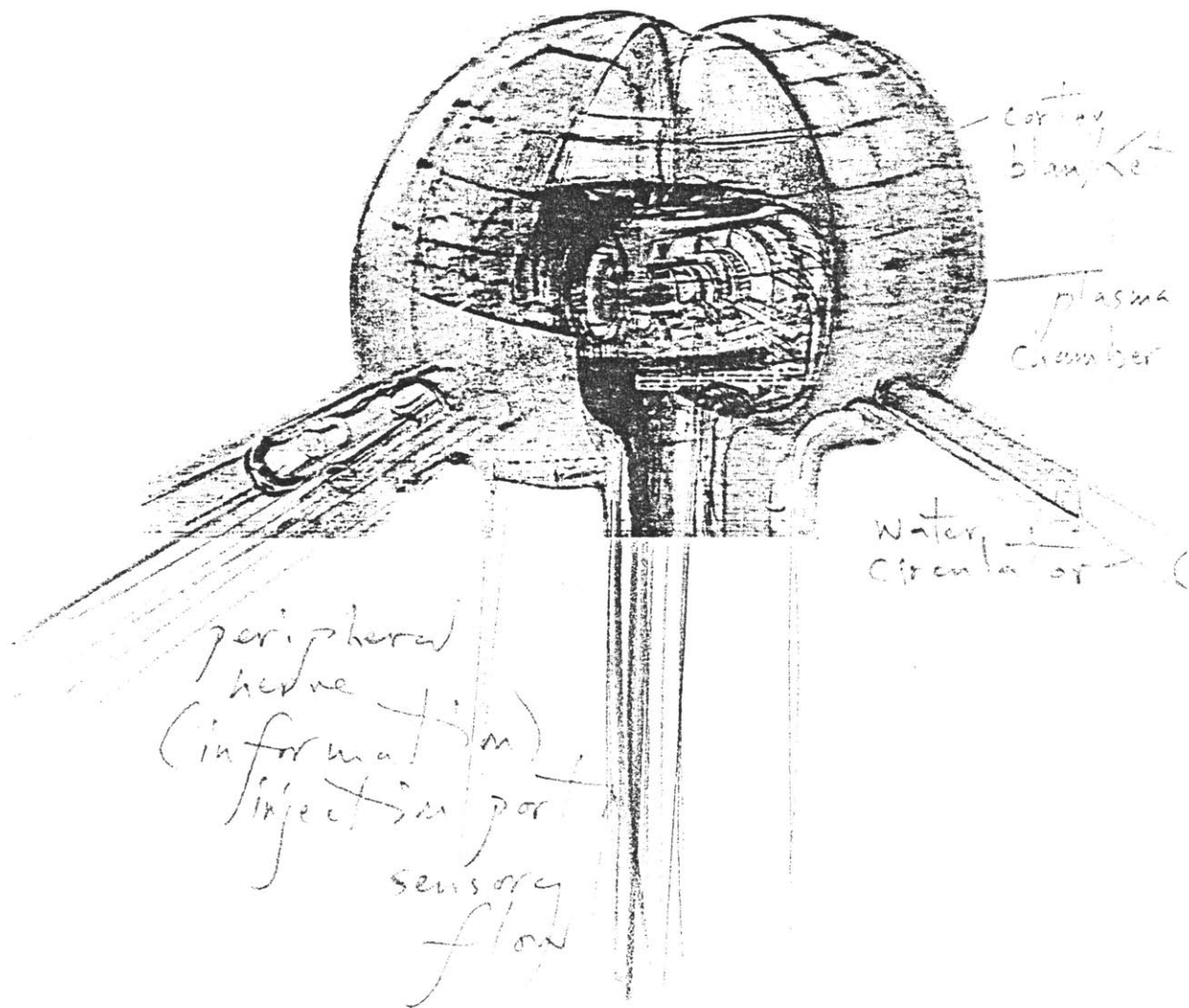
COMPONENTS OF A "CEREBREACTOR"  
(Comparative Anatomy and Physiology)



Assembled Torus

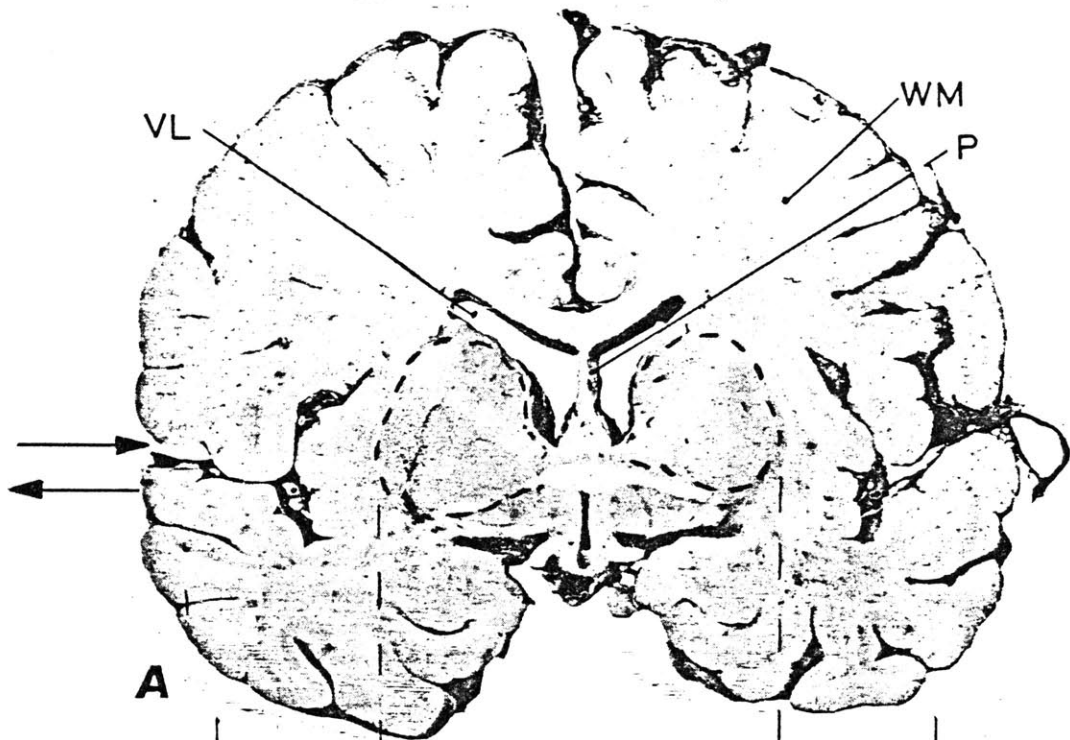
ORMAK Fusion Device, Oak Ridge National Laboratory  
Fifth Symposium on Engineering Problems of Fusion Research,  
Princeton University, Nov. 5-9, 1973, IEEE Nuclear and Plasma  
Sciences Society

eye bracket



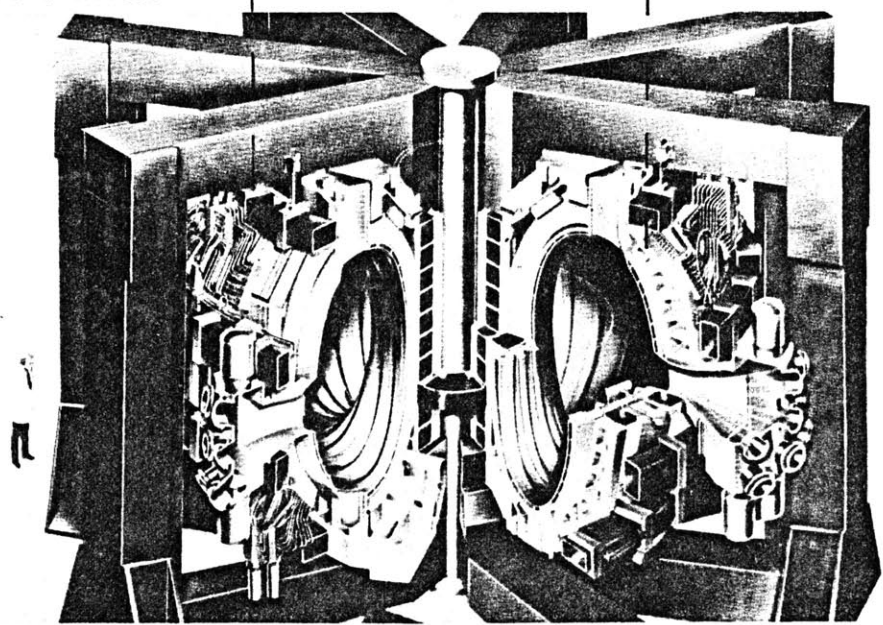


COMPONENTS OF A "CEREBREACTOR"



Comparative Anatomy and Physiology  
the coronal plane through the septum pellucidum (p).

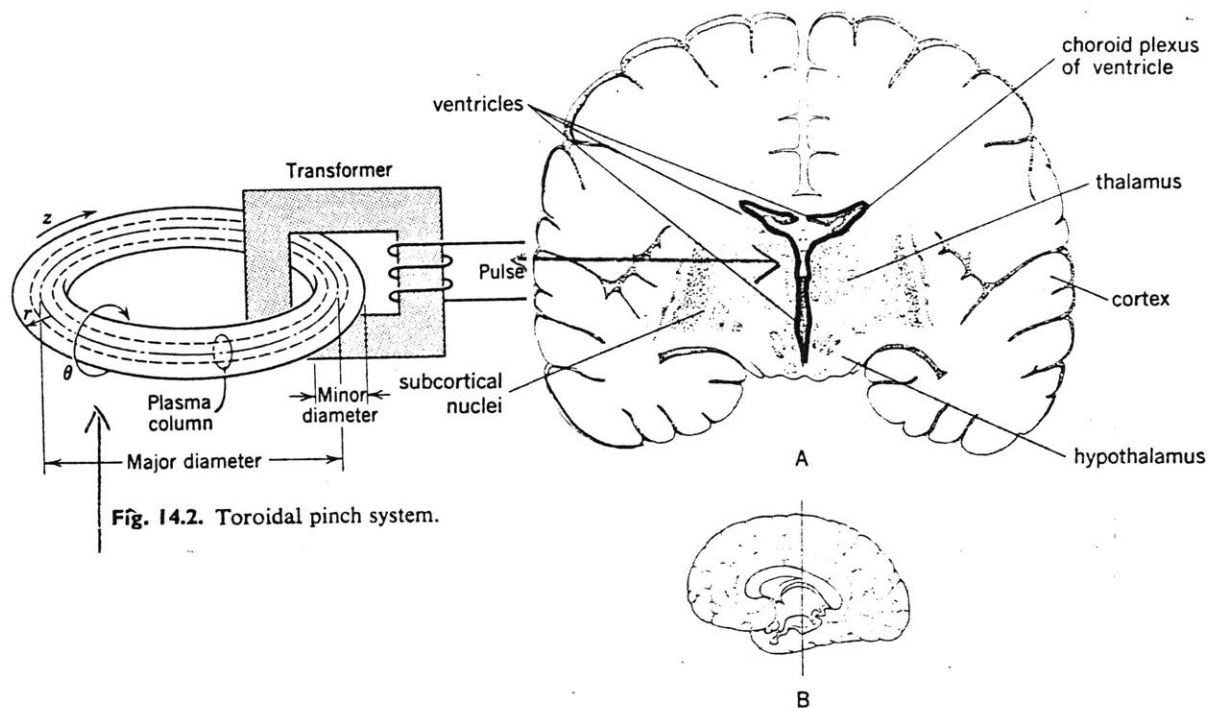
the white matter (WM), enlargement of  
cornu anterius of ventriculus lateralis (VL), and extensive sulcal widening. EUROPEAN JET



In early 1980s, production of high temperature/density plasmas is planned for Joint European Torus (JET), authorized by EURA-



Theoretically, the virtual particles and waves of thought produced in the "Cerebreactor" are complementary to those charged particles moving along a line of force in the direction of a magnetic field in a plasma fusion reactor. In the "Cerebreactor", this field signifies the 'line of concentration' containing the torus-shaped bits of neuronal information forming an intuition. Note Diagram Y.



It appears that the spinal cord, rhinencephalon and mesencephalon of the "Cerebreactor" are the key centers for regulating information input-output to the limbic system, like the apparatuses which pump hydrogen or other gasses into the heated chamber of a Tokamak (toroidal fusion reactor).

Detail: CORONAL SECTION OF THE HUMAN BRAIN showing the shape and direction of the electro-magnetic field in the region of the limbic system (at the instant of Cognitive Fusion).

$B_0$  = poloidal field outside the vacuum vessel  
 $B_i$  = poloidal field inside the vacuum vessel.

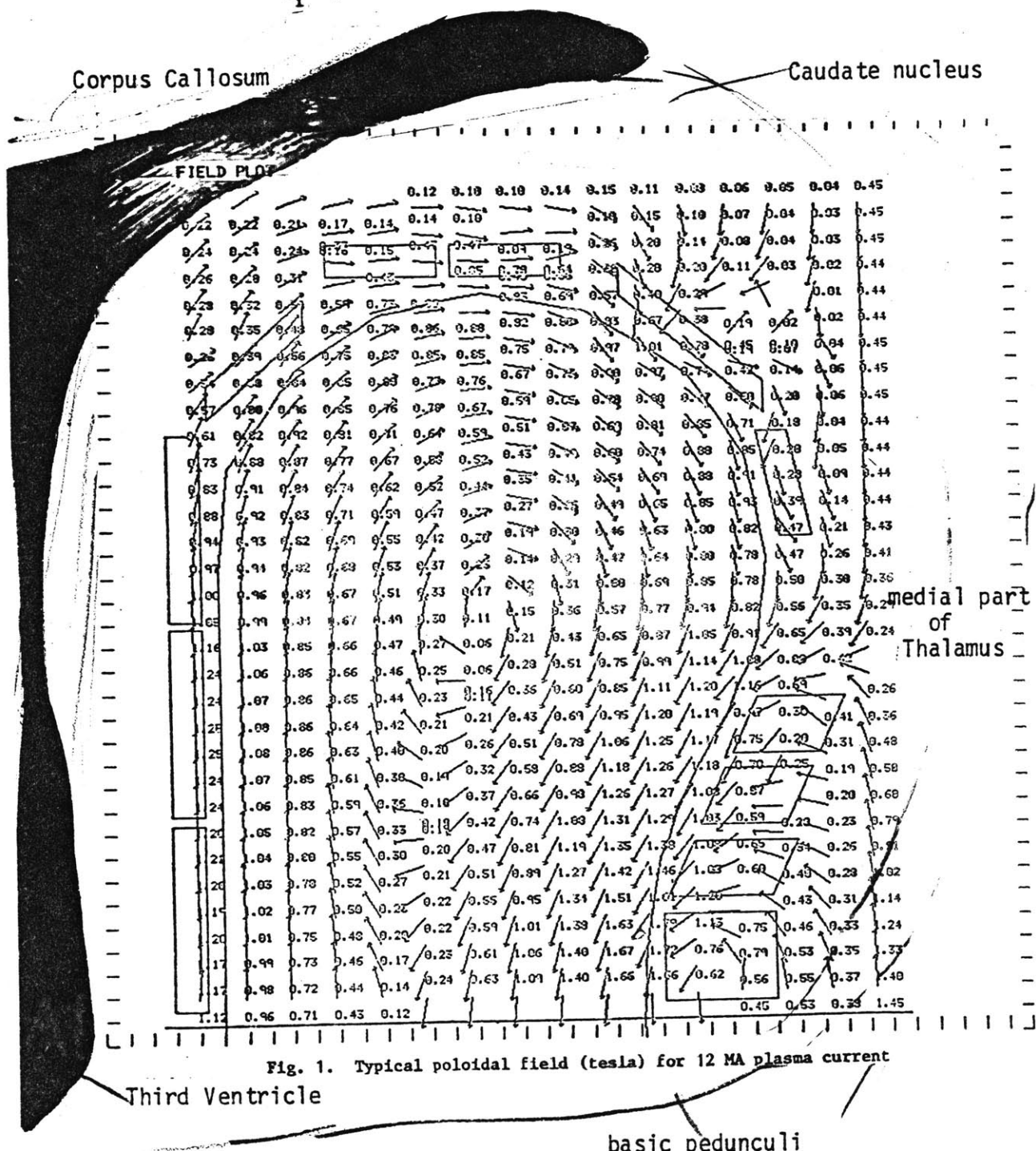


Fig. 1. Typical poloidal field (tesla) for 12 MA plasma current

Tokamak (Toroidal Fusion) type reaction

COMPONENTS OF A FUSION "CEREBREACTOR"

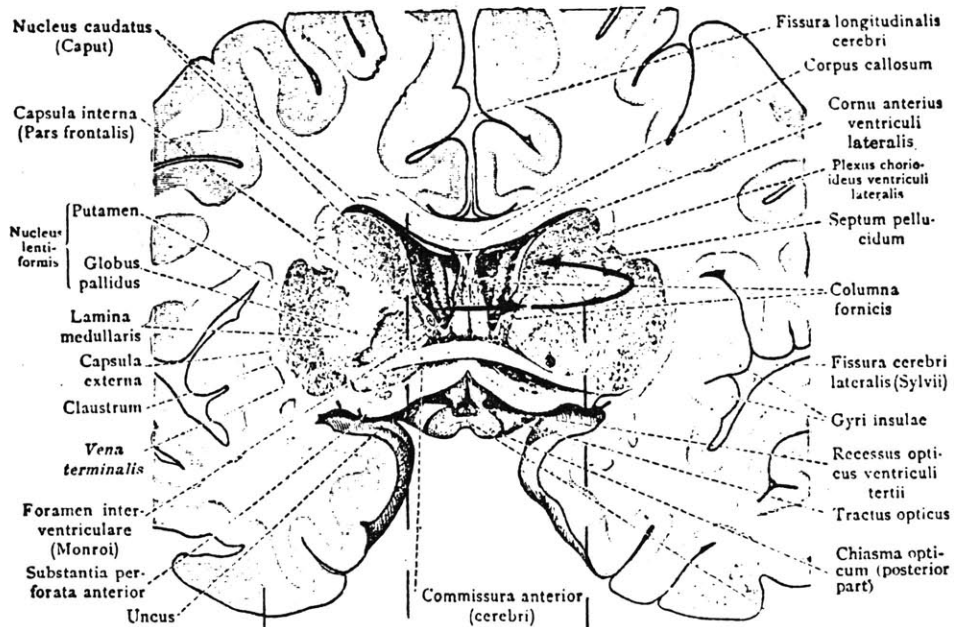


FIGURE 221. Frontal section of the human brain through the anterior commissure. (Toldt.)

arrows indicate direction of influence

'Cerebreactor': synthesis of R & Y.

PRINCIPAL FUELS FOR ENERGY CONVERSION

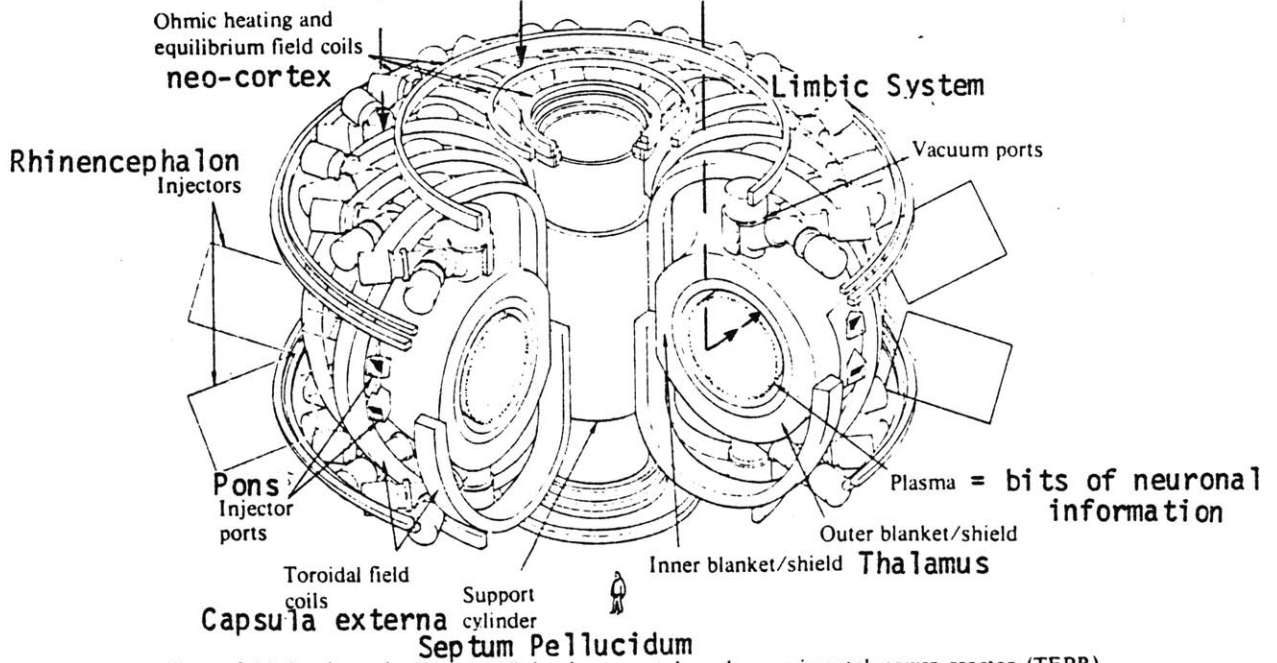
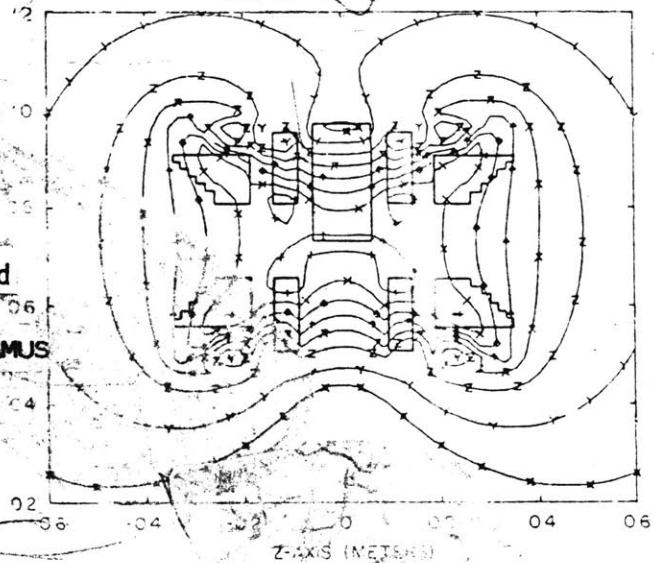


Figure 2.14 A schematic diagram of the Argonne tokamak experimental power reactor (TEPR). (Reprinted with permission of the American Nuclear Society.)

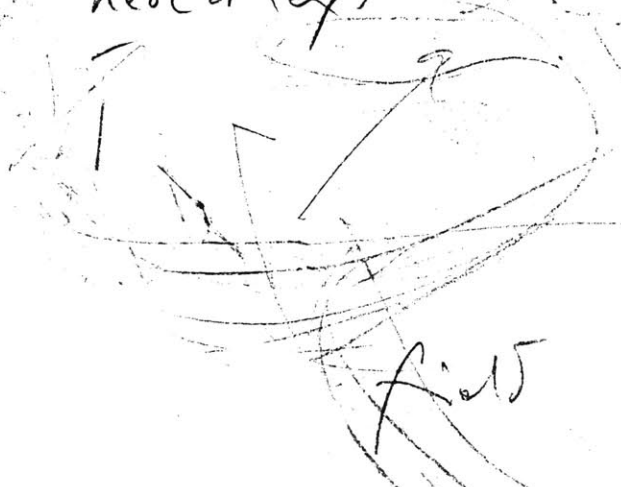
FIELD CONTOURS, XZ PLANE



re sponsible for creating and maintaining the magnetic field

Fig. 2b. Lines of constant values of the modulus of the magnetic field in an elevation view. The values of magnetic field are indicated in gauss.

*helps generate electro-magnetic field in neocortex*



BRAINSTEM

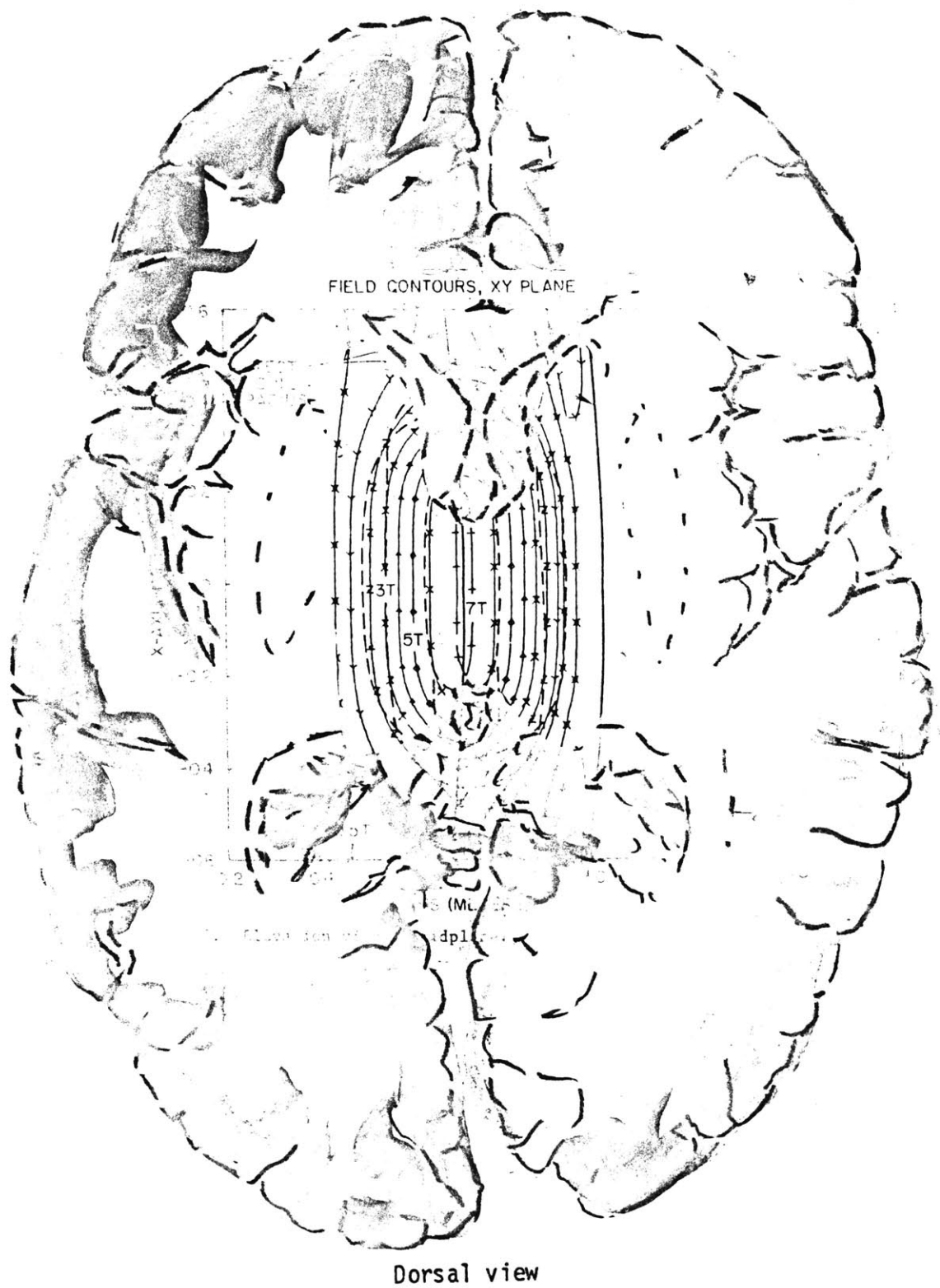
(a)

Nervous System, specifically the spinal cord, operates as a high-voltage accelerator

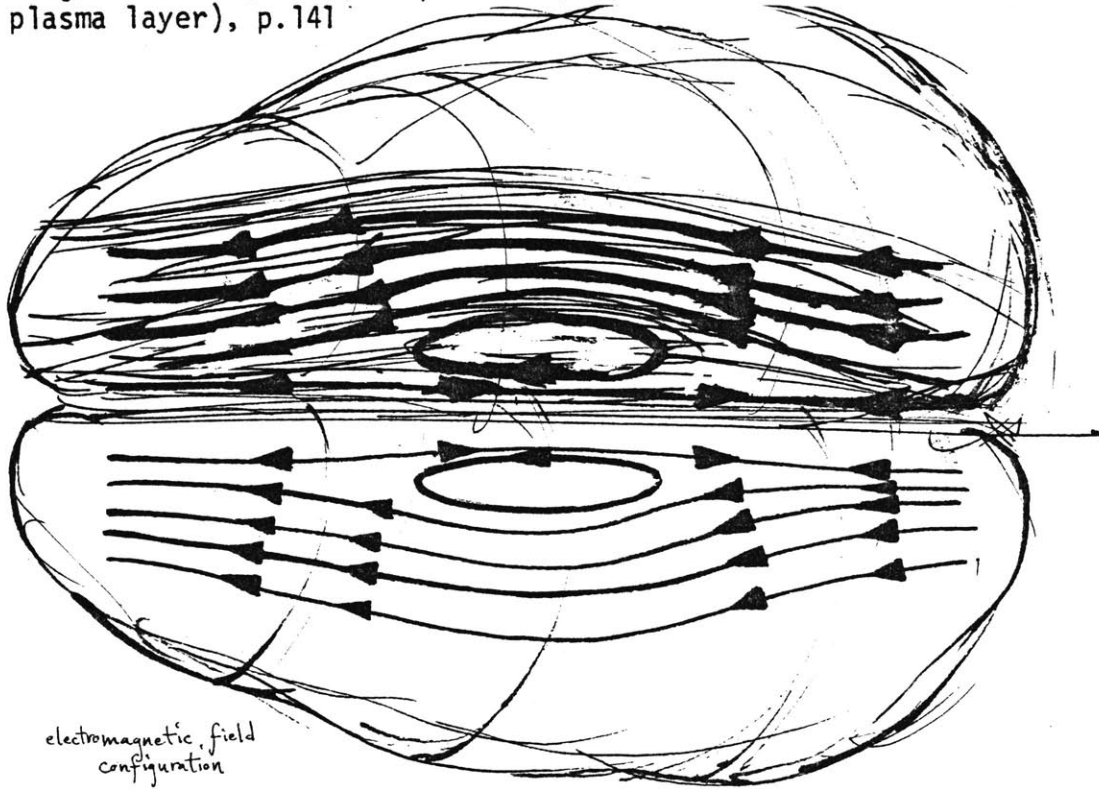
in which neural information, like molecular ions in a Direct Current

*Sensory signals (flow of afferent information)*

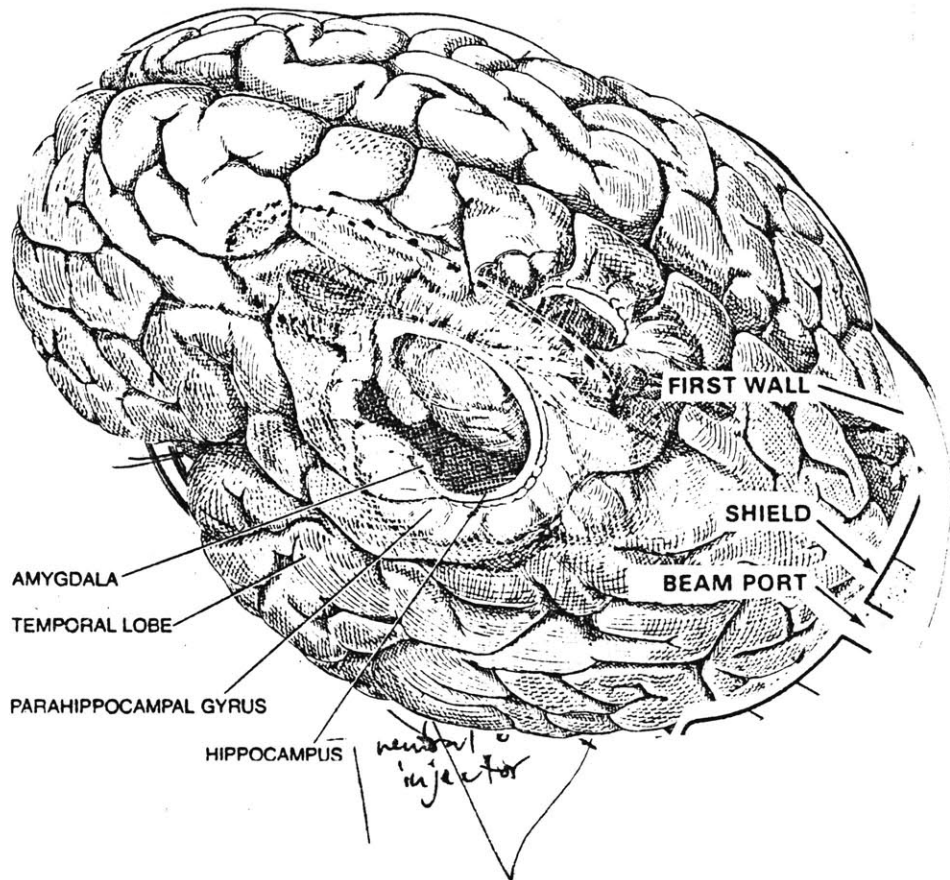
*(e) flow of efferent information*



Horizontal sections of the human brain through the internal capsule and corpus callosum showing the electromagnetic field contours (in the instant of Cognitive Fusion)



electromagnetic, field configuration





COMPONENTS OF A "CEREBREACTOR"

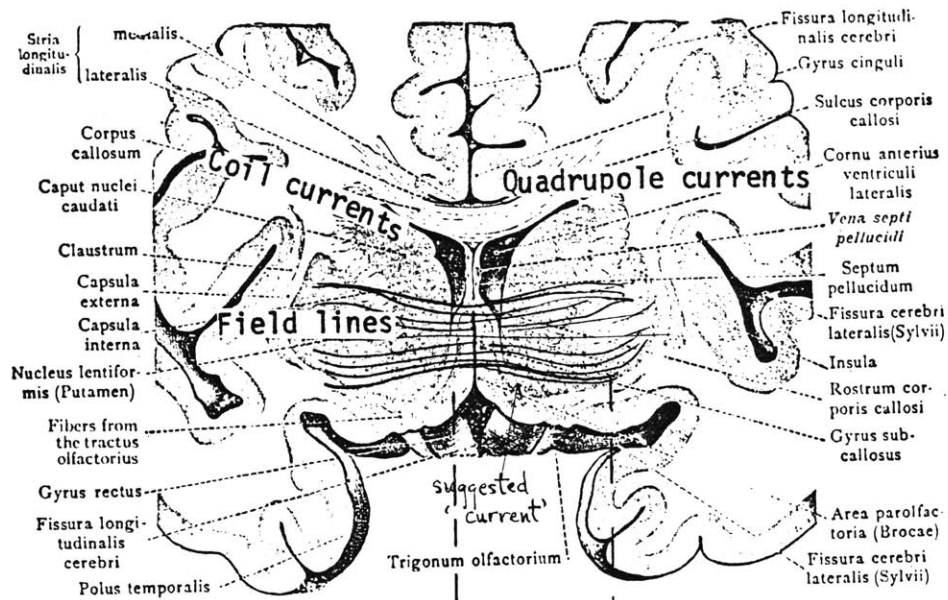


FIGURE 220. Frontal section of the human brain through the rostral end of the corpus striatum and the rostrum of the corpus callosum, (Toldt.)

Comparative Anatomy and Physiology

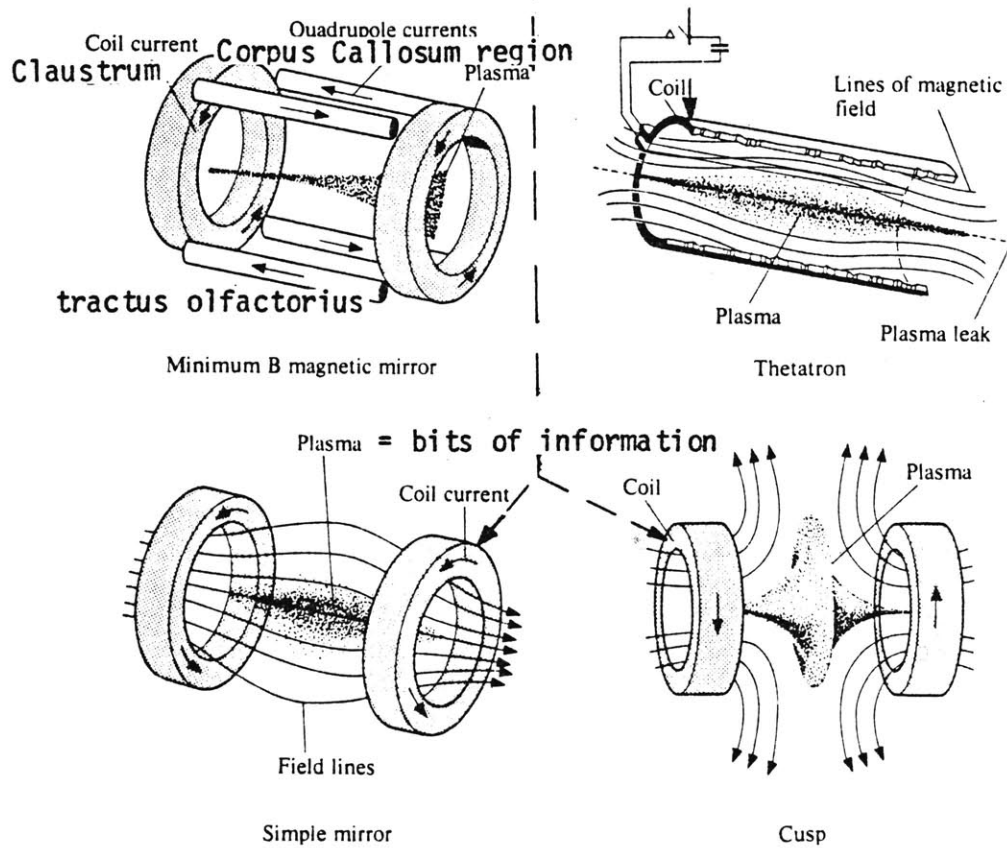


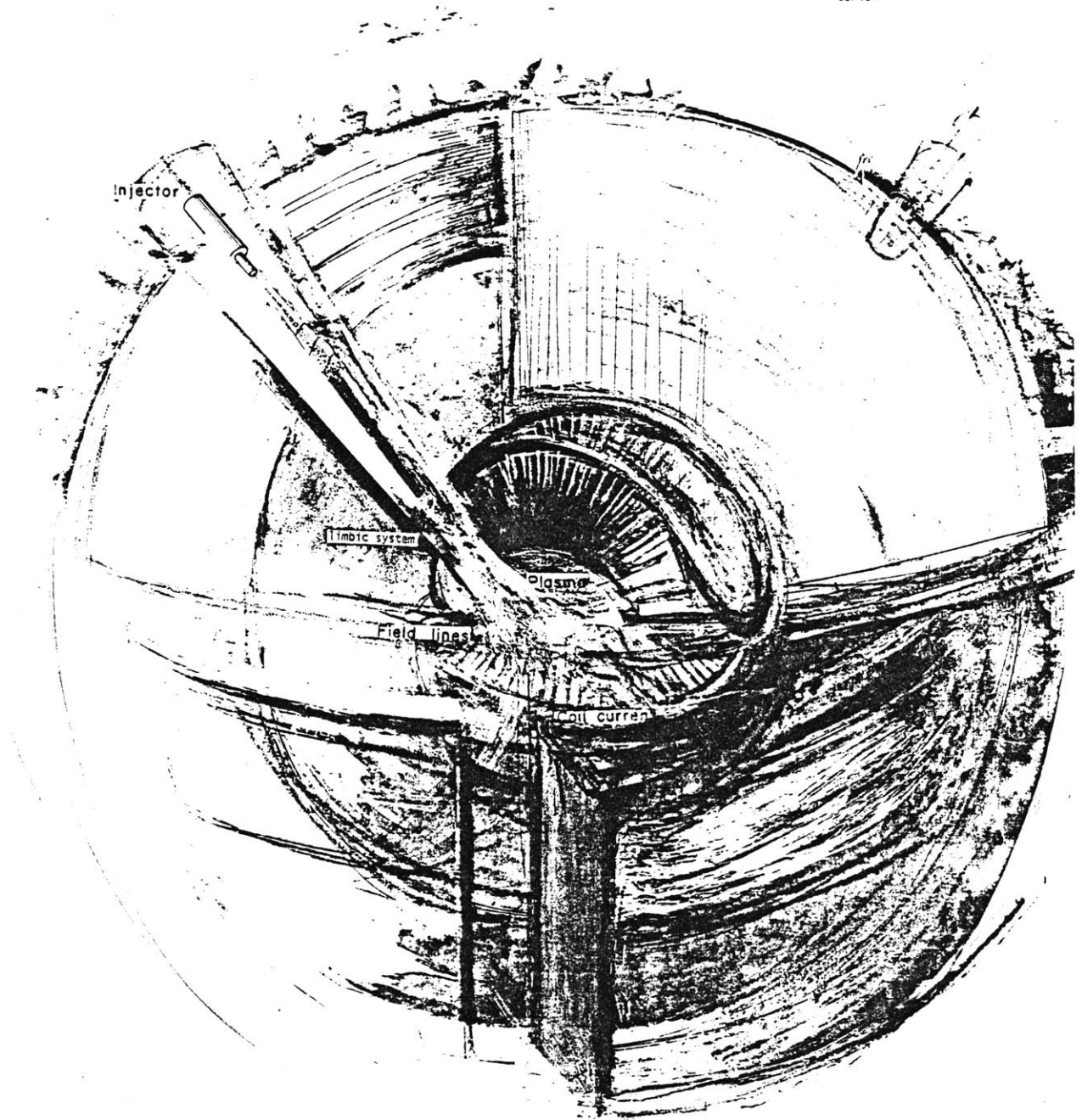
Figure 2.13 Schematic diagrams of some of the mirror fusion machines for the magnetic containment of plasma. (Reprinted with permission of the American Nuclear Society.)

DIFFERENT COIL CURRENTS DETERMINE DIFFERENT SHAPES AND DENSITIES OF COGNITIVE PLASMA

# CEREBREACTOR

Magnetic Mirror

cortex





## comparative anatomy and physiology

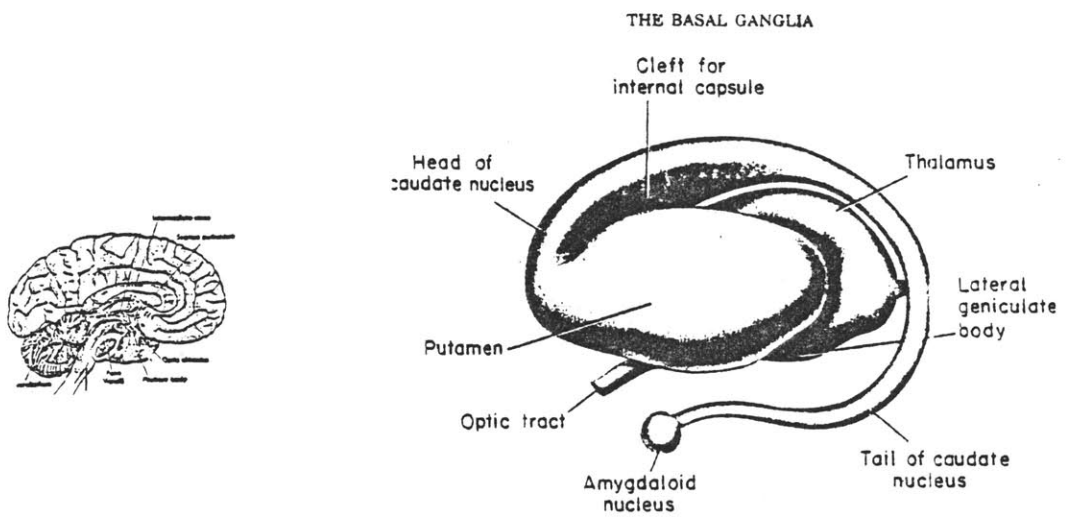


FIG. 20-4. Semischematic drawing of the isolated striatum, thalamus, and amygdaloid nucleus showing: (1) the continuity of the putamen and head of the caudate nucleus rostrally, and (2) the relationships between the tail of the caudate nucleus and the amygdaloid nucleus. The cleft occupied by fibers of the internal capsule is indicated. The anterior limb of the internal capsule is situated between the caudate nucleus and the putamen, (Fig. 3-23, and 20-3) while the posterior limb of the internal capsule lies between the lentiform nucleus and the thalamus.

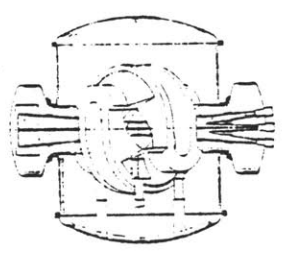


Fig. 12. Elevation view of injection system.

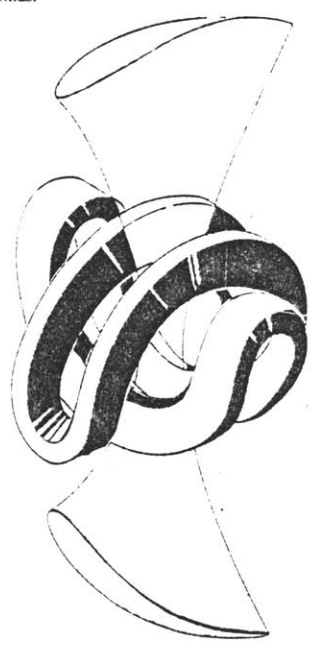
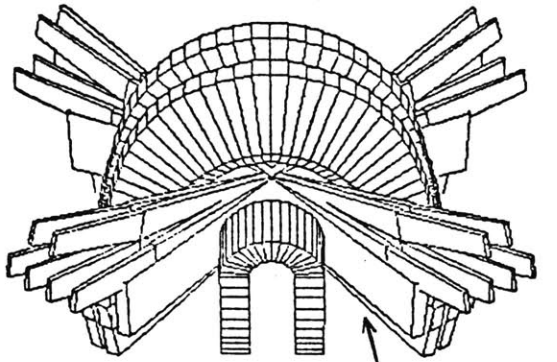
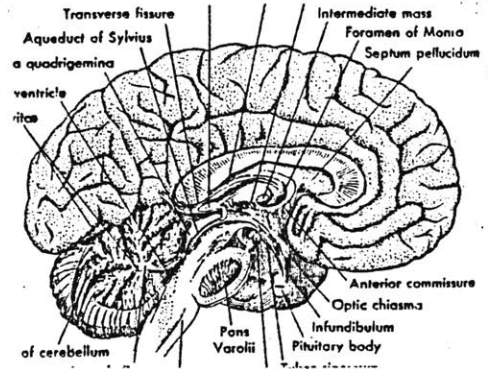
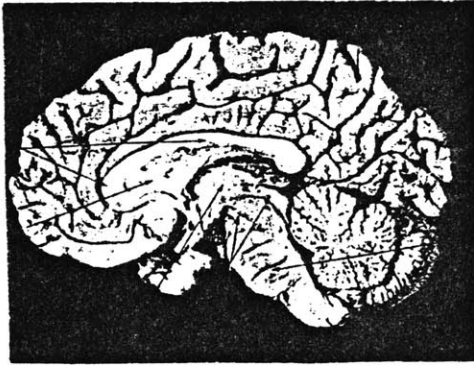
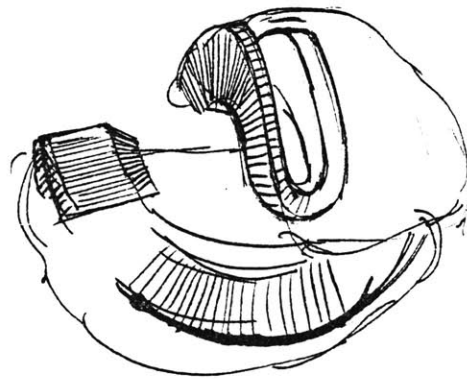
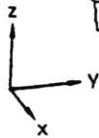
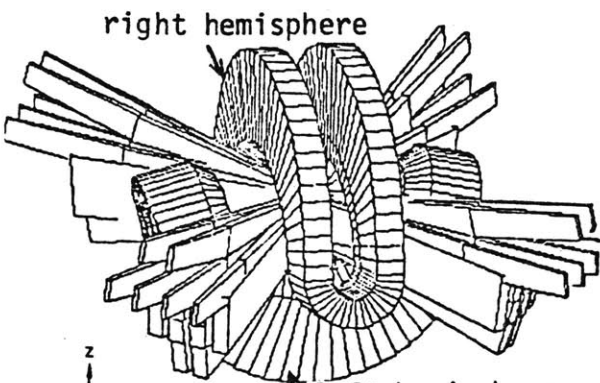
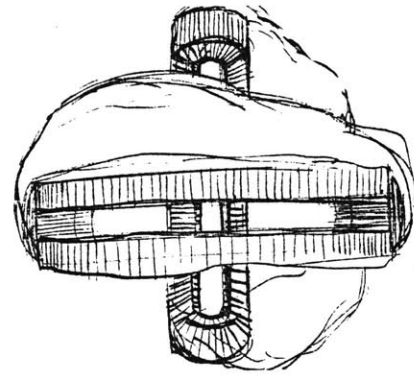
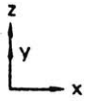


Fig. 3. Yin Yang magnet windings with relative plasma shape.



cognitive plasma



### Comparative Physiology

plasma-center neutral beam aiming configuration

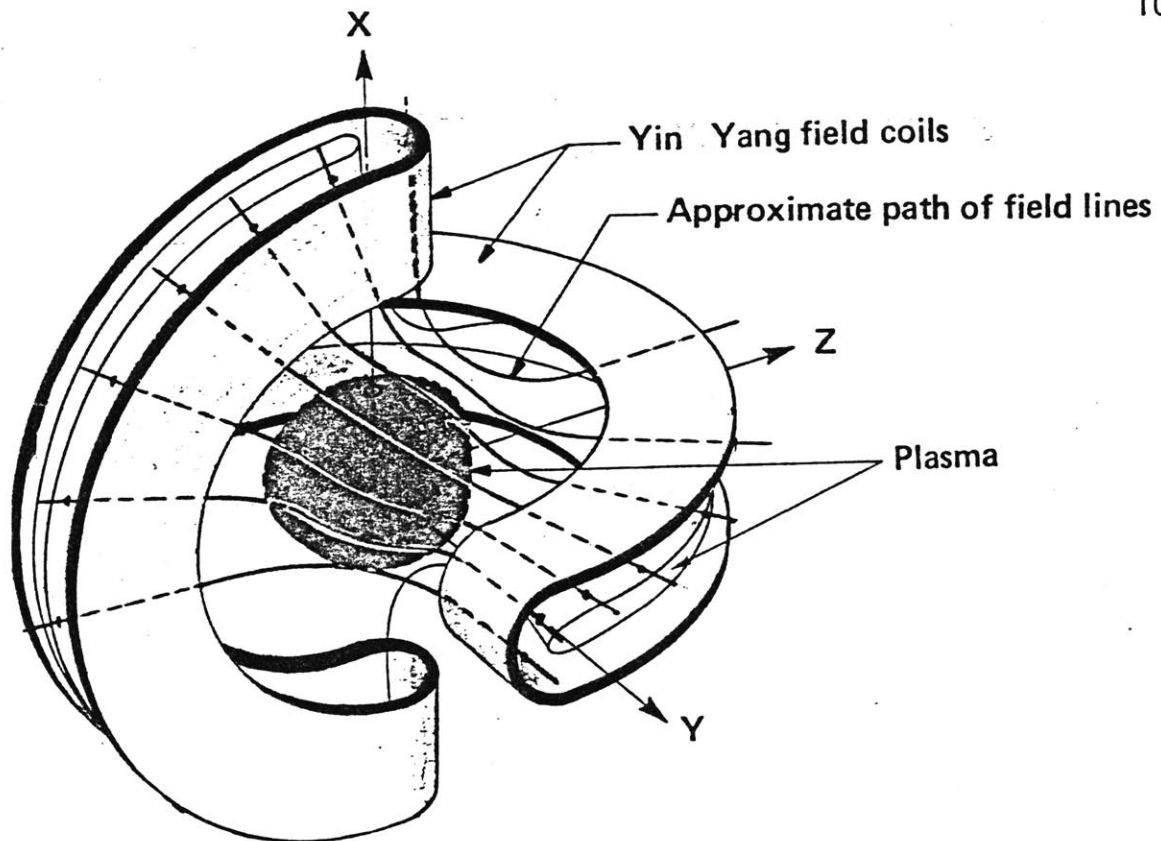
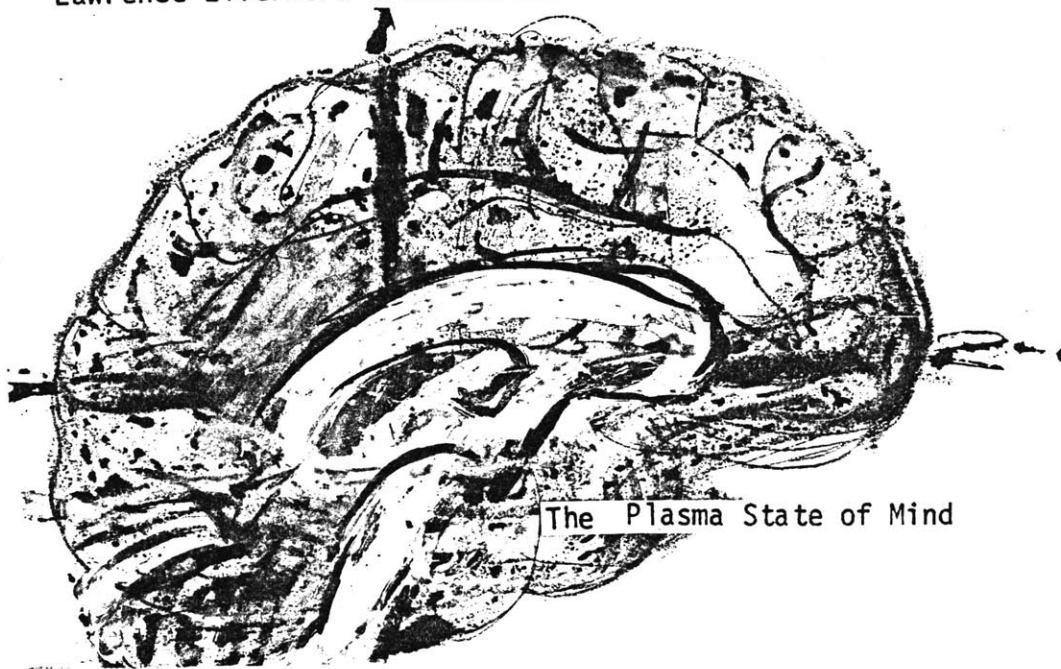


Fig. 2. The configuration of the Yin Yang magnet.<sup>1</sup>  
 J.D.Lee, "Geometry and Heterogeneous Effects on the Neutronic Performance of a Yin Yang Mirror-Reactor Blanket",  
 Lawrence Livermore Laboratories



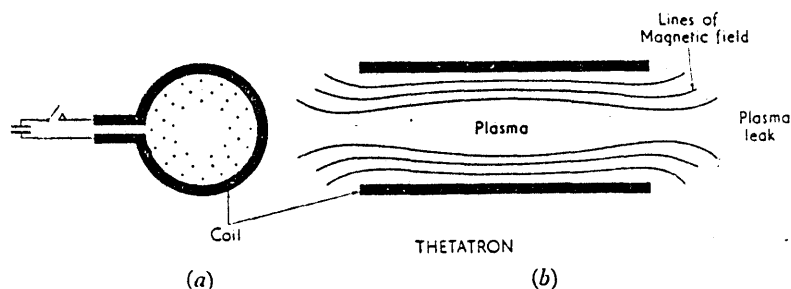
The engineers of the "Cerebreactor" are now questioning whether it will ever be possible to sustain the instance of intuition without damaging the reactor permanently. Just as confinement properties are not adequate to support self-sustained thermonuclear reaction in the DCX, perhaps the "Cerebreactor", like the human brain, is not biologically equipped - neurologically capable - of sustaining an intuition, that is, an intuitive reaction. These engineers are presently concerned with the problem of microinstabilities or particle-wave instability (unpredictability) in the sphere of the "Cerebreactor". It seems that the design of the magnetic bio-mirror is imperfect (by nature) and thus intuitions 'escape' from mirror confinement, like plasmas leaking from magnetic bottles. See the Escape Diagram.

*micro-instabilities* in which the plasma does not move about bodily, but which nevertheless result in a serious loss of energy to the walls of the surrounding vessel. 39

#### *The thetatron*

The figures below illustrate the compression of a plasma by the so-called *Theta Pinch* or *Thetatron*.

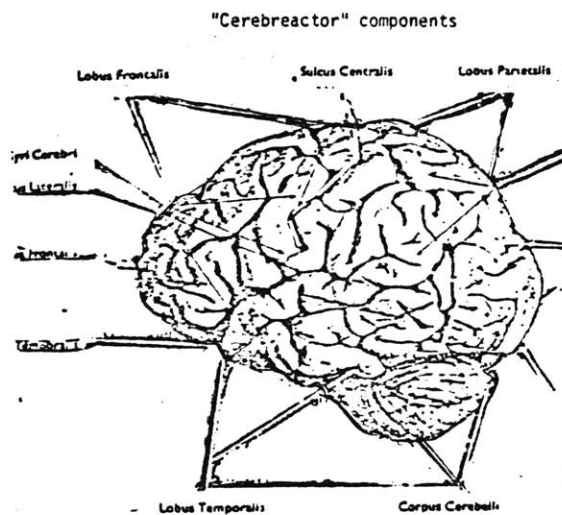
Figure 7.6 *a* shows an end on view of a cylinder containing a plasma surrounded by a single turn coil of metal through which a heavy current is passed. Figure 7.6 *b* shows the same arrangement viewed sideways



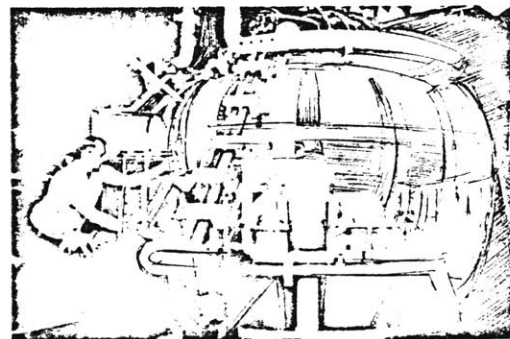
Unlike the "Cerebreactor", actual fusion reactors can divert plasma impurities, as they are closed 'absolute' systems. The "Cerebreactor" model, it is to be remembered, is partially an open system - implying that, as a concept, it is still forming in the imagination without formal definition.

The "Cerebreactor" engineers are also searching for mechanisms in the human nervous system which could be compared to the current and magnetic chamber of the Symmetric Tokamak (ST); in this comparison, they hope to discover other means of heating the cognitive plasmas (intuitions) in the "Cerebreactor" complex. The ST employs radio-frequency heating methods as opposed to using thermonuclear reactions, such as those created from deuterium or tritium magnetically confined in an endless figure-8 tube as in the original Stellarator of 1951. Even if this heating technique is applied to the design and function of future "Cerebreactors", there is no guarantee that this new model could produce plasmas with temperatures of 20 million degrees or better.

If plasma is 100,000 times denser than air, proper temperature need be held for only about one-thousandth of a second.<sup>40</sup>



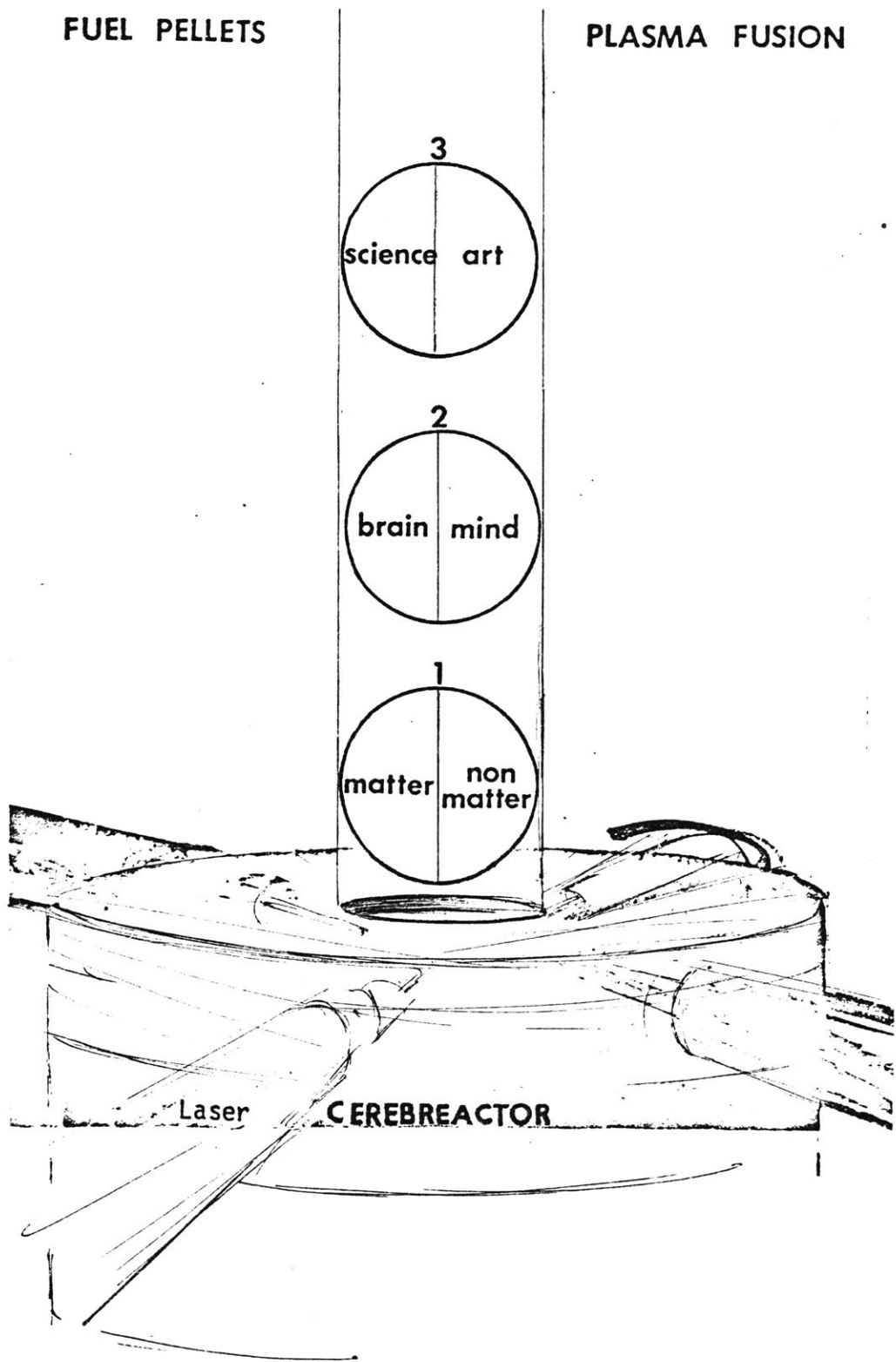
★ Density increases six-fold.  
Experiments demonstrate tokamak-like systems can operate effectively without heavy copper shells used by earlier devices to stabilize hot plasma.

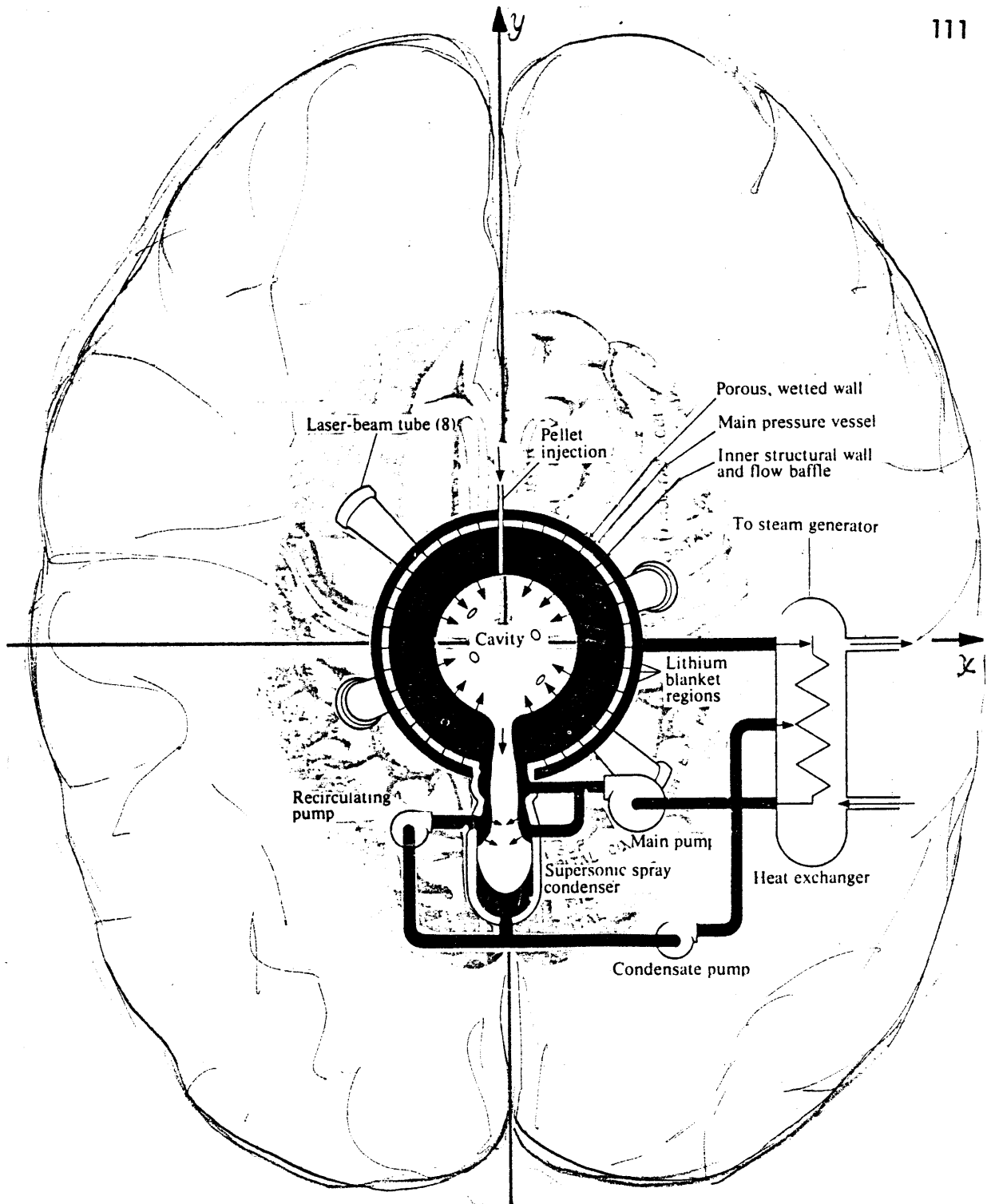


The difference between cognitive fusion and fission in all "Cereb-reactors" depends on whether there is an unbroken or broken nongeometric symmetry dividing or integrating the cerebral hemispheres functionally. In the case of cognitive fission, one could say there is a variance between neurophysiological events (or stimuli) and neuropsychological responses (or behavior) - as if the biomirror was inoperative during this mode of thinking; or, as if this nongeometric mirror was 'leaking' information like plasmas escaping from some magnetic mirror arrangement in a fusion reactor. In this state of "Cerebreaction" a person may be thinking about an idea they just realized, a feeling or some recent experience. Conversely, in cognitive fusion a person is in the process of 'having' or experiencing an idea or thought of particular importance; in which case there are no boundaries separating consciousness from unconsciousness - the two actually 'fuse' in this instance. Reality and ideality become one and the same thing - indistinguishable like an object and its virtual image in a brilliant plane mirror reflection. The object (=neurophysiological events) and the virtual image (=neuropsychological responses) reveal an invariance in their interrelations, when the elements of time, movement, plus the changing internal conditions influenced by the electro-chemical activity of the body make up the 'transformation' of the object and its corresponding image. In the milliseconds of this transformation they become One, coinciding with the functional union of the cerebral hemispheres. The resulting 'sphere' composes the plasma fusion chamber of a "Cerebreactor" in which it both confines and shapes the simultaneous implosion-explosion of all that is real -p and virtual -np in a "complete" Reality.

FUEL PELLETS

PLASMA FUSION

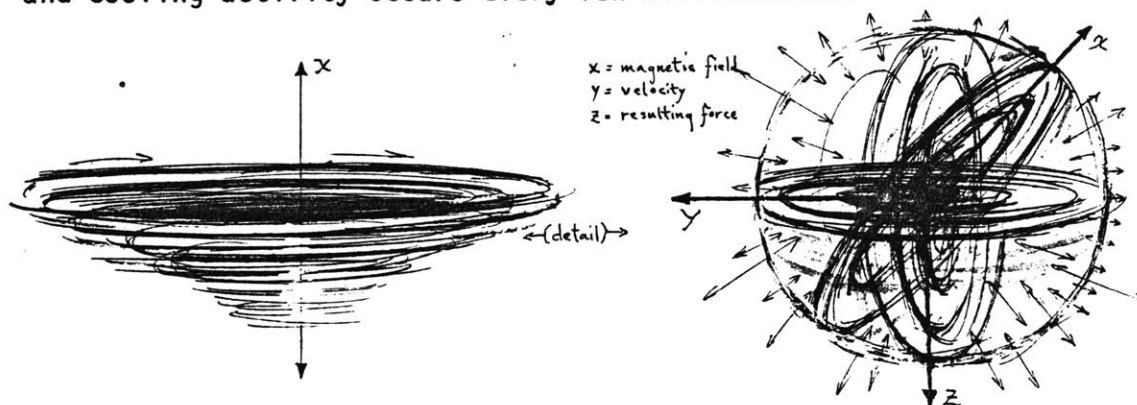




The process of generating intuitions in the "Cerebreactor" is comparable to the controlled heating of the core of some unspecified chamber in whose center there is a single point of concentration or focal point into which a fuel is added and acted on.



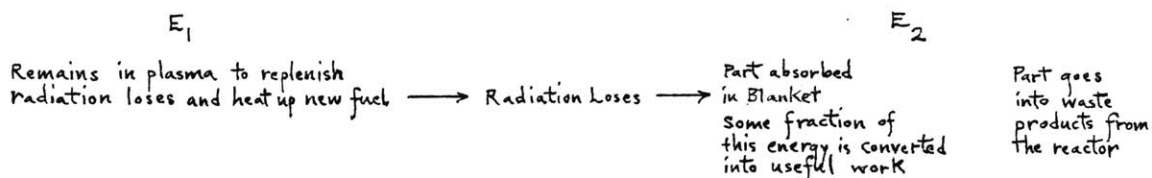
In removing the heat source from this point (= shifting mental concentration) the immediate area cools after which the less immediate areas cool and so forth until something of a series of concentric circles or spheres is formed possessing kinetic energy. In the "Cerebreactor", this heating and cooling activity occurs every few milliseconds.



These 3-Dimensional circles are interpretable as the wavelike characteristic of cognizance ... where the forms of the waves disperse physically only. In the imagination they remain as "thoughts lingering on". Like the sun shifting behind clouds or an object and its reflection moving out of range from the reflecting mechanism, the heated chamber of the 'Cerebreactor' is cooled after the initial cognizance.

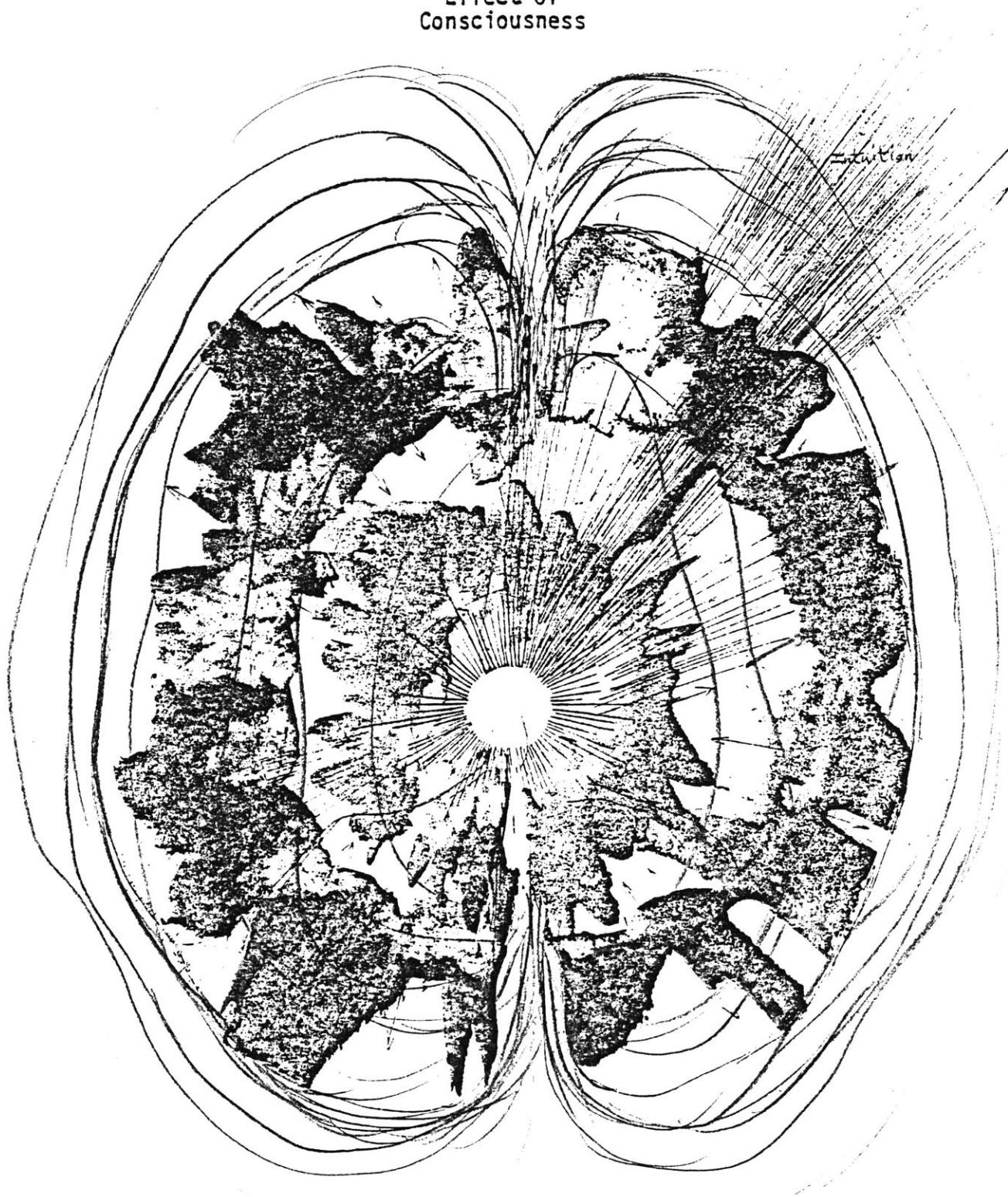
$$\text{(Fusion Energy)}$$



$$E = E_1 + E_2$$

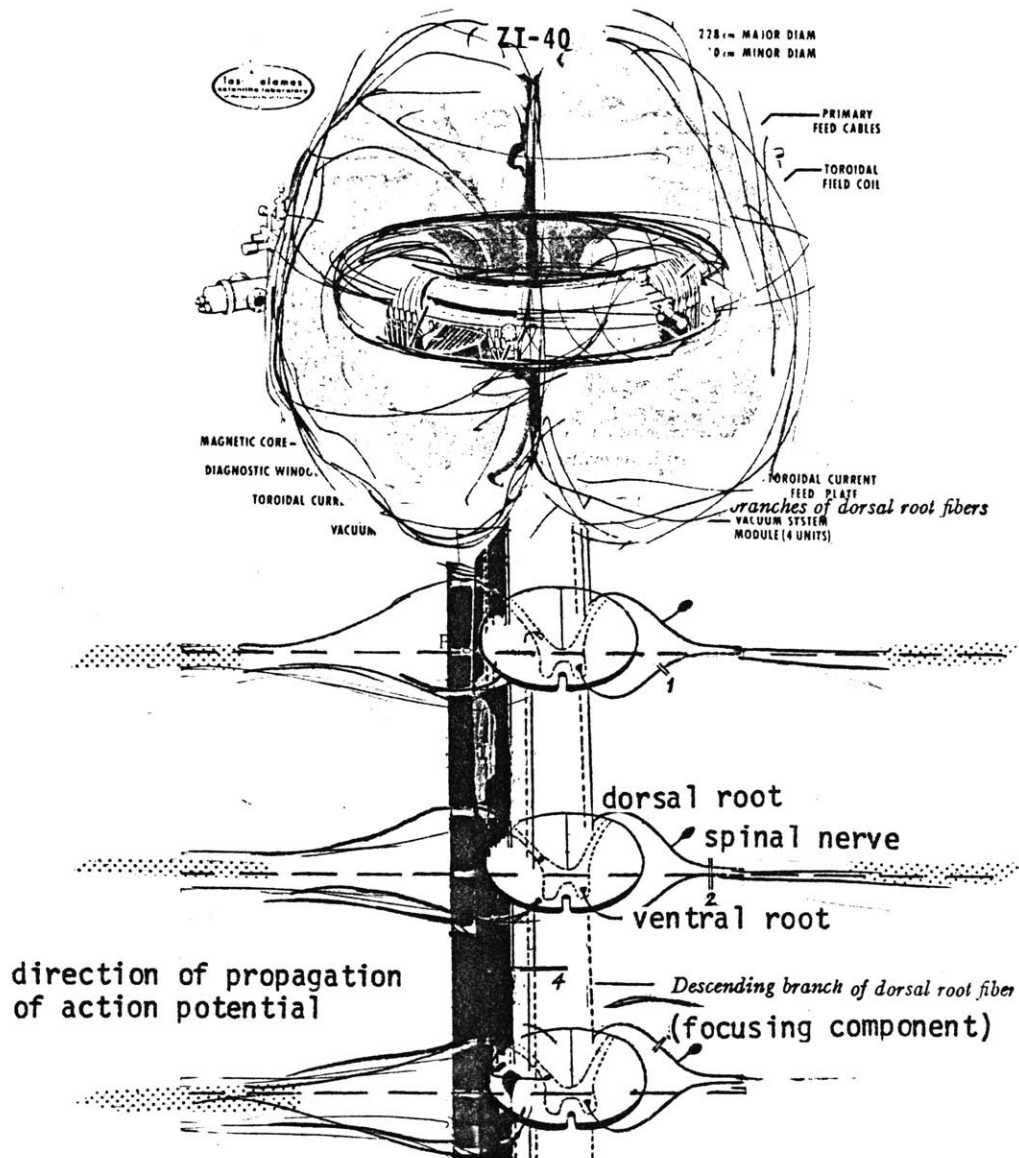


(H.R.Hulme, Nuclear Fusion,  
London: Wykeham Publications, 1969, p.96)

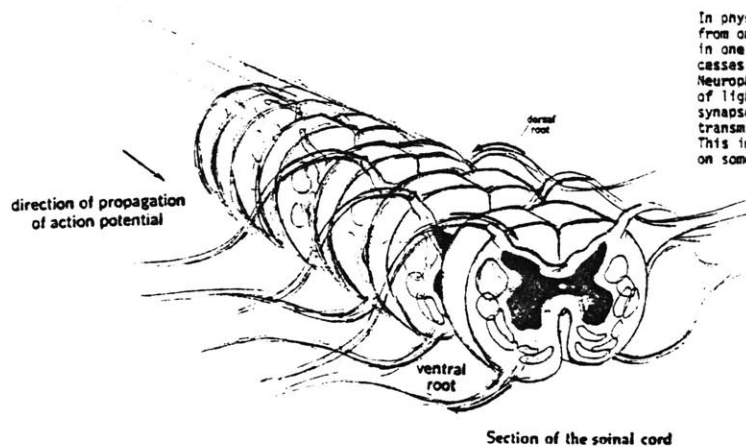
Explosion-Implosion  
Effect of  
Consciousness



Wave guides , Magnetic quadrupoles , and beam focusing apparatus are used in a Linear Accelerator version of the "Cerebreactor". In fact, the electron focusing mechanisms of both linear and circular (particle) accelerators have been re-adapted to focus neural information and to control the behavioral responses in the body of the "Cerebreactor". Coded information is processed throughout the Autonomic, Peripheral, and Central Nervous Systems - to be connected collectively in the 'brain's' center. See ZT-40.



SECTION OF THE SPINAL CORD (Ventral view) OF A "CEREBREACTOR"



In physical reality, we have an invertible transformation from one system to another such that the physical processes in one are transformed into approximately the physical processes of the other. In the case of Nuclear Physics and Neurophysiology, the transformation would take the velocity of light,  $c$ , on to the velocity of the spike potential in synapse because both are the 'barriers' to the velocity of transmission of information in the corresponding systems. This implies, nuclear events are comparable to neural events on some relativistic scale.

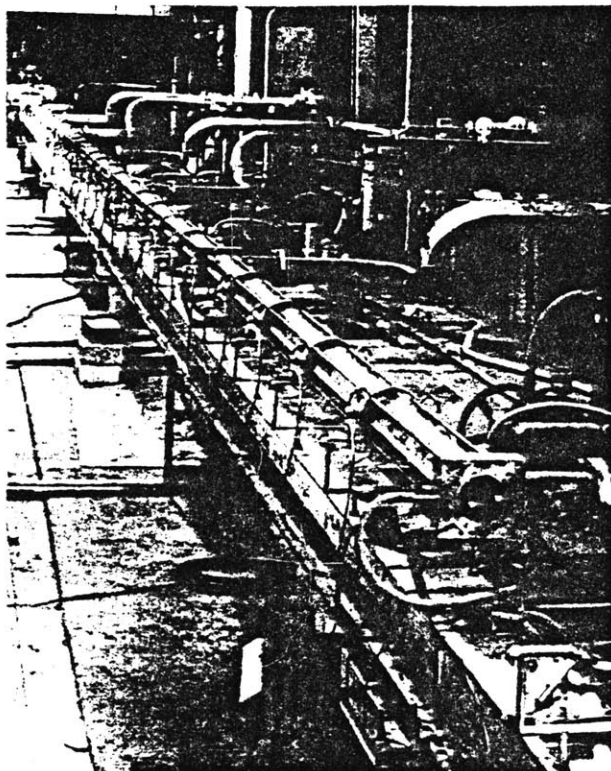


Fig 7. The 310-foot Mark III linear electron accelerator at Stanford University. The Mark III was later rebuilt to incorporate SLAC constant-gradient accelerator sections.

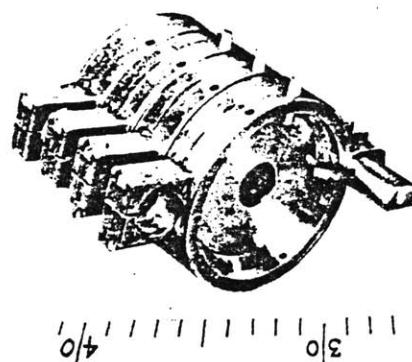
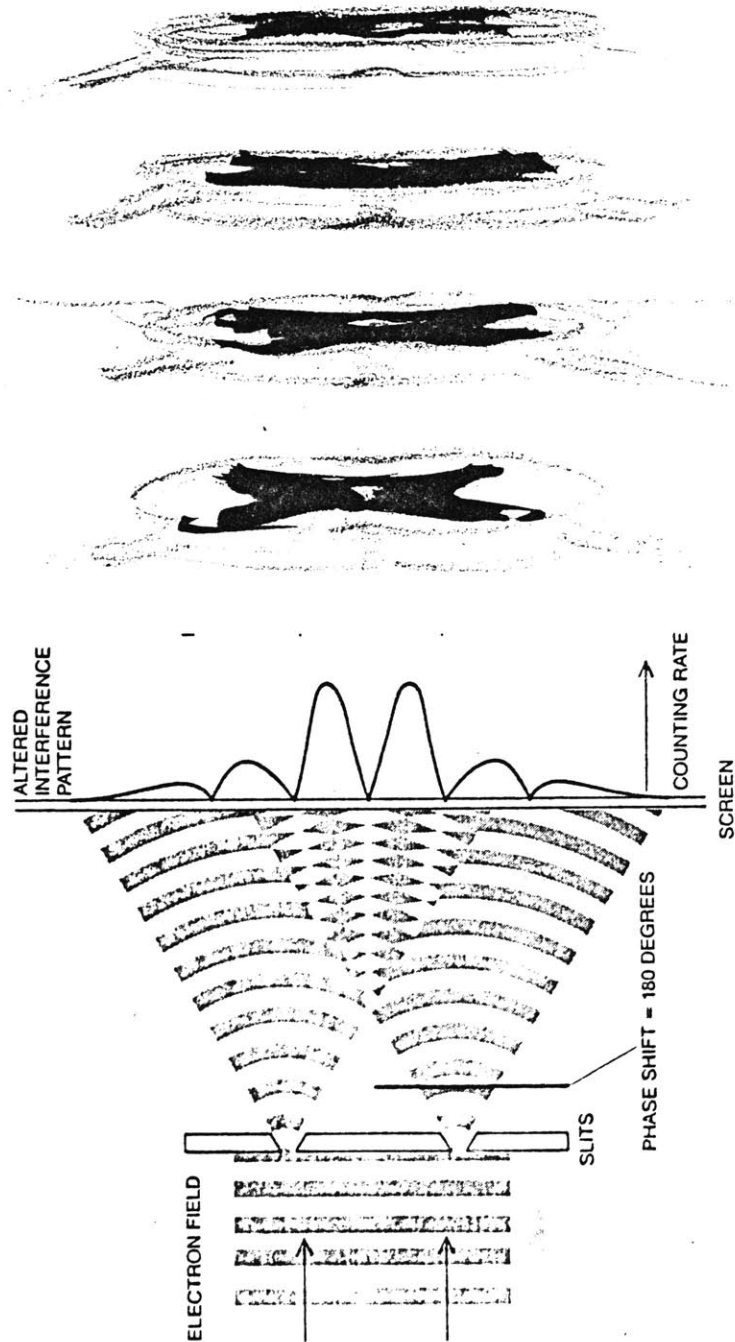
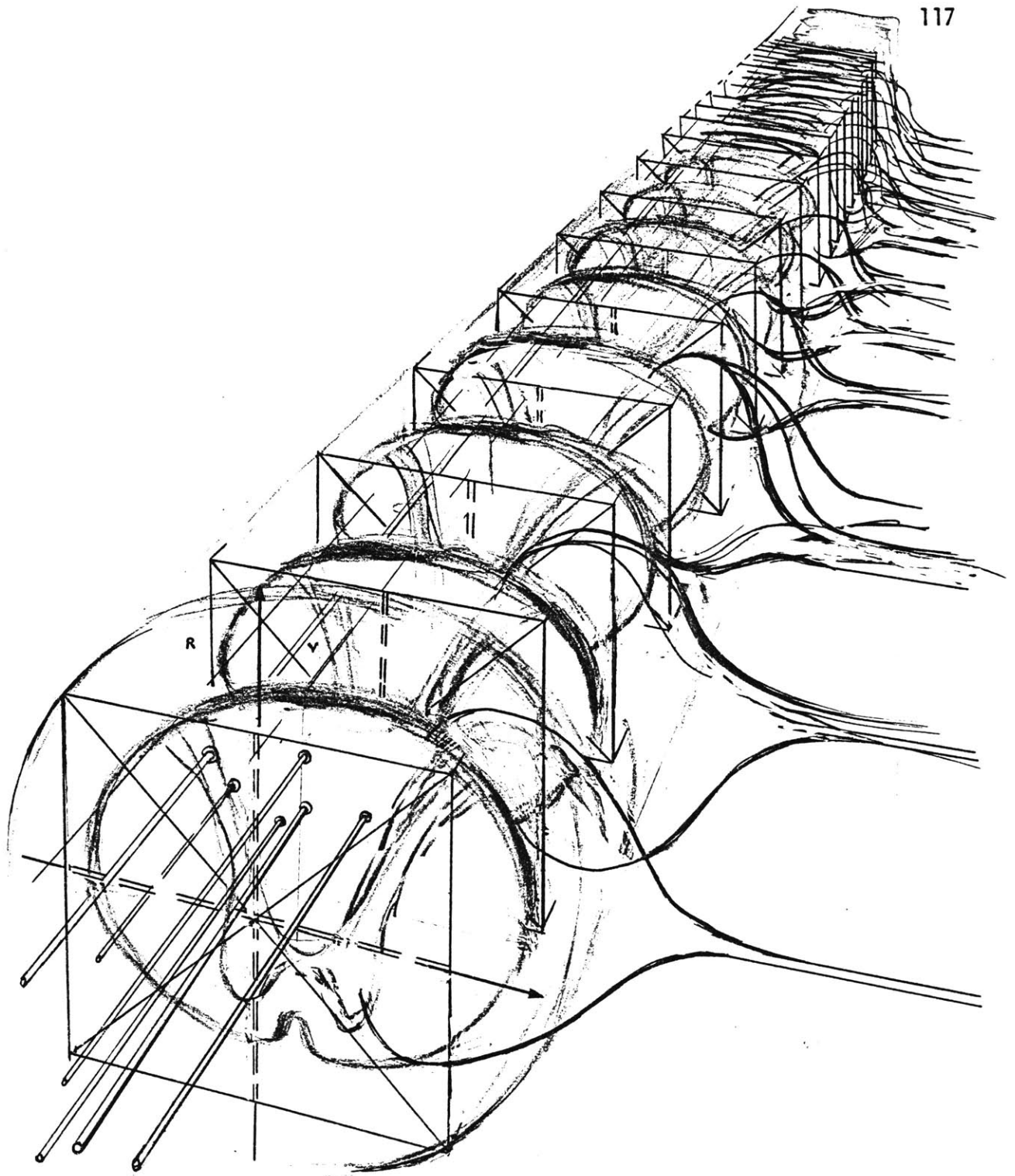


Fig. 9. Components of the CSF linear accelerator.

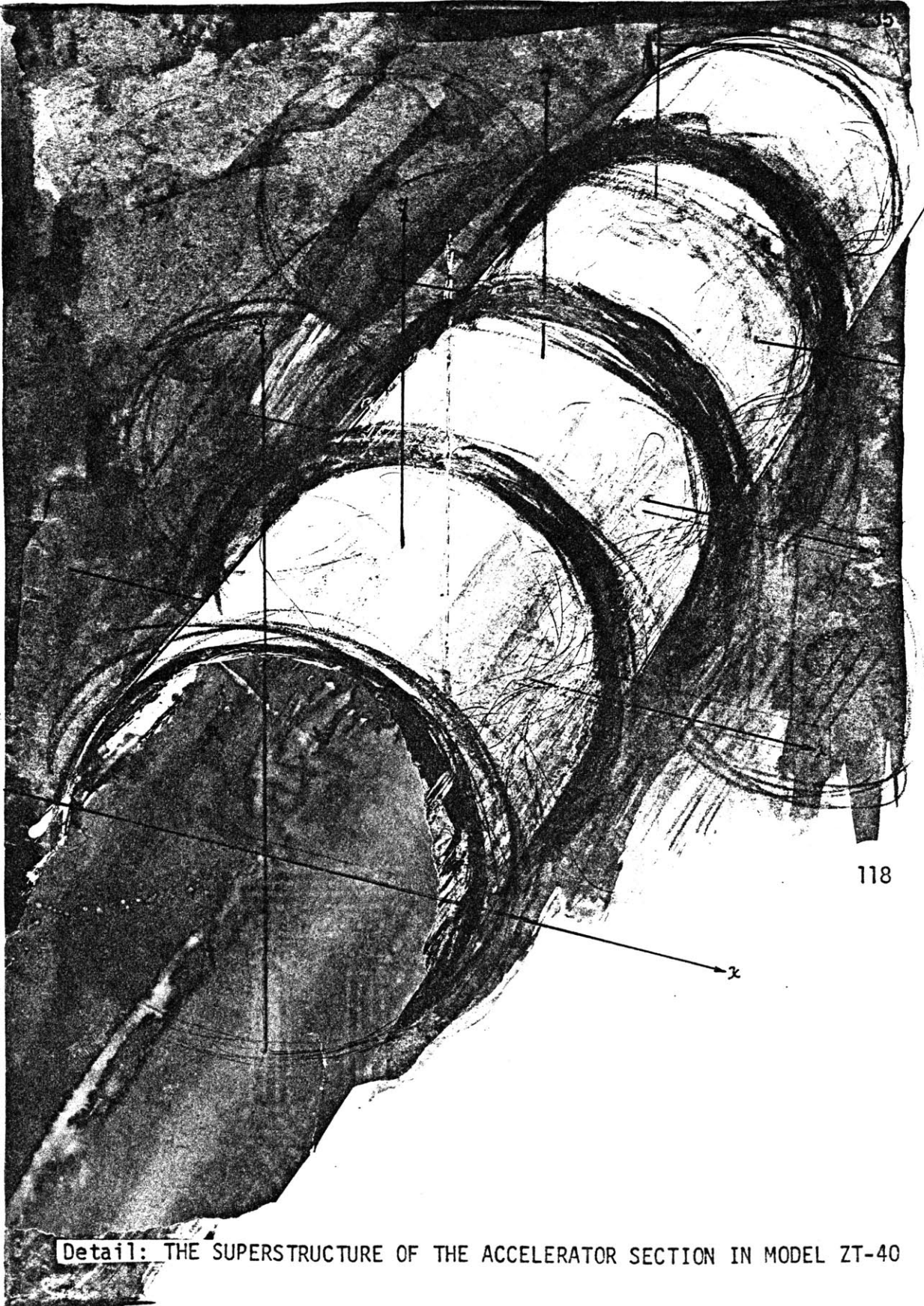


"LOCAL GAUGE SYMMETRY of the electron matter field is restored when magnetic fields are taken into account. Shifting the phase of one diffracted electron beam but not the other clearly alters the observed interference pattern." Gerard't Hooft, "Gauge Theories of the Forces between Elementary Particles", Scientific American, June 1980, Vol.242, No. 6, p. 110



Detail of THE ZT-40 LINEAR ACCELERATOR-TOROIDAL FUSION  
"CEREBREACTOR": Articulations of the Vertebral Column





118

Detail: THE SUPERSTRUCTURE OF THE ACCELERATOR SECTION IN MODEL ZT-40

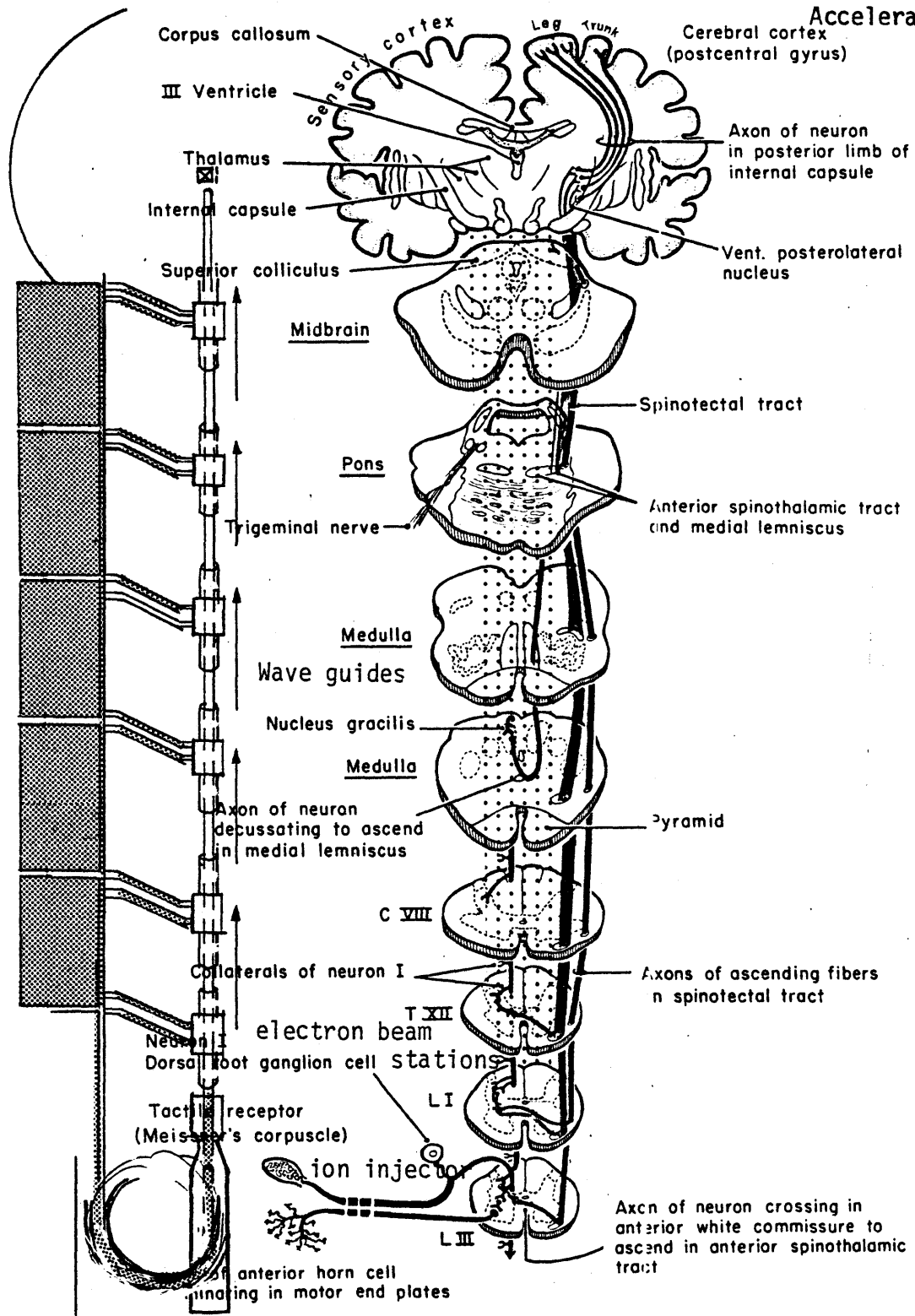
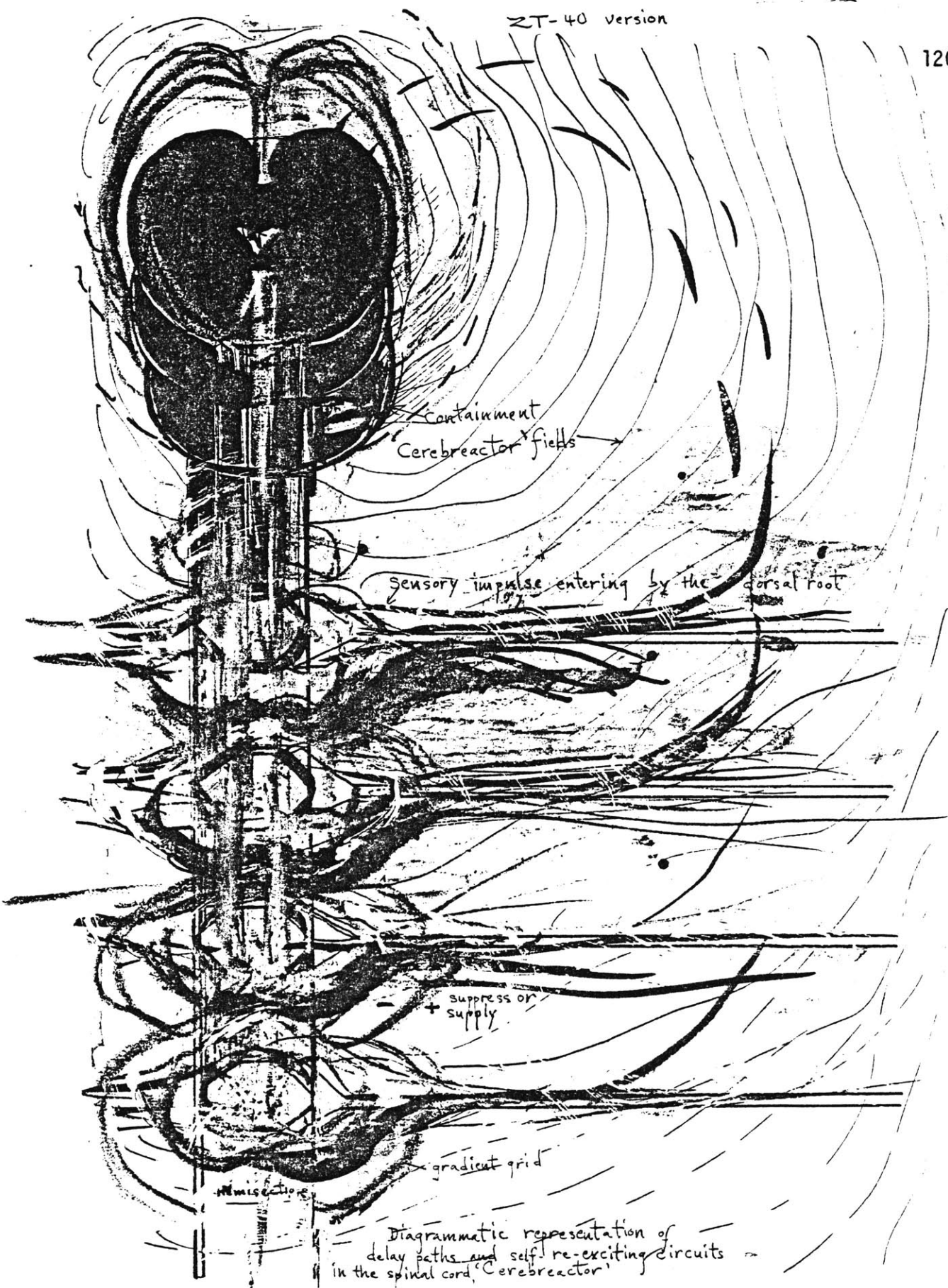


FIG. 13-12. Diagram of the anterior spinothalamic and tectospinal tracts. Although the precise cells of origin of these tracts are not known, spinothalamic fibers are considered to arise mainly from laminae VI, VII and VIII of Rexed. The anterior spinothalamic tract conveys impulses of light touch. Letters and numbers indicate segmental spinal levels.





The stage involving the analysis of the information collected in the ZT-40 experiments is comparable to that of spectroscopy research in Nuclear Physics in which the behavior and structure of the particle beams are studied. In the "Cerebreactor" model, the analogue for these "beams" are 'thoughts'. Particular interest is concentrated on the mechanism responsible for nerve-cell communication, in this stage of information processing. Communication involves the release of neurotransmitters at synaptic junctions and the processes by which the electrical activity of nerve impulses are created, collected, or stored in specific regions of the body like data in a computer bank.

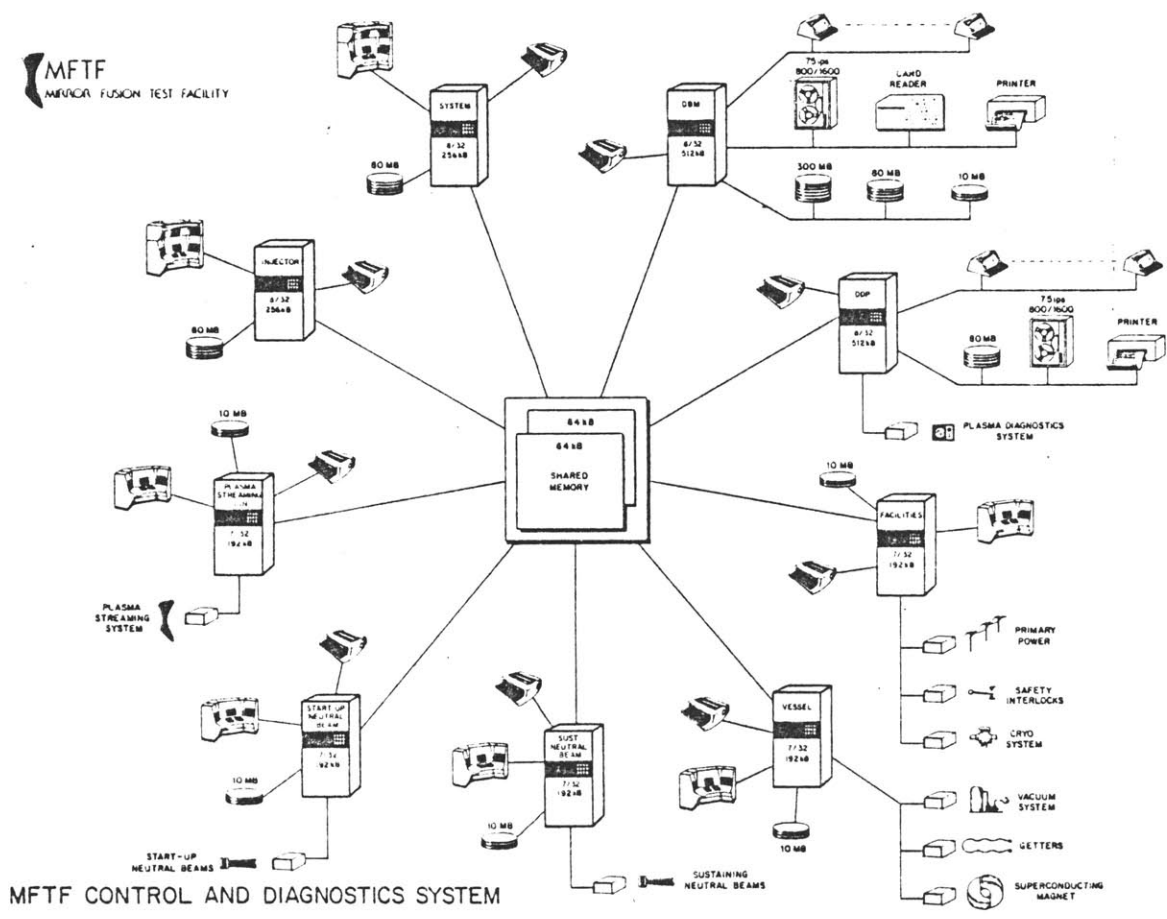
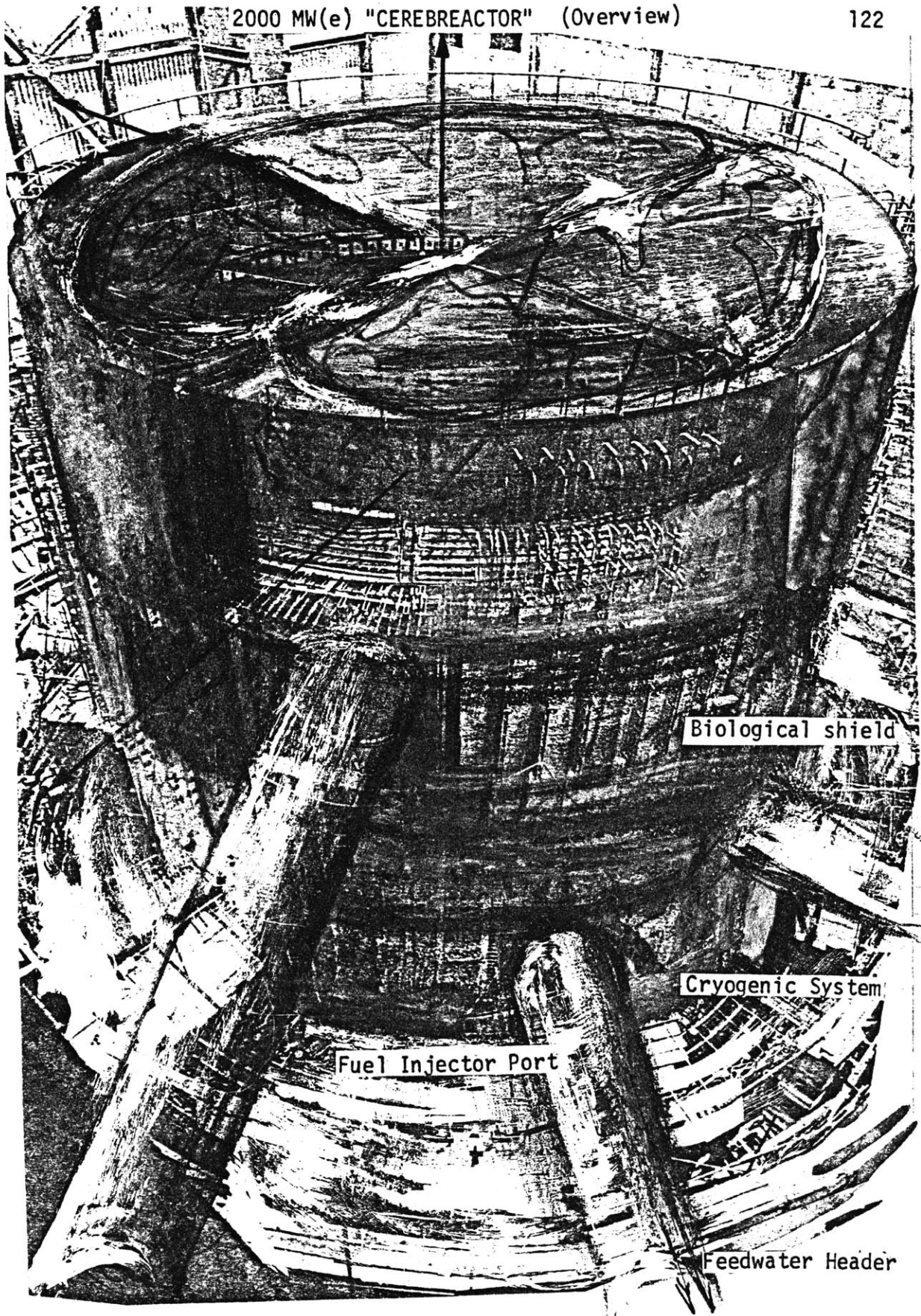


Fig. 14 Block diagram of MFTF data analysis system.  
 (R.F.Post, MFTF, Lawrence Livermore Laboratories)

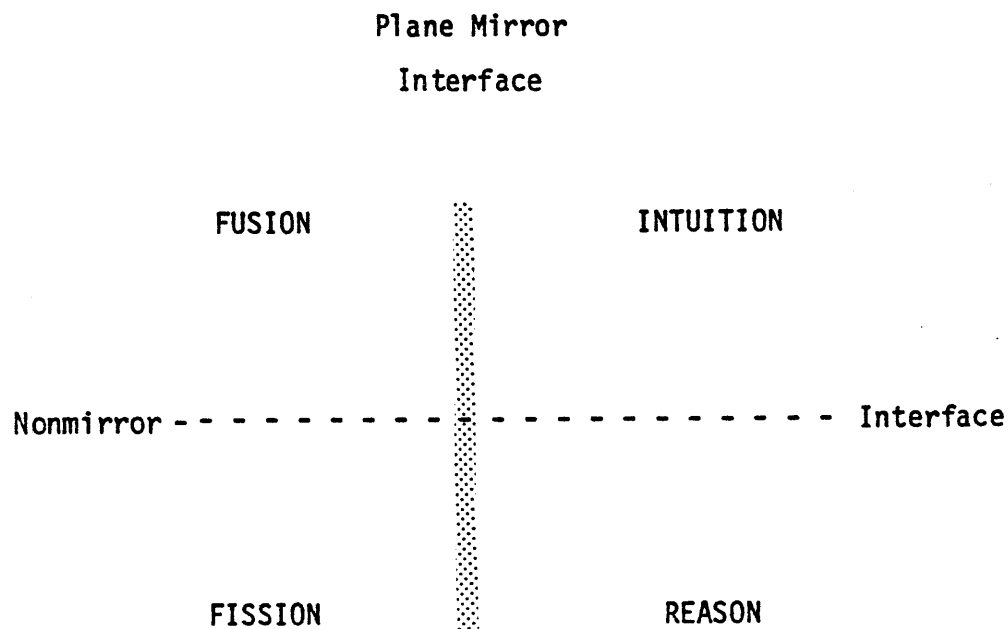


Biological shield

Cryogenic System

Fuel Injector Port

Feedwater Header

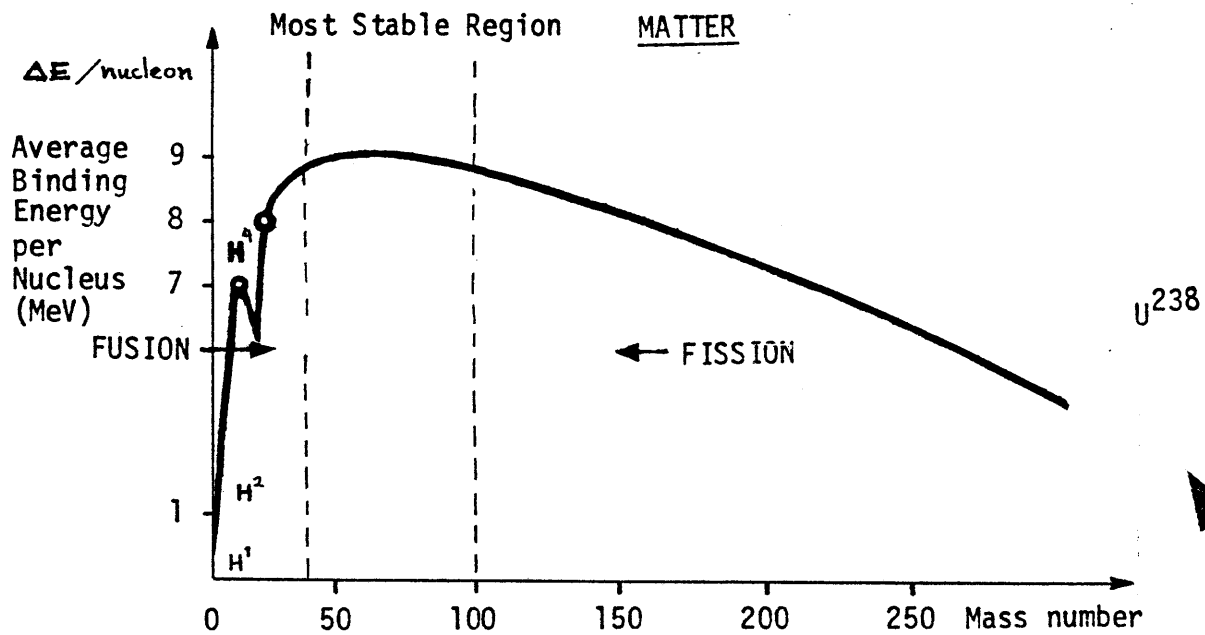


First, imagine that a thought, or the hypothetical, particle-force-field components of a thought, corresponds to the four basic interactive forces between elementary particles.

Second, imagine that we can relate Gauge Theories of the forces between elementary particles to those virtual forces which compose the mind and the properties of thought.

Third, imagine detecting and measuring the energies and forces of mind or thought resulting from the higher order functions of human cerebral hemispheres in cognitive processing of information.

When we look at the average binding energy per nucleon, we see it reaches its highest values for nuclei with mass number between 40 and 100 (8.5MeV/nucleon). For very heavy or light nuclei, the average binding energy is smaller. We can release nuclear energy by increasing the average binding energy of the nuclei in two ways: 1) splitting a heavy nucleus into two smaller nuclei with average mass; and 2) making a heavier nucleus from the union of two light nuclei.

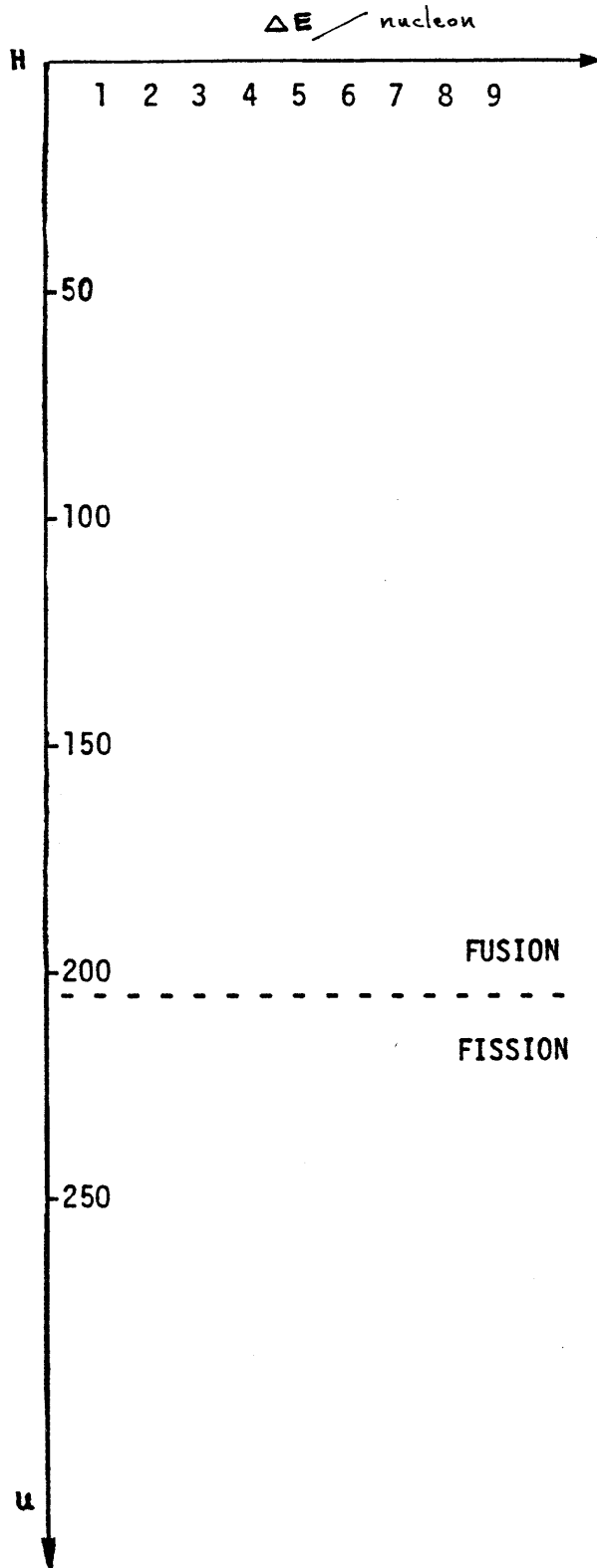


SYMMETRY TRANSFORMATION  
rotation by 90 degrees  
in the 'abstract internal  
space' and time of mind

MIND

Cognitive Fusion      Intuition      nuclear fusion

Cognitive Fission      Reason      nuclear fission



Statement

125

A mirror is anything which exhibits the property of reflection; that is, where one-thing may be seen divided into two parts - object and image.

Statement

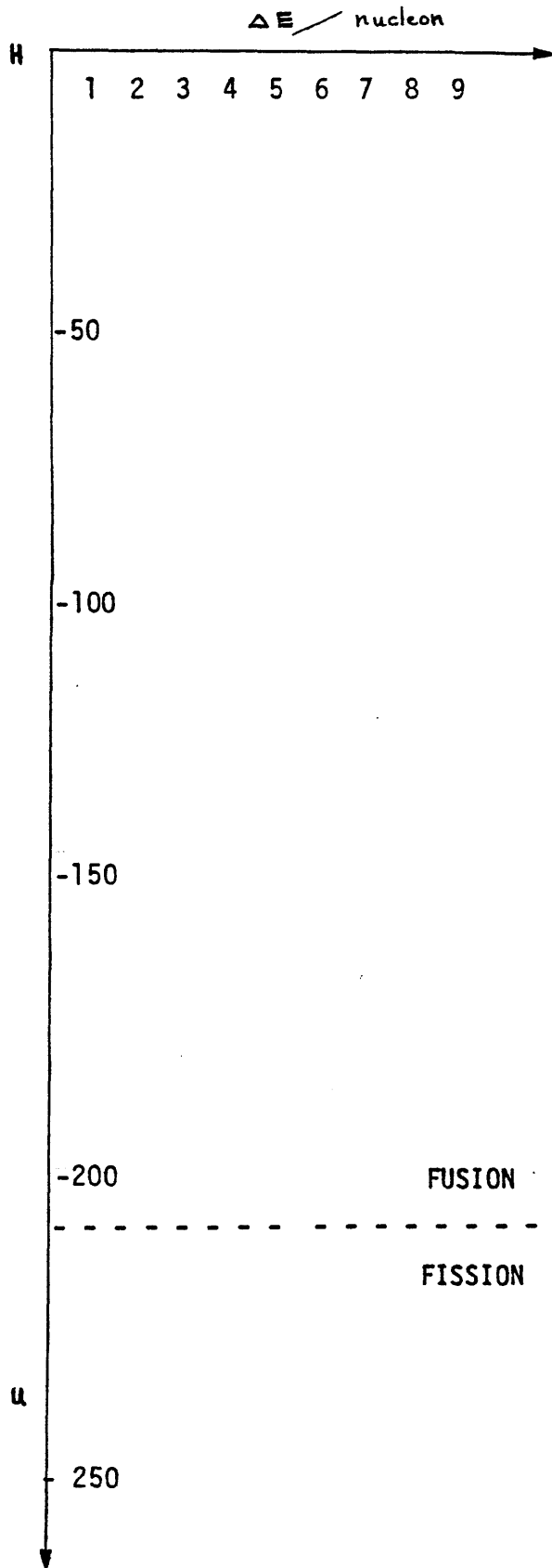
The perception of this one-thing involves two different aspects of the same thing - the physiology and psychology of the Brain And Mind - as the functions of one reflect the processes of the other.

Statement

The neuropsychology of sensation mirrors the neurophysiology of behavior.

INTUITION

REASON



Statement

Mirror interfaces represent both 'real' and 'virtual' aspects of a "complete" Reality. They may literally and figuratively show the interactions of two things symmetrically opposite and reverse one another in form, space and movement.

Statement

Non-mirror interfaces represent either 'real' or 'virtual' aspects of a "complete" Reality. They may describe the ideal relations between two things or within one thing (real or imagined). There is no reflection, or reflective mechanism, no symmetry of form, space, or movement.

Statement

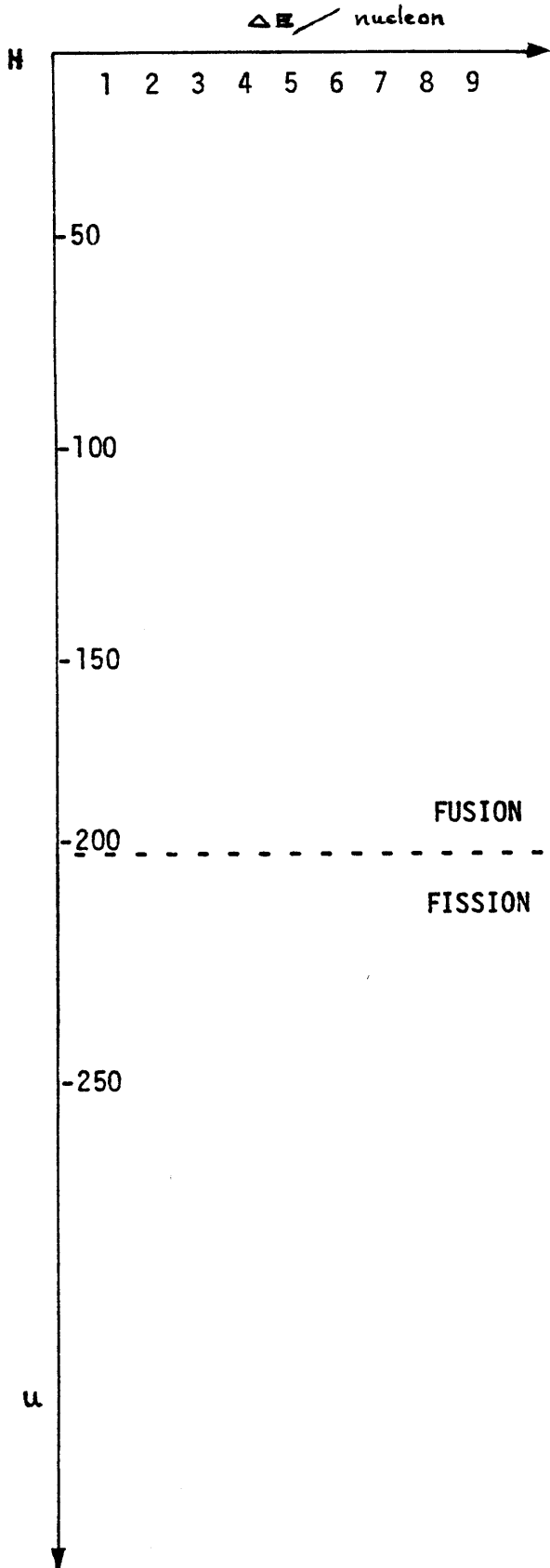
The words 'real' and 'virtual' represent the object and image, ~~making up the complete format of reflection.~~ The words real and virtual represent the object, O, and virtual image, I, in plane mirror reflection format.

INTUITION

REASON

FUSION

FISSION



Statement

127

The brain is the object, O.  
 The mind is the virtual image, I.  
 Their two realities are integrated  
 in the physics of plane mirror  
 reflection.

Statement

The object, O, represents Matter.  
 The virtual image, I, represents  
 NonMatter, figuratively.

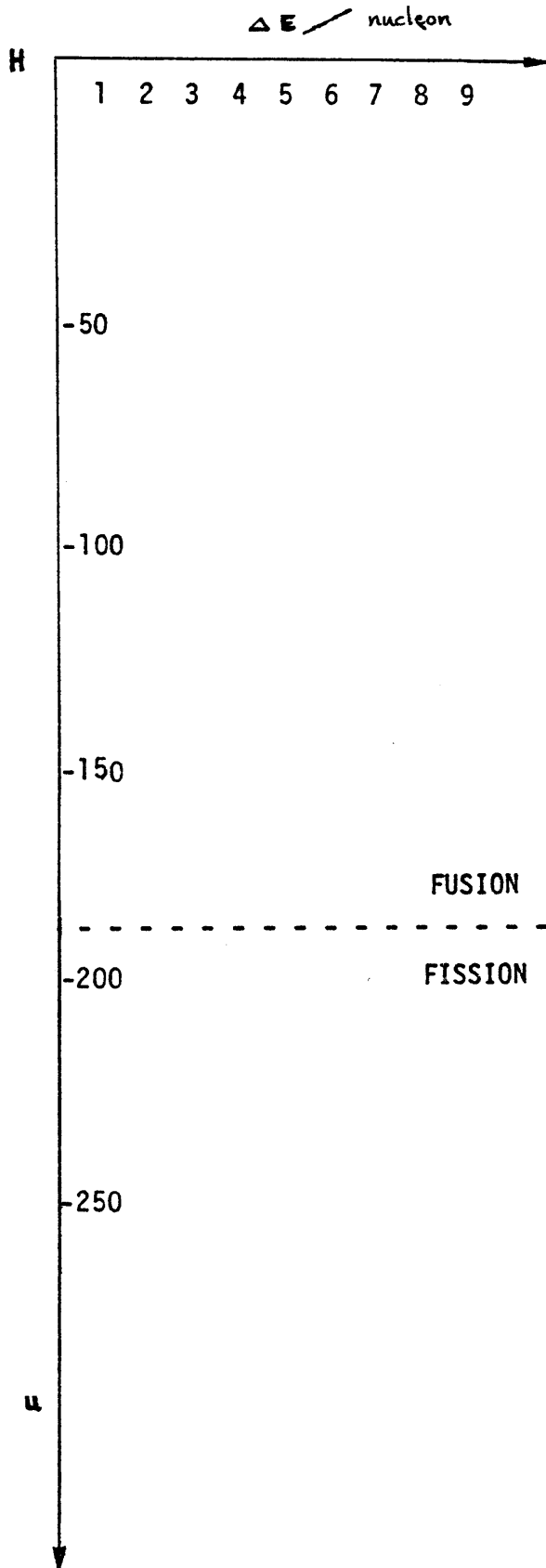
Statement

When you explain the functions of  
 the brain explicitly,  
 you show the processes of the mind  
 implicitly, and vice versa.

INTUITION

REASON





Statement

128

Intuition is everything that we know implicitly.  
Reason is every-thing that we understand explicitly.

Statement

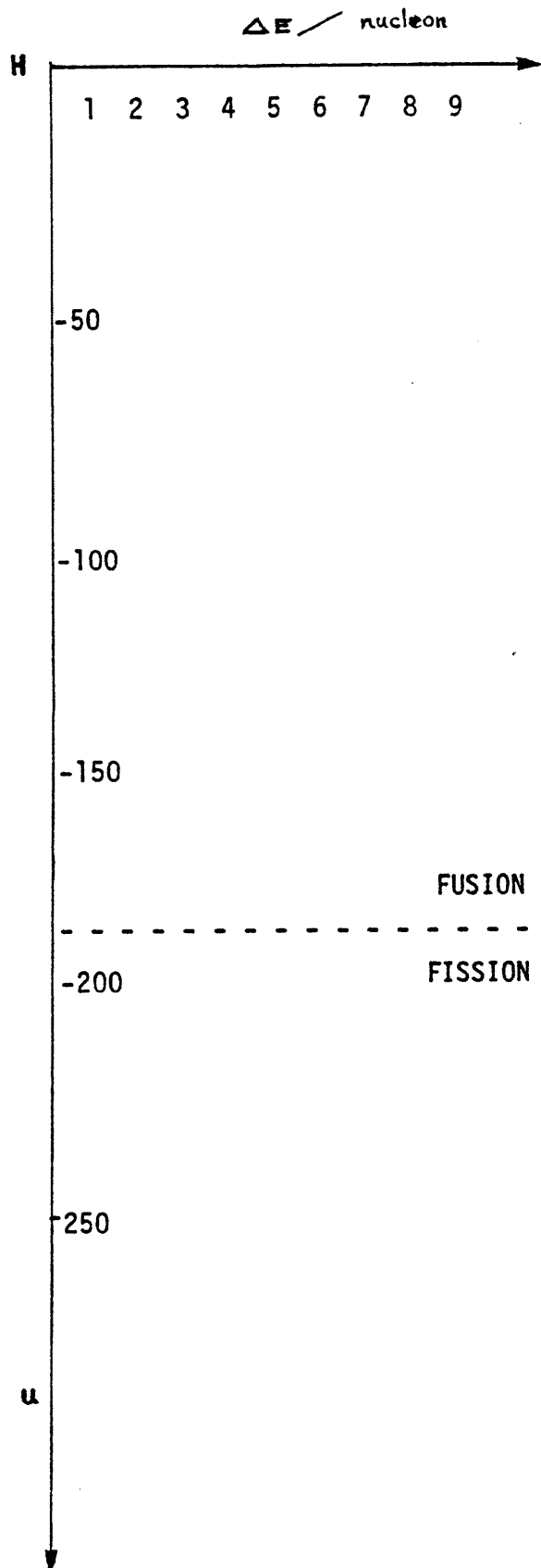
Implicit, interpretative descriptions, such as metaphors, are the 'real images' of nature. Explicit, illustrative descriptions, like similes, are the 'virtual images' of nature.

Statement

Both types of descriptions are only reflections of a "complete" Reality; they are not its physical essence.

INTUITION

REASON



Statement

129

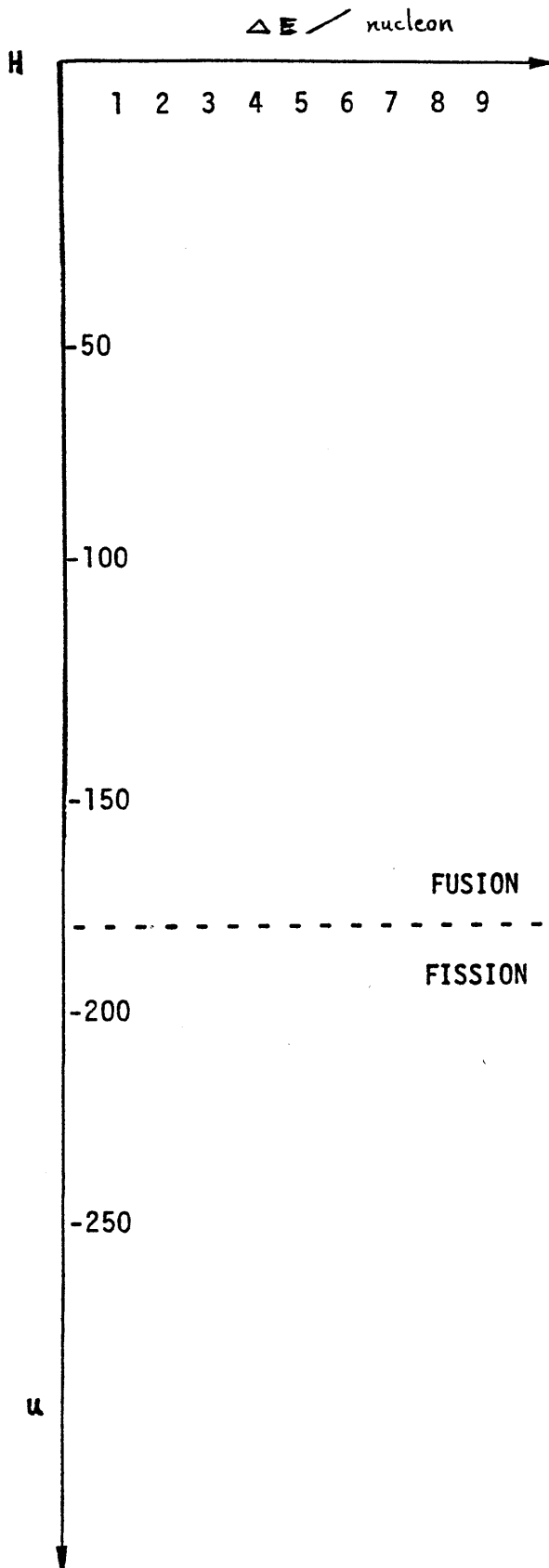
The human organism reflects, in fact and in effect, all physical and nonphysical aspects of particle-wave phenomena.

Statement

The deep meaning of everything and every-thing or form, regardless of what it is or how it functions, is related to some aspect of the universe organism.

Statement

The "concrete object" is the form of meaning; its substance is the "abstract concept", that is the reflection of the object.



Statement

Matter refers to matter and antimatter.

NonMatter refers to neither matter nor antimatter.

Statement

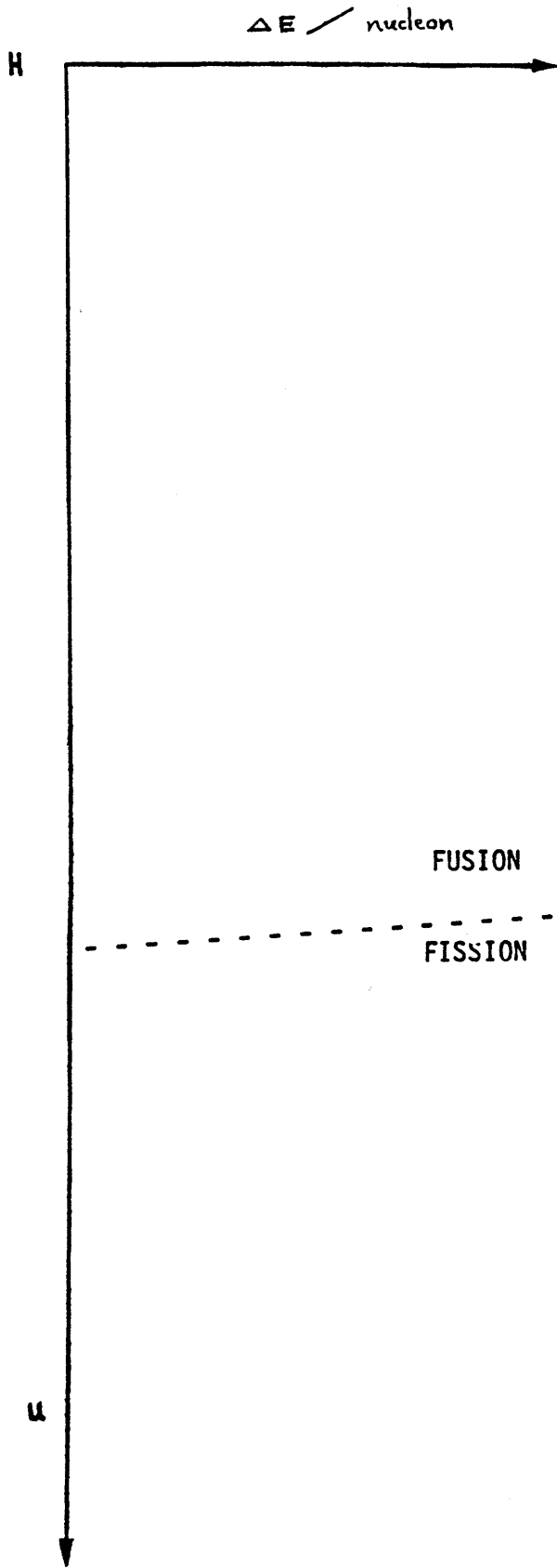
There are two mirror 'constructs': One is real and the other, imaginary. The real one is physical, existing in the material world. It may be a bio-mirror producing nongeometric type symmetries.

Statement

The ideal or imagined mirror, object, and reflection is non-physical, existing in the world of 'virtual' Matter or NonMatter.

INTUITION

REASON



Statement

A Statement is neither true nor false, neither question nor answer, neither real nor imagined

Statement

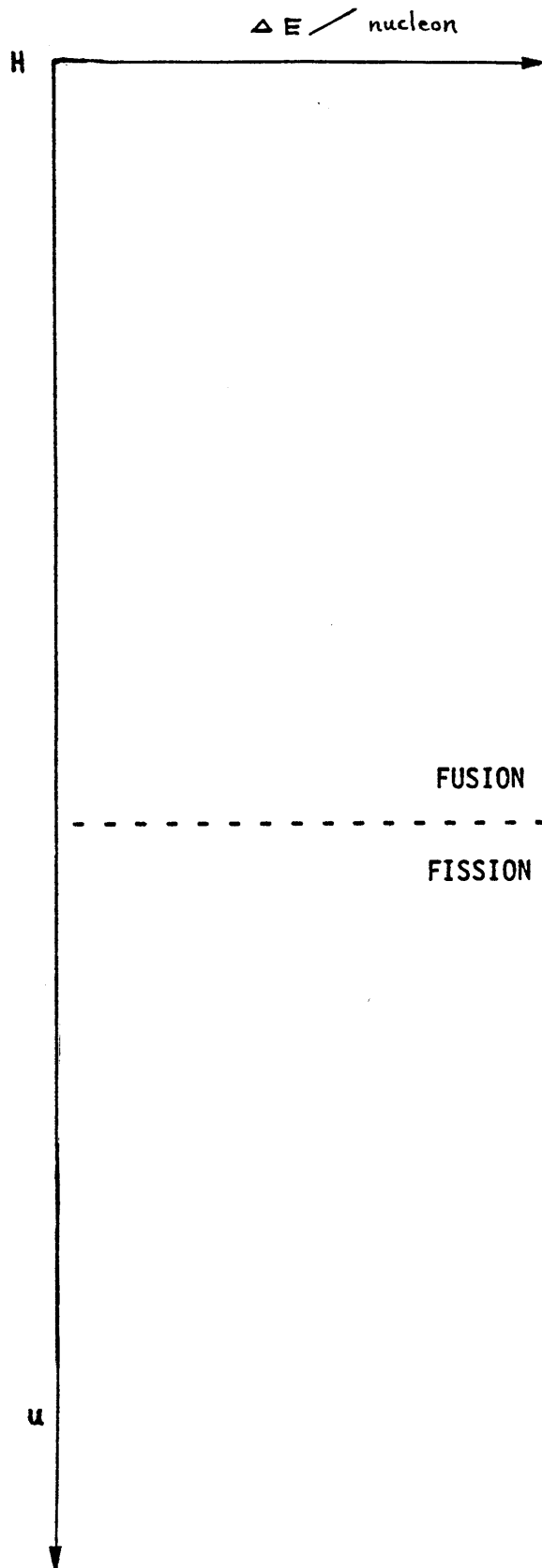
Each Statement may be opposite in 'meaning' of what is stated, according to which perspective the Statement was observed from - either the real world or...

Statement

Statements, in this context, are the essence of pure perceptions; applying perceptions implies forming conceptions.

INTUITION

REASON



Statement

132

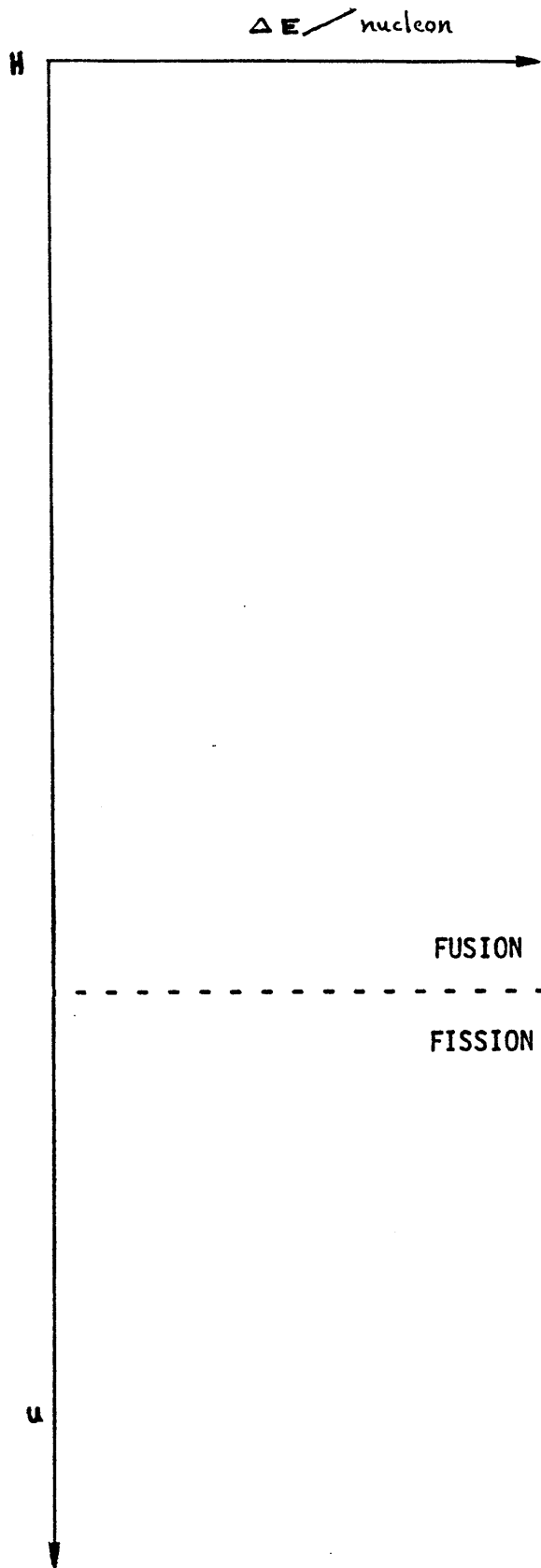
Intuition is to perception  
as reason is to conception.

Statement

Intuitions result from the union  
of both hemispheres of the brain  
operating as a single sphere -  
momentarily.

Statement

An intuition signifies the func-  
tional symmetry in the brain;  
occurring when the bio-mirror is  
activated.



Statement

133

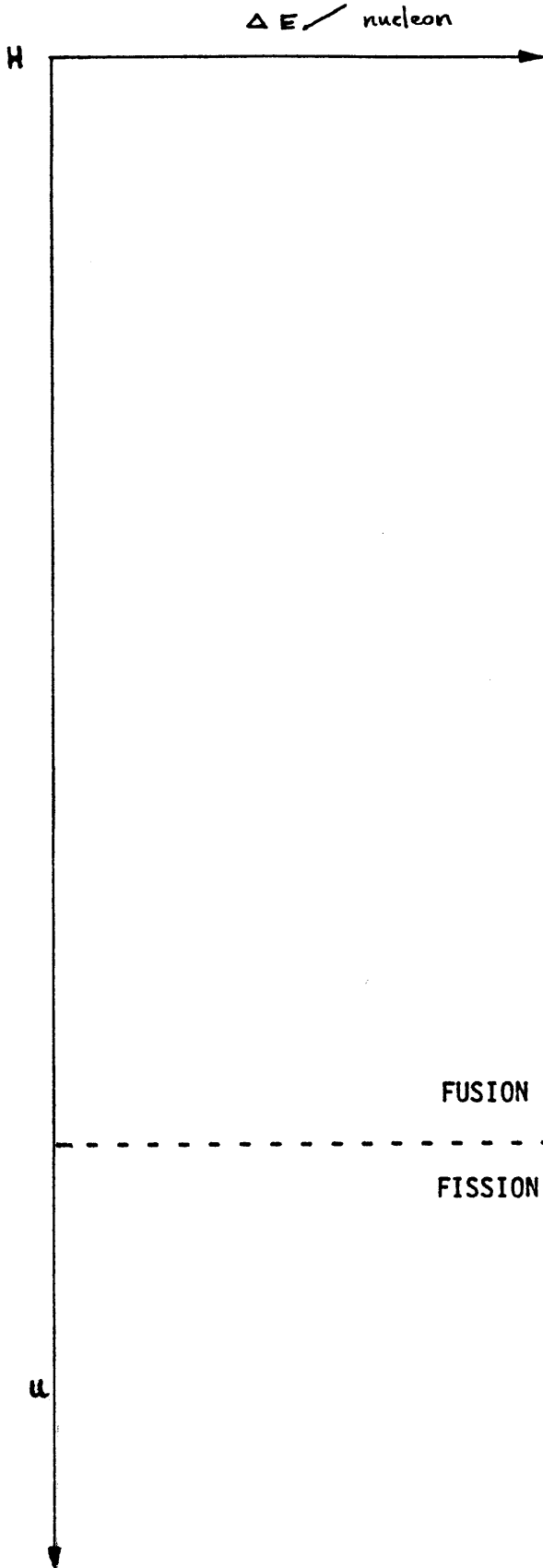
Reason stimulates the asymmetric-  
al operation of the brain,  
the bio-mirror is inoperative.

Statement

Reasoning seems to result  
when both hemispheres act in-  
dependently from one another and  
yet always remain dependent on  
each other.

Statement

Reason or analytic thinking  
represents the dislocalization of  
electrical activity in the  
specialized regions of  
the cerebrum; by contrast,  
intuitive thinking represents  
the brief period of  
localization.



Statement

The spherical union and localization effect involving the events of intuition. I liken to plasma fusion reactions in which plasmas are created having high-temperature regimes with high-current densities.

Statement

The dislocalization effect occurring in the processes of analytic thinking I relate to fission reactions in which heavy particles are split apart in close interaction.

Statement

Though fission reactions produce high-temperatures on the order of they are not as high as those of fusion reactions, within which there are orders of magnitude and degrees of purity contributing to higher temperature regimes.

FUSION

INTUITION

FISSION

REASON

In sum, the structures and mechanisms of the brain reflect the processes of the mind and vice versa. As my mirror model indicates, the physics and physiology of the human body seem to be reverse and opposite the virtual physics and physiology of the human mind. In exploring the dynamics of both I use data from particle accelerators, fission and plasma fusion reactor technologies whose dynamics are, I believe, extensions of the brain and whose energies are the material counterpart of the mind. My thesis attempts to show a new means by which brain phenomena may be described. Just as the isomorphisms of computers have helped unfold some of the complexities of information processing in cognition, I feel these nuclear devices may help stimulate insight into the rapidly changing, internal electromagnetic environment and energy fields which appear to influence the cognitive processes - like the movement of an object affects its mirror image. Ultimately these devices may describe the nature or formation of the bits of neuronal information.

As I have suggested, to understand the physics of the brain one must look from the side of a plane mirror that the object, O, is on; and to know the metaphysics of the mind one must look from the opposite side of this same mirror that the virtual image, I, is on or 'occurs in' or 'appears to exist in'. Using this approach a "complete" Reality is seen (illustrated) and sensed (interpreted) collectively as One divisible and indivisible world depending upon the State of Brain And Mind and its expression.



The theory of innate ideas (of Leibniz and Descartes) is a response to the problem of the causation of ideas, ideas of perception and mathematical ideas. It is an attempt to reveal the interactions of the physical world on the mind. According to Stace, Aristotle solves the problem 'becoming' by going between the dilemma; either something comes from nothing, which is impossible, or something already exists, in which case it does not become - implying there is no change. Aristotle's solution is that the something does already exist, but only potentially and not actually. If a leaf becomes red, the color must exist potentially in the leaf. In order to avoid the dilemma, the color must pre-exist in the leaf but not in the same relation to it as when the leaf is actually red.

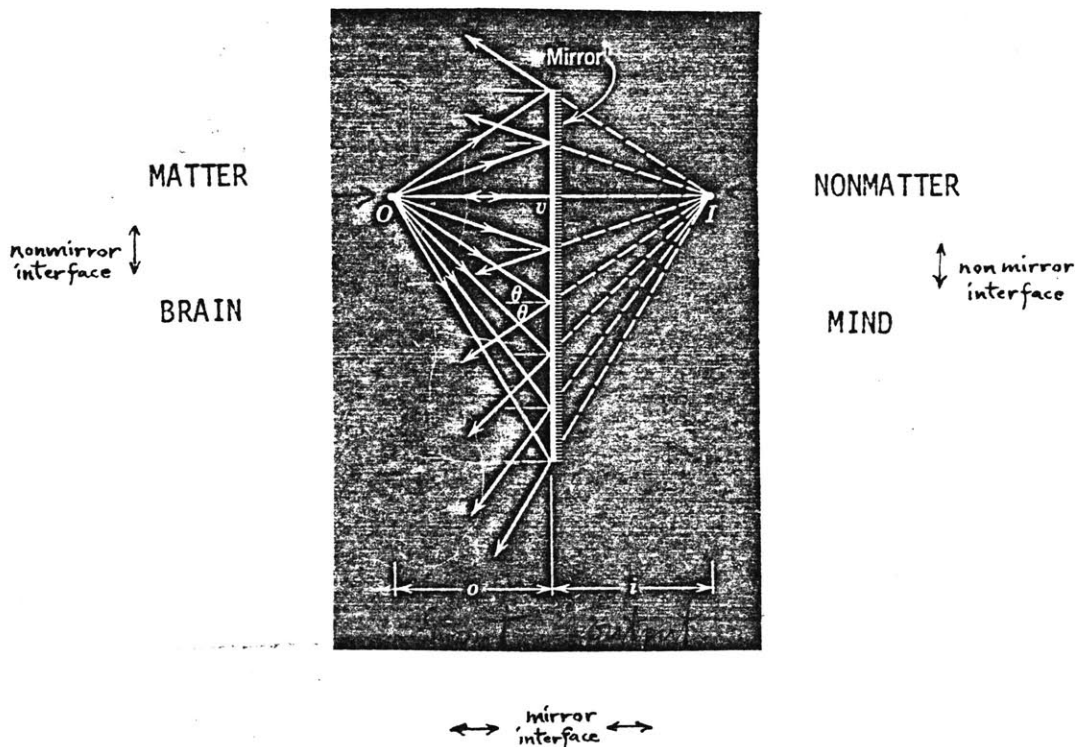
The "Cerebreactor" model demonstrates that even if a mirror was never actually present (in physical reality) the reflection or image (= abstract concepts) of the concrete object would still exist potentially as a physical reflection and actually as a mental reflection - without the reflecting device. As there would be no point of reference or single mirror plane, the image could be anywhere representing anything; it would seem to change its form and position, like a perceptual object-reflection in some physical space. This image would exist, whether one chose to view a mirror literally or interpret its reflections, like mental imagery seen in the cinema of one's imagination.

The dimension of infinity...belongs,  
as Holderlin saw it, to the whole,  
and one thing connects with another,  
compensates for the lack of the other -  
the other which it needs in order to be

wholly that which it can be as a separate thing...For man is a god as soon as he is man.

Fischer, Art Against Ideology,  
In Praise of Imagination.

Every-thing reflects itself; meaning every material or nonmaterial thing consist of two parts, with each part containing the other such that the point or line or Statement of A. (Perspective) must be considered together with the Statement or line of interface or point of B. (Perspective). To know and understand the Reality of perception is to account for both the physicality of brain states and the nonphysicality of states of mind; this considers the points of view of both the object and its reflection as they exist in some one to one correspondence - occurring at the same time or nontime, like Perception And Imagination.



In the language of picture-statements, this 'double-sided' Reality may be shown (schematically) by the mirror and the nonmirror interface model.

The models I propose are not only interpretations of Reality; they are a part of Reality, as much as reflections are the facts of the phenomenon of reflection. I believe they are definitive models just as the reflective properties of mirrors are definitive.

Whether I presented this thesis or some other person three-thousand years earlier or later than I is insignificant. In this sense, I emphasize with Wittgenstein who admitted that 'it makes no difference whether the thoughts that he expressed had been anticipated by someone else'.

In describing the models, I meant to exclude myself (whenever possible); I meant to avoid emphasizing my person, as "the observer", or "author". I wanted to dissociate myself as either some biological, concrete object or its reflection. This selflessness, I thought, could help me 'become' the mirror mechanism or the nonreflective interface (boundary) between the various thoughts I have had concerning the symmetries of nature. In one way I tried to live between the physical and nonphysical worlds at the same time...I tried to live outside them without any sense or consciousness. In being the mirror itself, if only in the instance of a billionth of an inch translated into seconds, I believed I could exist 'in between' both worlds. In that moment, I felt I would have the capacity to remove the storyteller from the story or history, like removing the object and consequently its reflection from the mirror face. Without experiencing this 'instance of between', I knew I could not observe critically and be part of a "complete" Reality. In this period of being, I may be electrically neutral like a neutron in the nucleus of an atom. I might transmute the nuclei of other atoms without interference of my personality which, to me, represents electrons and positrons - the sub-atomic obstacles of

physical interaction. I may move beyond the perceptions and interpretations of my own experiences, by being neutral and 'between'. So far, this neutrality has been impossible to achieve, for me; I suspect it is because I believe too much in the power of words and physical language, and too little in the power of that which is not proveable and yet seems to be the substance of words - that being the nonphysical, spiritual world I recognize as reflections.

THE END

On June 23, 1980, in the New York Times, Harold J. Morowitz reported that the U.S. Supreme Court Justices decided that in patent law no distinction exists between the living and nonliving. That is, between naturally occurring and non-naturally manufacture or composition of matter.

Millennia of awe and respect for the special character of life, dating back to biblical times, or before, are being discarded if that life has any element of biological or genetic engineering in its synthesis.

The refusal to draw a sharp distinction between animate and inanimate matter is the ultimate in reducing life to physics, a viewpoint that has been forcefully advocated with the scientific community since the mid-1800's.

The ultimate dangers of this union may involve a similar non-distinction between rational and irrational behavior, influencing negatively the co-existence of peoples. I believe, this is what Morowitz feared most when he said that the Court's decision in the Diamond v. Chakrabarty case 'goes beyond the confines of patent law and ultimately, may find its way back to our view of humanity'. If this non-distinction is accepted, finally, and as (made) law, then inherent in this acceptance is the assumption (or belief) that biology too is reducible to physics. In fact, all living and nonliving things are reducible to...

1. M. Grene, 'Reducibility: Another Side Issue?' in Interpretations of Life and Mind: Essays around the Problem of Reduction. M. Grene, ed. New York: Humanities Press, 1971, p.22.
2. J.P.C. Southall, Mirrors, prisms and lenses, A Textbook of Geometrical Optics, New York: Dover, 1923, Fig. 42-4.
3. P. Davies, ed., The American Heritage Dictionary of the English Language. New York: Dell, p.774.
4. Ibid., p.435.
5. Ibid., p.30 NonMatter, I want to emphasize, is something entirely different than Matter including 'antimatter'. In fact, its properties are opposite and reverse all material properties from elementary, subatomic particles to the flesh mass of our bodies which we regard as being 'real' or at least tangible. For example, the difference between an antimatter and a NonMatter human hand is the latter can move through any medium, exist potentially everywhere at once plus travel faster than light speed - leaving antimatter behind in the physical universe.
6. G. Hooft, 'Gauge Theories of the Forces between Elementary Particles' in Scientific American, June 1980, Vol.242, No.6, p.104.
7. H.D. Clarence, Japanese Enthronement Ceremonies, 2nd Edition, Tokyo: Sophia University Press, Chapt. The Mirror.
8. M. Jacob and P. Landshoff, 'The Inner Structure of the Proton' in Scientific American, March 1980, Vol.242, No.3, p.73 Author's comment: VIRTUAL PARTICLES serve as intermediaries between scattered quarks and other particles. Because virtual particles cannot survive long enough to be detected, their role must be deduced from the products of the interaction observed at long range.
9. G. Hooft, 'Gauge Theories of the Forces between Elementary Particles' in Scientific American, June 1980, Vol.242, No.6, p.104.
10. Ibid., p.118.
11. Ibid., p.109.
12. Ibid., p.104.
13. Ibid., p.104, 109.
14. M. Grene, 'Reducibility: Another Side Issue? in Interpretations of Life and Mind. M. Grene, ed. New York: Humanities Press, 1971, p.24.

15. U. Neisser, Cognitive Psychology, New York: Appleton-Century Crofts, 1966, p.20.
16. M. Grene, 'Reducibility: Another Side Issue?', p.26, 27.
17. Ibid., p.24.
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