

## Review Article

# The Two Faces of Our Three Brains (Part II)

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### Abstract

Arthur Koestler's Janus-faced holon is explored as characteristic of hierarchical levels that pervade the natural order. The self-transcending face of the holon identifies with an integrating ideal entertained by the conscious intellect that is easily subverted to the emotional desires of the crocodile and the horse wired into our limbic brain. This allows our self-assertive face to act without human conscience thus accounting for the tragic mess we have made of our history. The "flatland" vision of cause and effect has ruled the development of the psychological, social, physical and biological sciences while ignoring hierarchies implicit in the cosmic order that pervade all phenomena. The holon is shown to derive from Universal and Particular active interfaces that are requirements of universal wholeness implicit in the cosmic order. It is called System 2. The hierarchically nested Systems 3 and 4 require that there are three mutually closed active interfaces essential to physical reality, and to the mental integration of phenomenal experience, respectively.

This article reviews the Papez-MacLean Theory of Emotions from the perspective of the holon. MacLean researched the schizophysiology of the split between the ancient emotional limbic brain and the new brain or neocortex to account for humanity's tragic history. Sperry's work on split-brain patients confirms that the right and left hemispheres function independently, the holistic right brain acting as a self-transcending face with respect to the self assertive left brain. Together they can be conscripted into the service of our primitive limbic brain. Polar relationships between the sensory and motor topologies of the neocortex explored by Penfield and later by Woolsey act as two of the three polarities essential to the integration of human experience, the third being the ancient limbic system that reflects autonomic emotional experience in conscious awareness. The mind is shown to transcend and subsume the physical brain by regulating archetypal patterns behind the scenes that direct brain chemistry.

Part II of this two-part review article includes: The Right-Left Split in the Human Brain; The Sensory Motor Polarities as first identified by Wilder Penfield; The Mind-Brain Relationship; More on the Sensory Motor Polarities by CN Woolsey; The Autonomic Nervous System; and Overall Summary of Polar Relationships.

**Key words:** Koestler, Papez, MacLean, Sperry, Penfield, Woolsey, limbic system. split brains, universal wholeness, universal and particular, holon, cosmic order, brain and mind, three brains, hierarchies, active interfaces, triune brain, schizophysiology

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## The Right-Left Split in the Human Brain

While Koestler was writing his book Roger Sperry<sup>1</sup> was doing experiments on epileptic patients who had undergone surgery that severed the corpus callosum, the huge nerve bundle that joins the right and left hemispheres of the new brain – the neocortex. This drastic surgery helped to relieve severe seizures without noticeably affecting the normal behavior of these patients. Sensory input projects to both hemispheres which have motor outputs that project mainly to the opposite side of the body. Since both hemispheres are dragged along to the same places and focus on the same things they can thus function synchronously in parallel. It was known that there were some functional differences between the two hemispheres in humans, and Sperry sought to explore these.

Sperry took advantage of the fact that half of each eye projects to the opposite hemisphere of the neocortex, together with the fact that the response time for eye movement is about one tenth of a second. He accordingly set up a split screen as in Figure 9 so that pictures could be flashed from behind onto either side of the screen quickly enough to beat the reaction time of eye movement. So long as the patient focused on the centerline of the split screen the left hemisphere would not be able to see what was flashed on the left side of the screen and vice versa. A variety of tests were possible especially on vision, touch, hearing and speech. A few of Sperry's comments taken from his article referenced above are especially relevant.

*... these patients behave in many ways as if they have two independent streams of conscious awareness, one in each hemisphere, each of which is cut off from and out of contact with the mental experiences of the other. In other words, each hemisphere seems to have its own separate and private sensations, its own perceptions, its own concepts and its own impulses to act, with related volitional, cognitive and learning experiences. Following the surgery each hemisphere also has thereafter its own separate chain of memories that are rendered inaccessible to the recall processes of the other....*

*This separate existence of two visual inner worlds is further illustrated in reference to speech and writing, the cortical mechanisms for which are centered in the dominant hemisphere. Visual material projected to the right half of the field – left hemisphere system of the typical right-handed patient – can be described in speech and writing in an essentially normal manner. However, when the same visual material is projected into the left half of the field, and hence to the right hemisphere, the subject consistently insists that he did not see anything or that there was only a flash of light on the left side. The subject acts as if he were blind or agnostic for the left half of the visual field. If, however, instead of asking the subject to tell you what he saw, you instruct him to use his left hand to point to a matching picture or object presented among a collection of other pictures or objects, the subject has no trouble as a rule in pointing out consistently the very item that he has just insisted he did not see.... That is, they cannot recognize with one hand something identified only moments before with the other hand. Again, the second hemisphere does not know what the first hemisphere has been doing....*

The mute hemisphere excels at spatial and temporal organization and integration. It has holistic intuitive characteristics that are distinct from the linear logic of the language hemisphere.

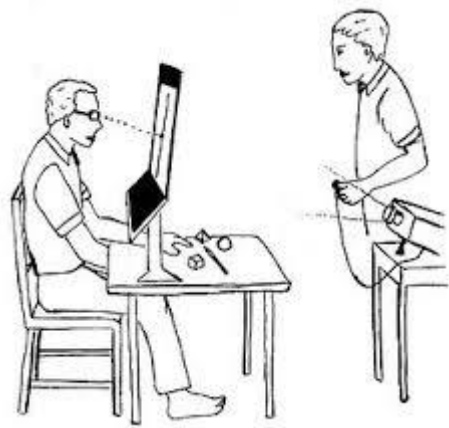


Figure 9.<sup>5</sup>

Although Sperry's philosophical views have been described as rather elusive they are not inconsistent with those of Koestler. Sperry's theory of holistic emergent causation is consistent with the right brain *self transcending* side of the holon that directs the left brain *self asserting* side of the holon in the neurological processes of the brain. It implies that Plato's holistic "top-down" approach interacts with Aristotle's mechanistic "bottom up" approach.<sup>2</sup> This assessment is consistent with comments by Sperry's colleague Joseph Bogen<sup>3</sup> and also by Erika Erdman and David Stover in their book on Sperry.<sup>4</sup>

Sperry was a thorough experimentalist who wrote many articles on interpretation of the evidence. For our purposes here we will simply observe that the experimental evidence clearly indicates that in normal right handed people, apart from a few rare relatively minor anomalies, that the left hemisphere is language dominated. It deals in linear logic and verbally reasoned techniques of behavior in response to transient circumstances. The independent yet related right hemisphere is mute. It excels at intuitively integrating phenomenal experience as a whole. It deals in abstract integrating ideas with timeless characteristics. Both sides are linked to the independent limbic system which fuels emotional energy to emote thought and behavior. In a normal person with the corpus callosum intact these three brains seek a mutually sustainable ongoing balance.

## The Sensory Motor Polarities as first identified by Wilder Penfield

We thus find that the three mutually independent but intimately related brains in the human head brain correspond to the triad of the Secondary Universal Set of System 4, which is a subsumed elaboration of System 3. The Brain Triad is nested within the overall intimate triad of Host, Organs and Cells for the whole human being in a self-similar way to how biological evolution is nested within the physical creation. With respect to the brain the closed integrating *Idea(1)* interface is associated with the mute, intuitive right hemisphere in right handed people. We all have an integrating world view or intuitive vision related to our character that integrates meaning over time, however fractured or flawed it may be. The *Knowledge(2)* interface is associated with the left language hemisphere that organizes specific techniques of explicit behavior. The emotive *Routine(3)* interface that fuels the energy patterns for thought and behavior is associated with the limbic system that projects patterned emotional feelings of autonomic origin into conscious awareness. All this happens of course within the open active interface of the molecular *Form(4)* of the universe as a whole, which is specified by System 3. Biological evolution is nested within the physical creation. Evolution elaborates on System 3 in structural accord with System 4.

As pointed out the three closed bio-social brain processes (Idea, Knowledge, Routine) function via the archetypal Host(1), Organs(2) and Cells(3) of the whole person. The Universal Sets subsume and integrate the Particular Sets that likewise function in three polar pairs as shown in Figure 8 consistent with our three brains. The three polar pairs require a specific neurological topography in the sensory and motor organization of the new brain to accomplish this.

Wilder Penfield<sup>6,7</sup> pioneered the mapping of the sensory and motor topology of the human brain to avoid serious neurological damage while operating on conscious patients for epilepsy and other brain disorders. Penfield points out that both Motor and Sensory areas independently receive inputs from deep centers in the brain stem:

*Each functional subdivision of the cerebral cortex of man may be looked upon as an outgrowth or projection outward of some area of gray matter in the older brain stem. ... Thus, the projected area in the newly formed cortex presumably serves to amplify and enlarge a function already being served in some sort of rudimentary manner by the old brain of more elementary animals. For example, the anterior frontal cortex may be thought of as an elaboration from the dorso-medial nucleus of the thalamus, and much of the temporal cortex as an outward projection of the pulvinar and posterior part of the lateral nucleus of the thalamus.*

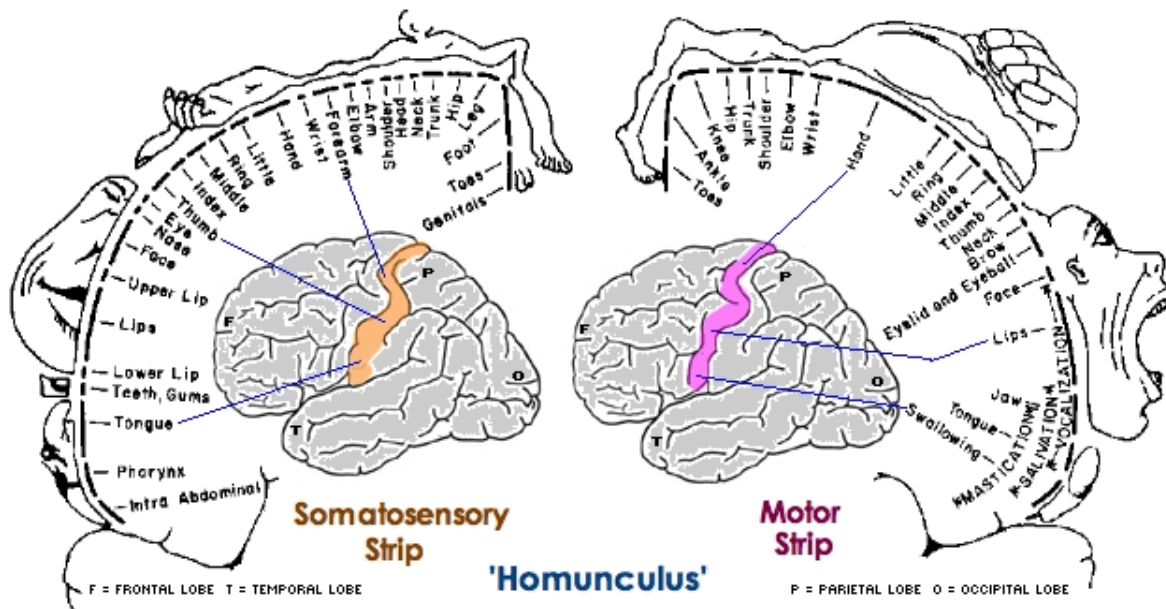


Figure 10<sup>8</sup>

Thus the primitive brain stem has direct access to the primary motor cortex of the new brain that projects directly to voluntary muscles, while the primary sensory cortex feeds back to the deep centers that project to it. These neural anatomy observations are related to MacLean’s split between emotion and intellect.

*...stimulation of the second somatic area causes the patient to feel sensations usually, though not always, similar to those produced in the post central (primary sensory) gyrus.*

*Thus he feels a tingling, numbness, sense of movement, desire to move. But whereas application of the electrode to the post central gyrus in arm or leg areas produces contralateral sensation only, application to the second sensory area within the fissure of Sylvius occasionally produces ipsilateral (same side) and bilateral (both sides) sensation.*

The corpus callosum in Penfield's patients was intact so the hemispheres could communicate. His comments on the secondary motor and sensory areas nevertheless indicate a capacity for each hemisphere to function independently of the other as Sperry demonstrated on test patients who had their corpus callosum surgically severed.

It is thus apparent that a secondary *Potential Dimension* can complement the primary *Commitment Dimension* within each hemisphere independently of the other hemisphere. (See the polarities represented in Figure 8.) This is why there is no obvious behavioral defect in Sperry's test subjects as a result of severing some 200 million nerve fibers in the corpus callosum joining the two hemispheres of the neocortex. The capacity of these patients to create and execute genuinely creative new ideas using the resources of both hemispheres will nevertheless be affected.

In both hemispheres the Primary Sensory cortex assimilates the potential *Idea(Term 2)* for action by drawing on the *Resources(Term 7)* of memory. The Primary Motor cortex assimilates the commitment to *Behavior(Term 5)* as it relates to *Social Organization(Term 4)*. These two polar relationships are emotionally fueled by and feedback to the third polarity in the limbic system (*Terms 8↔1*). (Figure 8) This integrates the bilateral organization of body movement because it works in a self-similar way in both hemispheres. Both hemispheres receive nearly identical sensory input.

The development of *creative Ideas* subsumes the bilateral integration of body movement however. There is a polar relationship between the Primary Sensory cortex as it relates to the Primary Motor cortex in the *right hemisphere* that develops a *potential Idea* that holistically integrates meaning intuitively as it may or may not relate directly to Behavior. (A person may have an idea and not necessarily act on it overtly, as in a private belief in a religion.) This is the *self-transcending* face of Koestler's holon. It has timeless intergrating characteristics. In right handed people the right hemisphere cannot act on it directly in any case because the *Commitment* to develop a *Behavioral strategy* depends on the polar relationship between the Primary Sensory cortex as it relates to the Primary Motor cortex in the *left hemisphere* of right handed people. This is the *self assertive* face of the holon. It acts in space and time.

In the Sensory Strip illustrated in Figure 10, there is feedback to the deep brain stem structures that project to the Primary Sensory Cortex. The feedback will follow the initial sensory projection in a later sequence. Sensory feedback is essential for the assessment implicit in the emotional *Performance Dimension*. Feedback may come from various sensory sources in addition to emotional feeling, including vision, hearing, taste, smell, touch, balance, and proprioception of the body's position in space.

We know from the split brain studies of Roger Sperry that both hemispheres can function independently to assimilate ideas and act on them, even though the left hemisphere does this

differently than the right hemisphere. This is the function of a second polar relationship subsumed in each hemisphere as Penfield suggested in his comments. In this case each hemisphere will have independent *self assertive* and *self transcending* faces of the holon.

## The Mind-Brain Relationship

Having operated on many hundreds of patients who consciously participated in their own brain surgery Penfield is uniquely qualified to express his thoughts about the relationship between mind and brain.<sup>9</sup> In the preface to his book on the mind he writes:

*Philosophers of a certain school would, no doubt, silence me before I began to discuss the mind and the brain, if they could. They declare that since the mind cannot, by its very nature, have a position in space, there is only one phenomenon to be considered, namely, the brain. Such a declaration, which is contrary to the thinking of most men today, as it was in ages past, is an unproven hypothesis. Like all hypothesis one should undertake to prove, or to disprove it, without initial prejudice.*

Penfield expresses great respect for Hippocrates, that Father of Scientific Medicine in the fifth century BC, who recognized the moral and spiritual as well as the physical. On the final two pages of his book he writes:

*In the end I conclude that there is no good evidence ... that the brain alone can carry out the work that the mind does. ... But I believe that one should not pretend to draw a final scientific conclusion, in man's study of man, until the nature of the energy responsible for mind-action is discovered as, in my own opinion, it will be. ... In ordinary conversation, the "mind" and "the spirit of man" are taken to be the same. I was brought up in a Christian family and I have always believed, since I first considered the matter, that there was work for me to do in the world, and that there was a grand design in which all conscious individuals play a role. Whether there is such a thing as communication between man and God and whether energy can come to the mind of man from an outside source after his death is for each individual to decide for himself. Science has no such answers.*

There have been great advances in molecular biology that were undreamed of when Penfield wrote these words. Together with insights provided by System 4 they confirm his conclusions about both a clear distinction between brain and mind as well as an intimate relationship between them. The ambiguity between the self transcending and self assertive faces of the holon is ever apparent. If we examine the biological evidence closely with respect to System 4 several key points are evident.

As applied to the human nervous system, System 4 encompasses all possible varieties of phenomenal experience. Since the Primary Universal Set represents the archetypal energy pattern of the human Species as it coherently relates to the Secondary Universal Set, the latter clearly defines the intimate triadic relationship that represents the archetypal energy pattern of an Individual human being. It is called the corporeal body for that reason. This is also fully consistent with the archetypal triad characteristics of mind that clothes itself in molecular form as

three independent yet intimately related brains within a physical brain. Although the triad of mind is operative *behind* the open interface of molecular Forms(4) shared with the biosphere and beyond, it is also anchored to the chemistry of the whole biosphere as illustrated by the Projections P1, P2, P3 in Term 6 of Figures 5b and 6b.

For our purposes here we can see two main aspects to this triad. The first is the triad of Host, Organs, and Cells. A human Host is obviously a whole but a person can hardly exist as a monolithic lump, nor can their Organs, nor can their Cells. These are each archetypal energy patterns in their own right but the existence of each depends on its intimate relationship with its two partners. It is only the archetypal energy patterns of Cells that synthesize molecular Form and this is specific to each kind of Cell that intimately relates to the integrating archetypal patterns of each Organ, and in turn the human Host as a whole. The triad is also subsumed in a self-similar way within each Host Cell which intimately relates to its Organelles and Chemical Form.

There is clear irrefutable evidence that protein enzymes are essential to facilitate virtually every chemical process in a living cell, yet they do not participate chemically in the chemical reactions between the reactants that they bring together. The chemical reactants are attracted by various non-covalent electronic forces to specific “active sites” in intricately folded protein enzymes that precisely fit the shapes of the reactants, thus bringing them together in just the right orientation to chemically combine them in the proper way. In this manner enzymes speed up chemical reactions a million times or more. A cell cannot function without them. Furthermore the enzymes catalyze their own chemical synthesis so the whole process of catalysis is a closed recursive loop of highly patterned energy transformations that functions as a whole interdependent unit behind the actual chemistry of the Cell.

This immensely complex energy pattern is archetypal with respect to each Cell species as it relates to each Organ and in turn to each human Host. This intimate triad of archetypal energy patterns implicit in each human being has taken a couple billion years to evolve up through the hierarchies of protists, plants and animals into the human species. Aristotle’s runaway horse of cause and effect across flatland can offer no credible explanation as to how the process got started or how it evolved because the whole process is recursively closed and hierarchical in nature. It is not randomly caused. The two faces of the holon are everywhere in evidence throughout the levels of the hierarchy.

The second aspect of the triad is the relationship between the right brain Integrating Idea, Emotional Routines of the limbic system, and the left brain developed techniques of explicit Behavioral Form. The archetypal patterns of these three intimately related brains are peculiar to each human individual within biological constraints imposed by the first aspect above. Our biological organization allows us to act in a great diversity of ways but we cannot fly like a bird or dive like a whale. Nevertheless we are free to independently evolve our particular talents, insights and capabilities according to how we entertain a guiding holistic right brain vision in accord with limbic emotional energy patterns that can be tailored by our left brain commitments. The right brain unifying vision is the *self-transcending* face and the left brain commitment is our *self assertive* face. We humans are holons.

Because the Primary Universal Set is associated with the Species while the Secondary Universal Set is associated with the Individual we can each work toward harmony with humanity as a whole. We can also intuitively identify with divisive Ideals that in extreme cases essentially exclude us from the archetype of humanity from which we derive our patterned energy as archetypal individuals. This second alternative does not bode well for our personal spiritual destiny beyond the grave. There is good reason to think that the intimate triad of mind that is anchored to the chemical Form of the brain can survive independently as an archetypal pattern after it loses this anchor. The degree to which this may or may not be possible depends upon the degree to which we identify *exclusively* with material goals. We all have material goals to live of course, but they ought not assume supreme importance.

The *self assertive* face of the Human Species relates to each human being while its *self-transcending* face of the Species relates to the *Universal Active Interface subsuming all creation*. Because of the way System 2 works, each Particular individual can relate face to face in the subjective mode to the Human Archetype of the whole human species. Most of us intuitively feel our common humanity. We sense an aspect of self in others. We can share the joy and pain of others. We have human conscience. If we hurt another we feel it ourselves.

Because of the bi-lateral polarization of our new brain associated with language we are also afforded an avenue of intuitive insight into the whole cosmic order. We can *relate directly to the Unique Universal Active Interface that transcends and subsumes the whole of creation*. The compelling intuitive impulse to seek the experience of unity is the motivation behind humanity's age old spiritual quests. It is also the motivation behind the scientific quest for grand unified theories. Unfortunately the social manifestations of both endeavors have exclusive characteristics with divisive and often tragic results from Hiroshima and nuclear stockpiles to the hotbed of strife in the Middle East and elsewhere.

Nevertheless each individual human being is vested with an inherent freedom of choice on how to use our three brains according to the integrating right brain vision that we intuitively entertain. If we can manage to do this *in accord with the transcending Universal Active Interface* that subsumes the cosmic order by which we have organically evolved, then our triad of mind that animates our bodies can achieve a degree of independence from our molecular Form that is regulated by the Human Archetype of the species. According to how we live our lives we can each relate as a Particular Active Interface to the Universal Active Interface that subsumes all creation. This by its nature is a timeless realization that transcends physical events in space and time.<sup>1</sup>

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<sup>1</sup> I feel obliged to emphasize that the System of delineating the cosmic order is not an intellectual contrivance of mine. I do not believe that anyone could re-invent the cosmic order by dint of their own intelligence. Indeed the entire academic community has not been successful at the endeavour. What I call the System comes from cosmic insights following an intensive quest into organization structure when I found myself a key management figure at the centre of a highly charged company takeover that lasted for several years. The structural dynamics of how it works was explicitly demonstrated by the Universal Active Interface transcending the whole of creation. It transcended the whole of space and time, the whole of history. The intense reality of it could not be denied, nor could I rationally accept and understand it. My mind was wrenched open into the workings of the cosmos in such a way that I had to bridge the gulf between the transcendent nature of All Being and the left brain rational intellect of normal behaviour. It has taken most of a lifetime to make rational sense of it. I was able to assimilate it into ordinary understanding only with the explicit help of more cosmic insights along the way, for which I am personally grateful.



Unlike Aristotle's runaway horse that was born in an explosive Big Bang from absolutely nothing and has been galloping across flatland ever since, the active interfaces that define the cosmic order are not metaphysical concepts intellectually extrapolated from limited random events such as colliding billiard balls causing a chain of events. Active interface processes are realities that can be identified in phenomenal experience. Even a collision between billiard balls depends on an active interface between them but this takes place on the flatland of the pool table.

In the nested hierarchical order of nature the System delineates how the cosmic order works. The hierarchies proliferate in an open ended progression of discrete higher Systems that elaborate on the lower Systems that transcend and subsume them. The higher Systems soon become beyond the grasp of human intelligence but just the first four Systems can advance our understanding of Ali's computer and the natural world around us in far more significant ways than Aristotle's runaway horse. The System has great integrative power that can intuitively guide our physical, biological and social sciences in meaningful ways never before contemplated as a universal methodology. It can breathe life into science. Since it can only be understood as a quest into the nature of meaning it cannot be a belief system. It requires direct confirmation in phenomenal experience.

One thing is clear. There are no chosen people and no one true religion. There is an essential core of truth in all spiritual traditions, despite a lunatic fringe sadly evident in their social expression. Spiritual pursuits are essentially a private quest. Some of us pursue a sense of unity in meditation, others in prayer, others like Koestler through investigating the scientific evidence with an open mind.

### **More on the Sensory Motor Polarities by CN Woolsey**

Before proceeding further it is worth emphasizing how the cosmic order proliferates in a Janus-faced nested manner within itself. Clinton N. Woolsey<sup>10</sup> was another early pioneer in mapping the neocortex using evoked potential and electrical stimulation studies on animals and some of his comments in 1964 are relevant in this regard.

His work is a further indication of how the cosmic order elaborates within itself. He shows that each sensory point in the Sensory topology areas has a motor surround and likewise each Motor point in the motor topology areas has a sensory surround. Although it is well known that motor behavior is dependent on sensory input and that paralysis results if somatic sensory function is impaired this goes one step further. This is clear evidence that sensory integration *within the sensory cortex* has a polar relationship to motor function, and conversely that motor integration has a polar relationship to sensory function *within the motor cortex*. It indicates how the cosmic order proliferates in nested levels within itself and that each level exhibits two faces of the holon.

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I do not know why this has fallen to me. It was another unsolicited gift you might say. I am simply passing it along for whatever pragmatic value the reader may find in it without exposing them to the same trials. I was not a believer and the subsequent journey has led to a thorough re-evaluation of the sciences and their philosophical underpinnings. If the reader is interested the following links describe the first of the cosmic experiences: [http://www.cosmic-mindreach.com/Cosmic\\_Insight.html](http://www.cosmic-mindreach.com/Cosmic_Insight.html) The same general description is better organized at: <http://scigod.com/index.php/sgj/article/view/225/260>.

Woolsey accordingly designates by capital and lower case letters which is dominant in each case for the primary and secondary areas as follows:

*The evidence ... indicates that the central region of the hemisphere contains four areas, each of which appears to be concerned with both sensory and motor functions. In keeping with the evidence, the following terminology has been proposed for these four areas: Somatic sensory-motor area I (Sm I) for the post-central gyrus and its homologue in non-primate forms; somatic sensory-motor area II (Sm II) for the "second" sensory area, on the superior bank of the sylvian fissure in primates; somatic motor-sensory area I (Ms I) for the pre-central motor area; and somatic motor-sensory area II (Ms II) for the supplementary hemisphere. The abbreviations in parenthesis indicate, by capitals and lower case letters and by order, the relative dominance of sensory and motor features of each area as these have been revealed under conditions of barbiturate anaesthesia."*

The primary and secondary sensory and motor topological areas are simply illustrated in Figure 11. The diagram is looking down on the brain from above with the hemispheres splayed apart to show their medial faces within the Sulcus Cinguli where the secondary motor areas MsII are. The secondary sensory areas SmII are on the lateral sides of the brain by the temporal lobes.

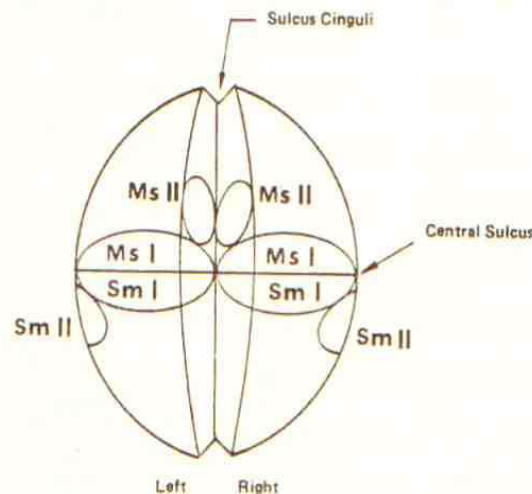


Figure 11

Note that the neocortex is divided into four quadrants. The rear half has to do with sensory integration and the front half with motor integration. The right half in right handed people is concerned self-transcending mute intuitive integration of holistic meaning. The left half is the self-assertive face of explicit thought and behavior.

## The Autonomic Nervous System

The relative functions of the sympathetic and parasympathetic divisions of the autonomic nervous system may be generalized as working in mutual polar restraint. In general the

sympathetic division increases muscle contraction and gland secretion while the parasympathetic division decreases muscle contraction and gland secretion. The sympathetic division fuels the energy for immediate ongoing behavior while the parasympathetic division is more concerned with integrating the long term interests of the organism and the species. In the latter respect it is responsible for erection so that one may be aroused without due regard for social consequences while the more socially oriented sympathetic division is responsible for ejaculation.

In general the sympathetic division may be regarded as self-assertive, since it fuels patterned energy for immediate behavior in accord with the left hemisphere. The parasympathetic division employs patterned energy archetypes to integrate the organism as a whole as it relates to the human species. It can be regarded as self-transcending since it acts in accord with holistic right-brain ideals. Our left brain behavioral responses to ongoing circumstance are generally guided by a long term intuitive right brain vision or worldview that we entertain.

Both autonomic divisions employ archetypal patterns that are subject to a degree of conscious tailoring by right brain integrating archetypes and left brain behavioral archetypes according to circumstances. Both divisions come under the control of the limbic system. There is also a very ancient enteric system that functions in the lining of the gut from the esophagus to the anus. It receives input from both autonomic divisions although it capable of functioning independently, similar to an independent brain.

See <http://www.1cro.com/medicalphysiology/chapter6/images/fp6-1.jpg> <sup>11</sup>

The limbic system transmits to both divisions of the autonomic nervous system via the hypothalamus and descending pathways. Both divisions transmit to target organs by a two synapse pathway. The sympathetic nerves go from the spinal cord to the sympathetic chain ganglia that parallel the spinal cord on each side. Here they can run up or down the chain and synapse, or they can synapse at the level of entry. They can also pass through the chain and synapse elsewhere. A preganglionic fiber may synapse with up to 15-20 postganglionic fibers that in turn synapse at the target organs. This allows for a diverse pattern of energy supply to muscles and organs according to immediate *self assertive* needs.

The parasympathetic system is responsible for stimulation of "rest-and-digest" or "feed and breed" activities as some biologists put it. The archetypal patterns entertained generally reflect long term *self-transcending* integration of the individual. Preganglionic fibers arise from the cranial nerves apart from the uro-genital functions which leave at the pelvic region of the spinal cord. The second synapse is generally at ganglia near the target organ.

The two divisions of the autonomic nervous system thus reflect *self assertive* and *self transcending* faces of the holon in the left and right hemispheres of the brain respectively. The sympathetic division works in general accord with the left hemisphere. The parasympathetic division works in general accord with the right hemisphere.

The reptilian circuit that Papez, first identified with emotion, arises from the hippocampus and transmits via the fornix to the mammillary body with interconnections to the thalamus and hypothalamus, the latter having a stalk extending to the pituitary gland. The fornix and the top

part of the hypothalamus can be seen in Figure 13. The extension to the pituitary gland is not shown. The hypothalamus is regarded as an integrating center for both divisions of the autonomic nervous system. In humans the reptilian hippocampus is primary to the recall process. Wilder Penfield reports that: *“It can be removed on one side with impunity when the remaining hippocampus is functioning normally. But if it is removed on both sides, the ability to reactivate the record of the stream of consciousness, voluntarily or automatically, is lost.”*<sup>12,13</sup>

Figure 12 shows simplified views of the of the primitive Limbic cortex in relation to the neocortex. The left side of the illustration shows the right hemisphere with the brain stem removed. The hippocampus is part of the reptilian brain towards the front of the temporal lobe.

The brain of the lower mammals consists mainly of the cingulate gyrus that overlays the reptilian cortex. The cingulum is a longitudinal nerve bundle not shown that runs in a “C” shape within the cingulate gyrus. It facilitates communication between lower mammalian and reptilian components of the limbic system. The horse can reflect on the drives of the crocodile allowing the limbic system a degree of independent thought. It connects the uncus and hippocampal gyrus by traversing throughout the cingulate gyrus to the frontal lobe around the top of the corpus callosum to the subcollosal areas in the frontal lobe. It forms the white matter core of the cingulate gyrus.

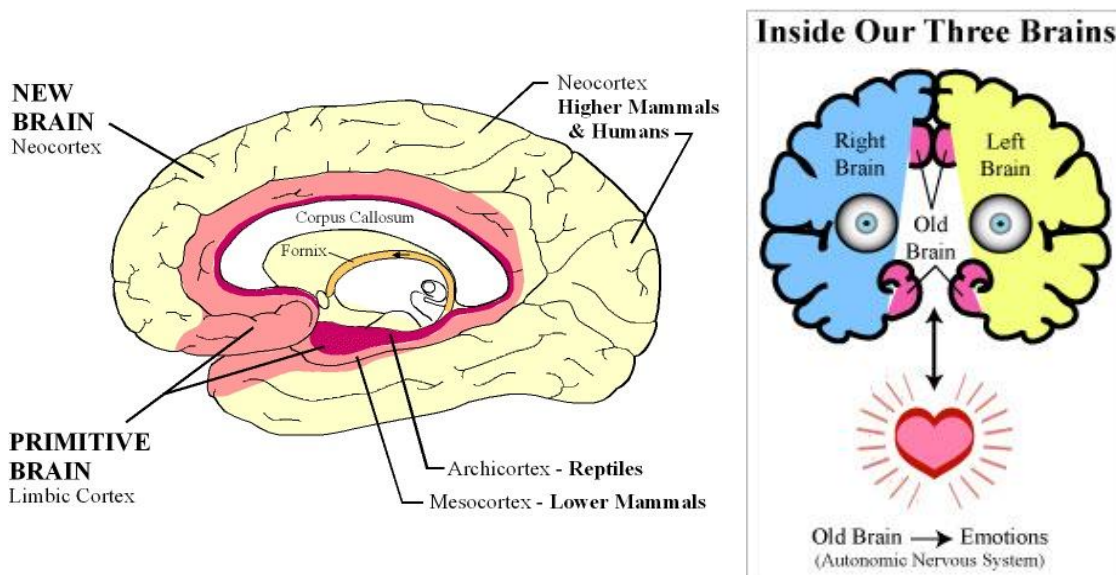


Figure 12

## Overall Summary of Polar Relationships

In Figure 13 the top green triangle represents the cerebral brain in a reciprocal relationship with the bottom autonomic triad across the limbic system. Sensory input recalls relevant emotional

archetypal patterns via the limbic system in concert with right brain recall of integrating archetypes. Although recall is keyed to the molecular Form of the nervous system and the body, memories are stored as hierarchically organized quanta elements of the timeless Void. They are projected into conscious awareness in the neocortex that MacLean compared to a TV screen.

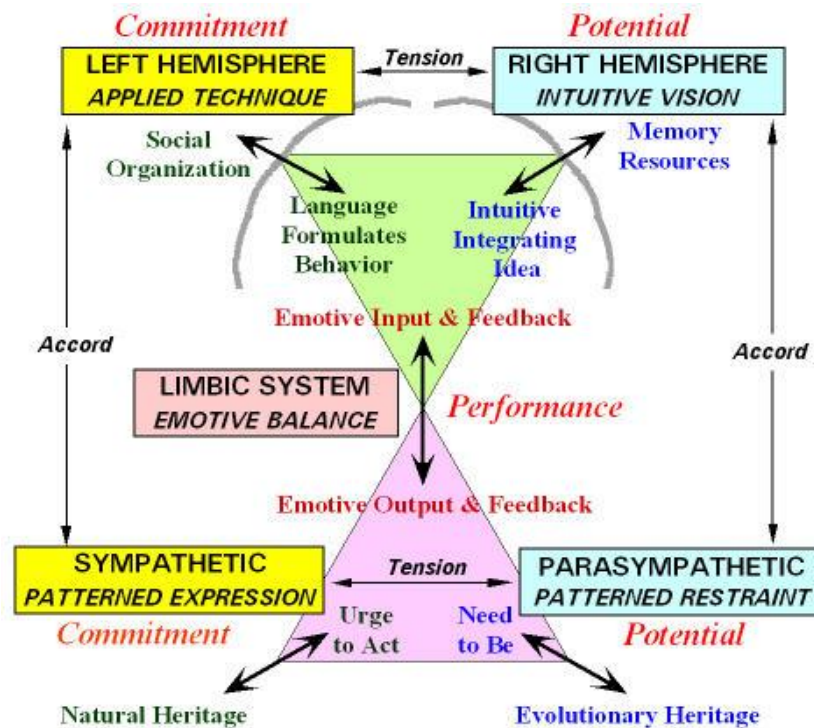


Figure 13

The right half of the Figure 13 diagram is the *self transcending* face of the holon in both triangles. The left half is the *self assertive* face of the holon in both triangles.

In summary it is clear that we have the intuitive capacity for direct insight into the workings of Ali's computer after all. Moreover this potential insight embraces all possible varieties of behavior. It can redeem the aberrations that so often creep into our religions and sciences, while adding meaning to their essential core. Armed with a structural outline we can develop awareness behind our mental and emotional processes that can help to bring our three brains to a sustainable balance.

All of us need an integrating world view of some kind, regardless of how deficient it may be. For example we may seek it in a career, or in a political, religious or other agenda of some kind. But we often discover to our chagrin that over identification in one area can erode social relationships in another. Although there are endless ways it can work there is a common theme of intuitive and rational identification with an emotional desire of some kind. The new brain is short circuited to the desires of the old brain. We lose conscious awareness behind our mental and emotional processes. Our ability to bring our three brains to a sustainable constructive balance falters.



In a self-similar way the problem is especially common in the corporate world driven exclusively by profit maximization without social conscience. There is no equitable distribution of benefits to the three primary interest groups, namely the employee, the customer and the shareholder. Employee commitment is lost, the consumer base is eroded, and ultimately the shareholder suffers, especially if the senior executives are motivated by huge bonuses. This erodes the quality of life for us all, as the financial collapse in 2008 attests. By recognizing structural imperatives for organizing and sustaining the balanced triad of creative activity,<sup>14</sup> corporations could become vehicles of social regeneration and enrich the creative potential of us all. This is in the best long term interests of corporations.

There are some fortunate souls that avoid major self-inflicted trauma in their lives, but their numbers are comparatively few. Difficult trials of some sort seem to befall most of us at some point in our lives. We seek a feeling of unity. We want to feel whole and to resonate with our social and natural heritage. Unfortunately many of us seem to be trapped in Plato's cave chasing shadow phantoms on the wall with our backs turned to the light of reality. *The fault dear Brutus is not in our stars: it is in the crocodile and the horse that we carry in our skulls.*

Meditation practices of various types can be used to advantage to still the left brain dialogue that tends to go on endlessly in our minds, fueled by sympathetic energies that urge us to thought and action. By stilling the treadmill of thought that captures the left brain we can access more holistic right brain archetypal energies that expand our horizons in more meaningful ways. This can help us to reach a more sustainable balance consistent with the cosmic order through which we have evolved. This can enrich not only our personal lives, but also our social, biological and physical sciences that we depend upon to cope collectively in constructive ways. The unsolicited gift viewed in this light is a personal evolutionary opportunity that can potentially open our minds to our global civilization and bridge our cultural differences. Although there is no collective solution, our sciences and our corporate organizations can become vehicles to assist to this end. This can facilitate a private quest to expand our personal horizons, with patience, over time.

**Note:** This review article has been condensed from parts of an unpublished book written by the author 36 years ago. I had already written an earlier unpublished book that delineated the System up to System 4 when I first came across Arthur Koestler's books. Scientific advances since then have further confirmed the structural interpretation given in this article of how the brain works in concert with how the mind evolves. I hope to rewrite the remainder of the book in some form as time permits. The original manuscript was sent to Arthur Koestler who returned an encouraging reply despite the onset of Parkinson's disease. His unusual life, his interest in science, and his work as a journalist and author of many books and articles were widely recognized. After several rewrites the earlier book evolved into *Fisherman's Guide*.<sup>15</sup>

It is noteworthy that he describes the first of a series of spiritual experiences that began in 1937 when he was in solitary confinement awaiting execution in a Spanish Nationalist prison. After a few months he was fortunately exchanged for the wife of one of Franco's ace fighter pilots held by the Loyalists. The experience came as he was scratching mathematical formulae, from his math and science schooling, on a wall with a piece of bedspring from his cell. Since his comments about it are consistent in a few respects with the experience of the Void,<sup>16</sup> it is worth quoting his description here. The pure experience of the Void, although awesome and life changing is not characterized by organic bliss. Everything vanishes completely including one's own body and one becomes one with All in a dumbstruck boundless field of wonder. However the Supreme Intelligent Being, or in the language used in the article above, the

Universal Active Interface that manifests as System One, transcends and subsumes the Void and can use it as a medium of communication to a Particular human being via System 2. So it is quite possible that the Void was employed to assist Arthur Koestler in his hour of need. In whatever manner this was orchestrated it certainly influenced his life. Koestler's account may help to show that cosmic interventions are possible that one cannot access volitionally. They come in response to an intensive quest as acts of compassion in times of great need. They cannot be otherwise induced:

*When I say 'the I had ceased to exist,' I refer to a concrete experience that is verbally as incommunicable as the feeling aroused by a piano concerto, yet just as real---only much more real. In fact, its primary mark is the sensation that this state is more real than any other one has experienced before---that for the first time the veil has fallen and one is in touch with 'real reality' the hidden order of things, the X-ray texture of the world, normally obscured by layers of irrelevancy. What distinguishes this type of experience from the emotional entrancements of music, landscapes or love is that the former has a definitely intellectual, or rather noumenal, content. It is meaningful, though not in verbal terms. Verbal transcriptions that come nearest to it are: the unity and interlocking of everything that exists, an interdependence like that of gravitational fields or communicating vessels. The "I" ceases to exist because it has, by a kind of mental osmosis, established communication with, and been dissolved in, the universal pool. It is the process of dissolution and limitless expansion which is sensed as the "oceanic feeling," as the draining of all tension, the absolute catharsis, the peace that passeth all understanding.*

*The coming-back to the lower order of reality I found to be gradual, like waking up from anaesthesia. There was the equation of the parabola scratched on the dirty wall, the iron bed and the iron table and the strip of blue Andalusian sky. But there was no unpleasant hangover as from other modes of intoxication. On the contrary: there remained a sustained and invigorating, serene and fear-dispelling after-effect that lasted for hours and days. It was as if a massive dose of vitamins had been injected into the veins. Or, to change the metaphor, I resumed my travels through my cell like an old car with its batteries freshly recharged.*

*Whether the experience had lasted for a few minutes or an hour, I never knew. In the beginning it occurred two or even three times a week, then the intervals became longer. It could never be voluntarily induced. After my liberation it recurred at even longer intervals, perhaps once or twice in a year. But by that time the groundwork for a change of personality was completed. I shall henceforth refer to these experiences as "the hours by the window."*

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- <sup>8</sup> The illustration is from Dr. J Houghton's online study notes. Similar illustrations are widely used.
- <sup>9</sup> Penfield W. *The Mystery of the Mind*. Princeton University Press (1975)
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