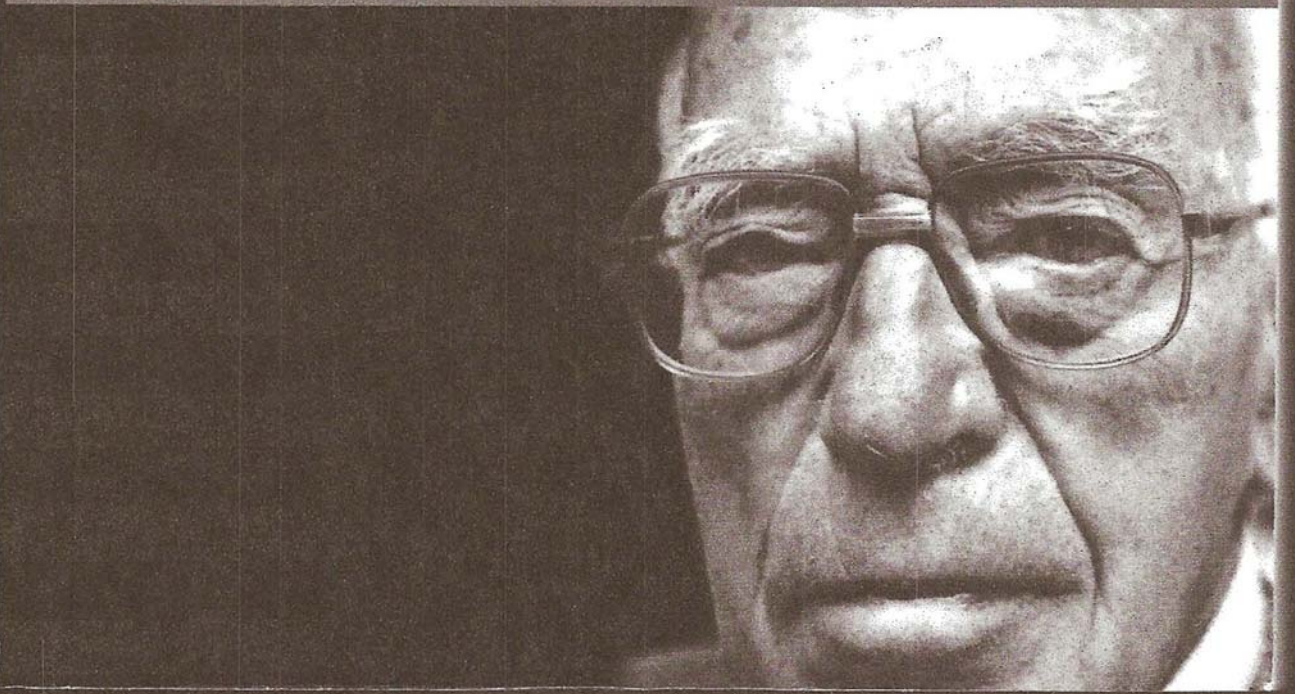


The Self and Its Brain

An Argument for Interactionism

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2. Anatomical Introduction

The principal anatomical features of the human brain are the two cerebral hemispheres that are approximately symmetrical and that are linked together by a great commissural structure, the corpus callosum. The hemispheres are intimately connected by enormous tracts of nerve fibres to the next lower levels of the brain, the immense neuronal complexes of the thalamus and basal ganglia (diencephalon). Great ascending and descending pathways, composed of millions of nerve fibres, link the cerebral hemispheres and the thalamus to still lower levels, the mesencephalon, pons, cerebellum, medulla and spinal cord. A detailed description of these pathways would be out of place here, but there will be reference to some of them in the appropriate chapters on perception and control of movement, chapters E 2 and E 3 respectively.

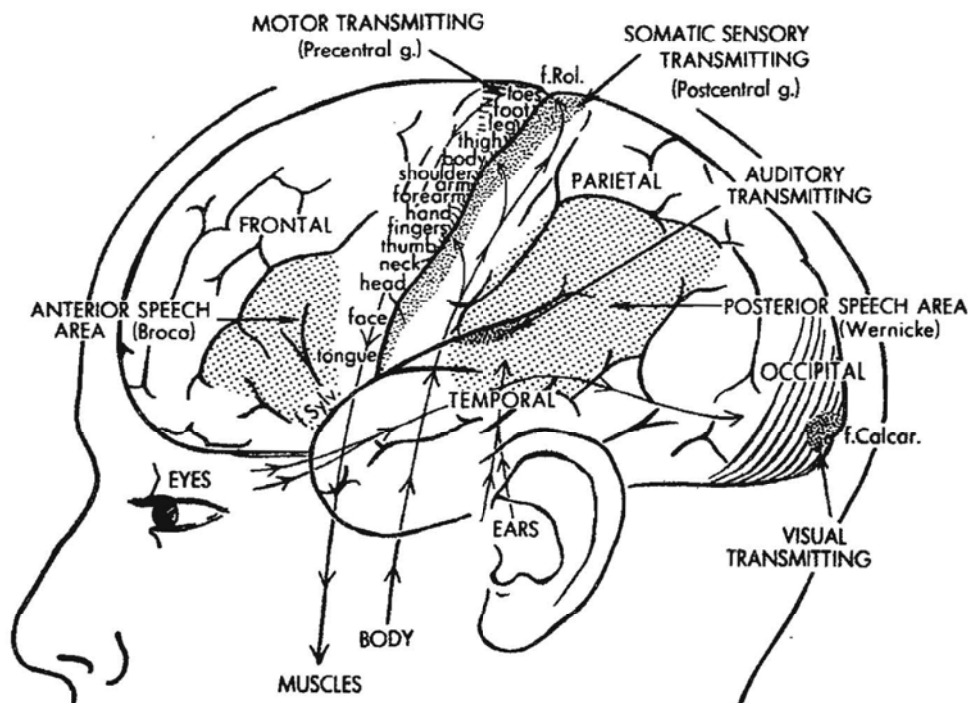


Fig. E1-1. The motor and sensory transmitting areas of the cerebral cortex. The approximate map of the motor transmitting areas is shown in the precentral gyrus, while the somatic sensory receiving areas (cf. Fig. E2-1) are in a similar map in the postcentral gyrus. Other primary sensory areas shown are the visual and auditory, but they are largely in areas screened from this lateral view. The frontal, parietal, occipital and temporal lobes are indicated. Also shown are the speech areas of Broca and Wernicke.

Evolution of the brain: creation of the self

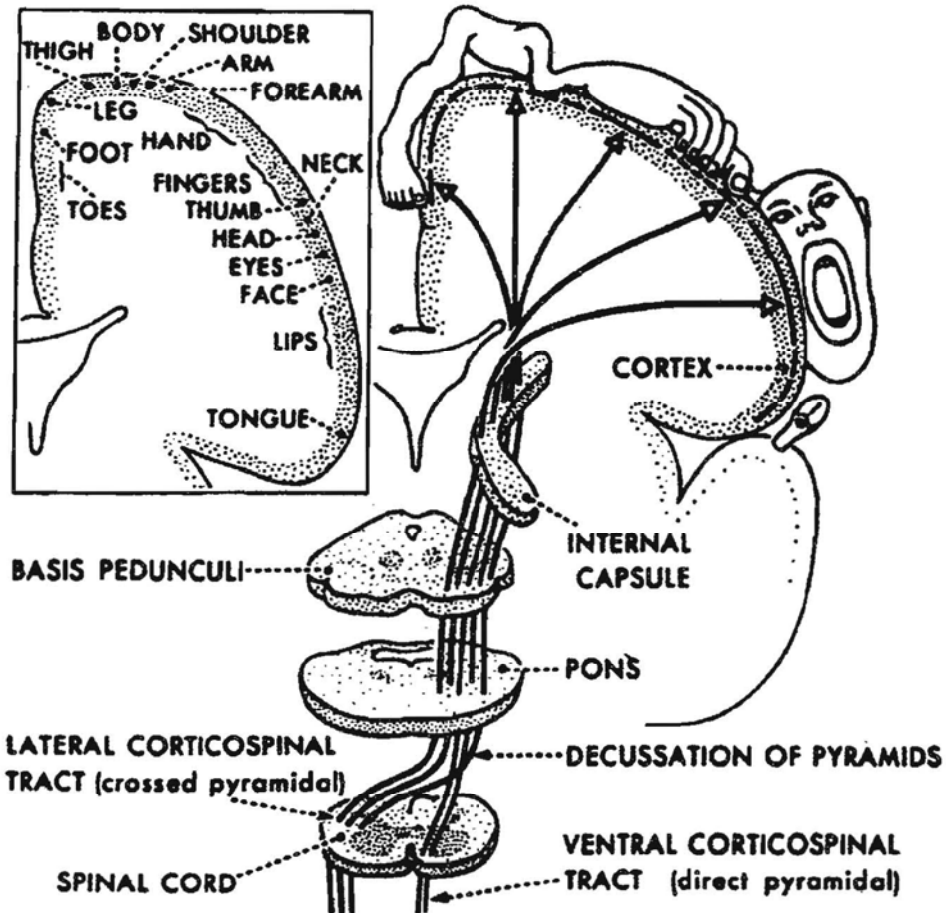


Figure 3.6 Homunculus of the motor strip, localizing the functions of large pyramidal cells. The descending tracts through the internal capsule and brain stem into the spinal cord are also shown (see Figure 3.14). The tracts mostly decussate to descend in the dorsolateral column of the spinal cord on the opposite side. (McGeer *et al.*, 1987.)

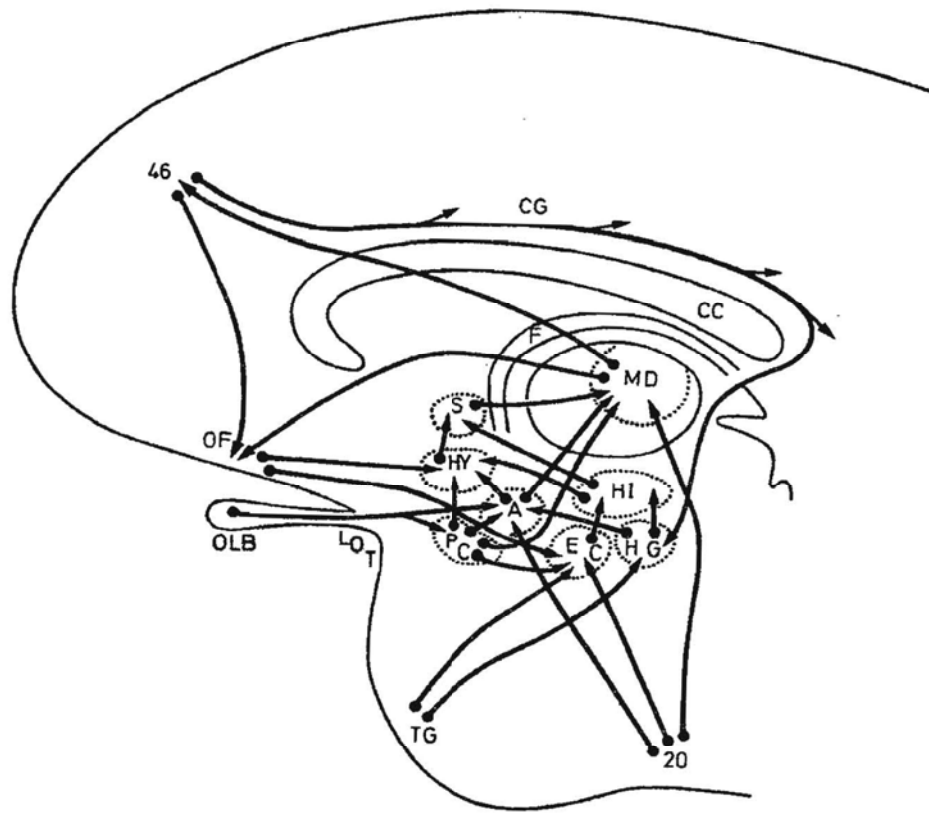


Fig. E1—9. Schematic drawing to show connectivities from the neocortex to and from the medio-dorsal thalamus (*MD*). *OF* is orbital surface of prefrontal cortex; *TG*, the temporal pole; *HG*, the gyrus hippocampi; *HI*, the hippocampus; *S*, septum; *F*, fornix; *CC*, corpus callosum; *OLB*, olfactory bulb; *LOT*, lateral olfactory tract; *PC*, piriform cortex; *EC*, entorhinal cortex; *A*, amygdala; *HY*, hypothalamus; *CG*, cingulate gyrus.

61. Hippocampus in Learning and Memory

393

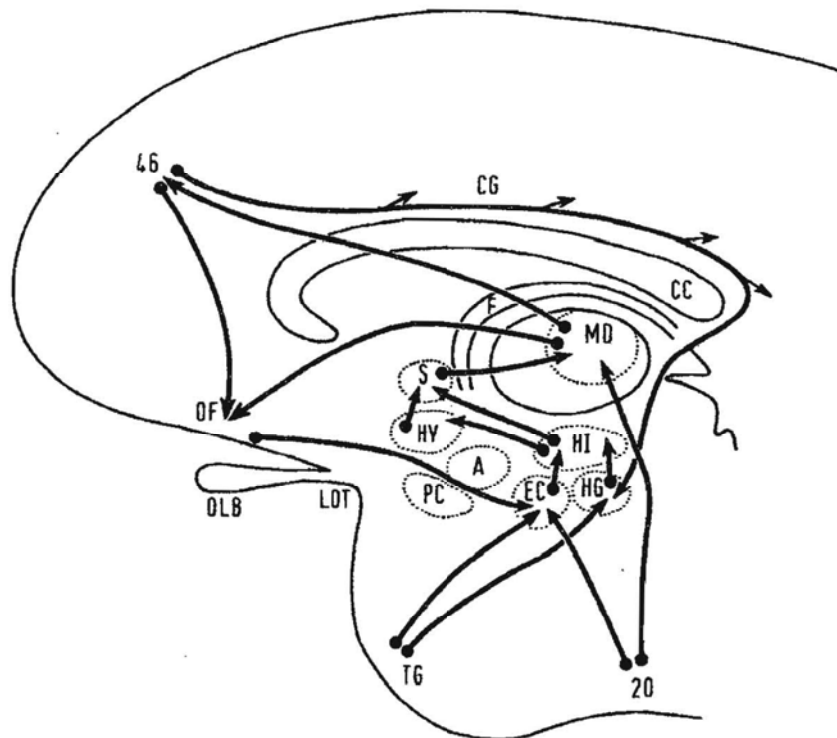


Fig. E8-6. Schematic drawing simplified from Fig. E1-9 to show connectivities from the neocortex to and from the medio-dorsal thalamus (*MD*). *OF* is orbital surface of prefrontal cortex; *TG*, the temporal pole; *HG*, the gyrus hippocampi; *HI*, the hippocampus; *S*, septum; *F*, fornix; *CC*, corpus callosum; *OLB*, olfactory bulb; *LOT*, lateral olfactory tract; *PC*, piriform cortex; *EC*, entorhinal cortex; *A*, amygdala; *HY*, hypothalamus; *CG*, cingulate gyrus.

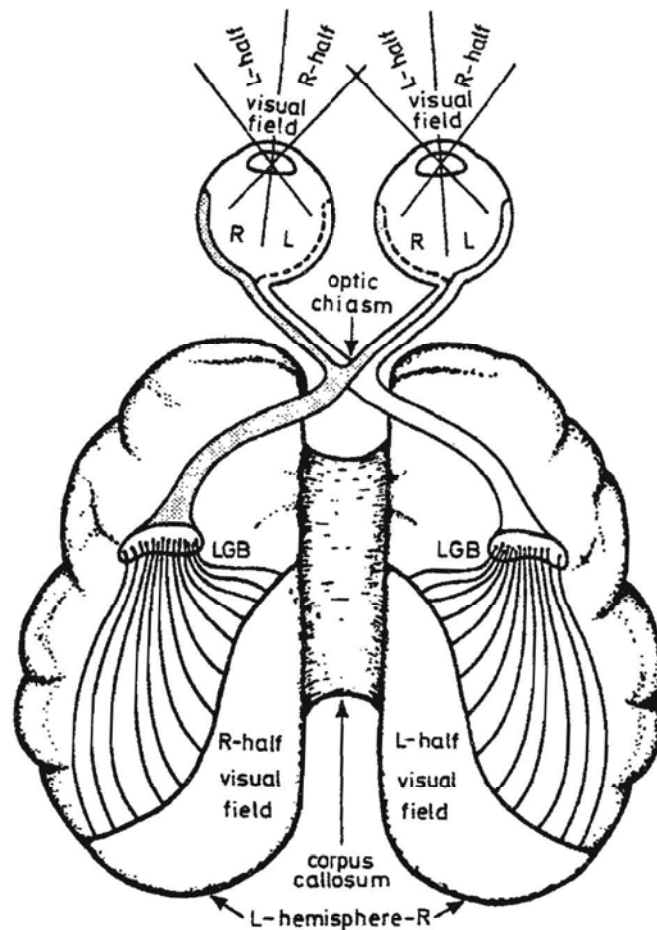


Fig. E2-4. Diagram of visual pathways showing the L-half and R-half visual fields with the retinal images and the partial crossing in the optic chiasma so that the R-half of the visual field of each eye goes to left visual cortex, after relay in the lateral geniculate body (*LGB*), and correspondingly for left visual field to right visual cortex.

35. The Human Brain after Commissural Section

319

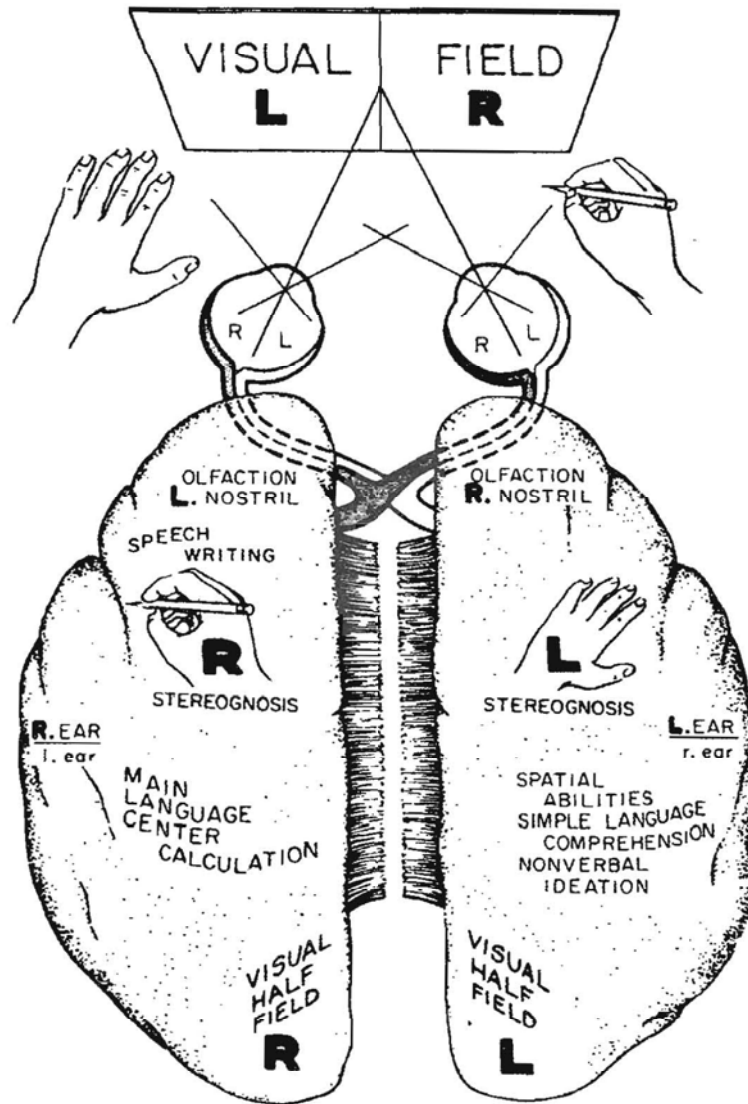


Fig. E5-4. Schema showing the way in which the left and right visual fields are projected onto the right and left visual cortices, respectively, due to the partial decussation in the optic chiasma (cf. Fig. E2-4). The schema also shows other sensory inputs from right limbs to the left hemisphere and that from left limbs to the right hemisphere. Similarly, hearing is largely crossed in its input, but olfaction is ipsilateral. The programming of the right hand in writing is shown pictorially to come from the left hemisphere (Sperry, 1974).

13. Emotional Colouring of Conscious Perceptions

It is a common experience that the conscious perception derived from some common sensory input is greatly modified by emotions, feeling, and appetitive drives. For example, when hungry the sight of food gives an experience deeply coloured by an appetitive drive! Nauta [1971] conjectures that the state of the organism's internal milieu (hunger, thirst, sex, fear, rage, pleasure) is signalled to the prefrontal lobes from the hypothalamus, the septal nuclei and various components of the limbic system such as the hippocampus and the amygdala. The pathways would be mainly through the MD thalamus to the prefrontal lobes (Fig. E 1–9). Thus, by their projections to the prefrontal lobes, the hypothalamus and the limbic system modify and colour with emotion the conscious perceptions derived from sensory inputs and superimpose on them motivational drives. No other part of the neocortex has this intimate relationship with the hypothalamus.

Figures E 1–7, 8 show for the somaesthetic, visual and auditory systems the many projections to the prefrontal lobes from the primary sensory and the principal secondary and tertiary areas. Simultaneously these areas project to the limbic system, and in Figure E 1–9 there are also projections from the prefrontal lobe (areas 46 and OF) to the limbic system. Thus there are pathways for complicated circuitry from the various sensory inputs to the limbic system and back to the prefrontal lobe, with further circuits from that lobe to the limbic system and back again (Nauta [1971]). From the connectivities of Figure E 1–9 it can be seen that the prefrontal and limbic systems are in reciprocal relationship and have the potentiality for continuously looping interaction. Thus by means of the prefrontal cortex the subject may be able to exercise a controlling influence on the emotions generated by the limbic system. An additional sensory input (olfaction) comes directly into the limbic system for cross-modal transfer to the other senses and thus contributes to the richness and variety of the perceptual experience. For example, the neocortical sensory systems via areas 46, OF, 20 and TG project to the hypothalamus, the entorhinal cortex and the hippocampal gyrus and so to the hippocampus, to septal nuclei and to the MD thalamus, while, after relay in the piriform cortex and amygdala, the olfactory input also goes to the hypothalamus, septal nuclei and the MD thalamus. Thus the MD nucleus is the receiving station for all inputs and it projects to the orbital and convex surfaces of the prefrontal lobe. So one can think of the prefrontal cortex as being the area where all emotive information is synthesized with somaesthetic, visual and auditory to give conscious experiences to the subject and guidance to appropriate behaviour, as will be described in chapters E 3 and

E 7. We conjecture that conscious experiences are derived from spatiotemporal patterns of neuronal activity in special modules of the neocortex (cp. chapter E 7). This conjecture is based in part on the finding that, after section of the corpus callosum, the self-conscious mind is in liaison only with the dominant hemisphere (chapter E 5).

14. Epilogue

Mountcastle [1975] gives a terse and vivid expression of the relationship of conscious perception to sensory systems and the brain:

“Each of us lives within the universe - the prison - of his own brain. Projecting from it are millions of fragile sensory nerve fibres, in groups uniquely adapted to sample the energetic states of the world about us: heat, light, force, and chemical compositions. That is all we ever know of it directly: all else is logical inference.

Sensory stimuli reaching us are transduced at peripheral nerve endings, and neural replicas of them dispatched brainward, to the great gray mantle of the cerebral cortex. We use them to form dynamic and continually up-dated neural maps of the external world, and of our place and orientation, and of events, within it. At the level of sensation, your images and my images are virtually the same, and readily identified one to another by verbal description, or common reaction.

Beyond that, each image is conjoined with genetic and stored experiential information that makes each of us uniquely private. From that complex integral each of us constructs at a higher level of perceptual experience his own, very personal, view from within.”

Eye Of Siloam Summary:

Eccles speaks of monistic materialism, and the dualism of Descartes regarding rational materialism, and concludes a "trialism" that includes an immaterial third part identified as Spirit (God) by Eccles.

Yet, in his discussion of emotion he fails to witness the "Life Giving Waters" of the ancient metaphysics as "his own, very personal, view from within." These waters are the transition between material sensation and personal physical worth. This is where Isis restores life to the Ka, the cadaver of Osiris. The emotions are a primordial system of judgment to survive (amygdala) and to thrive (hypothalamus) that redacts all the sense based material messages into a living value system (sentiment) for further refinement and further redaction and final rationalization in the duality of Descartes. When we jump from the material form to the rational form within the dualism of Descartes, we skip the emotional form by repression of feelings for the sake of self created cognition. Because of this, the "trialism" of Eccles has been denied by Popper and many rational philosophers whose aberrant rational intent is the elimination of the flood waters of physical emotion and the denial of maternal exigency. Life requires an external body to provide a space for development within a totally beneficent environment, a womb. If the womb is not totally benevolent then the amygdala will destroy the organism for the sake of betterment without self knowledge. It is this destructive aspect of the emotions that the rational mind denies. If the benevolence of the womb provides hyper satisfaction of specific sensual input the hypothalamus will redirect the growth of the organism toward preferential development and that will lead to repression by the amygdala based upon feedback not present in the genetic plan. Undesired content will again be repressed. Children will reject genetic perfection and mutations and aberrations will occur.

This suppression of feminine emotionalizing forces all sensation to fit into the "perfect fitting boxes" of the rationalizing masculine mind influenced to a greater extent by the hypothalamus for the sake of happiness. Once bound by rational metaphors the box floats down a stream of consciousness (Nile) as the body of experience (Osiris) drifts aimlessly without the intent to live. The "life force" of the emotions in all creatures represents the first line of defense and reincarnation. Since the idea of reincarnation does not fit into the perfection of dualistic eternal rationalizations it is quickly prevented by the repression of defense mechanisms, which is a warp form of defense because the rationalizations were born of self cognition. The repression of defense mechanisms is initiated when the rational mind denies sentiment for the organism where the "value system" says, "Live and Live Again." As the living value system matures the spirit of the father is reincarnated and the journey into the Cosmic Womb is perfected. This spirit that is "intent to affect" is the paternal intent called love. Mother Love is the physical benevolence, while Father Love is the spirit that perfects intent. The Son of Man is rational conscious, while the Son of God is universal cognition of Paternal Intent.

The process of perfection is a never ending spiral with periods of progress and regress depending upon the benevolence of the womb and the quality of the perfecting intent. The four ingredients -- material, emotional, rational, spirit -- encompass the whole of existence. And since the perfecting paths cause variations, each individual is the result of "self creation." Nothing else exists outside these four, except truth. Truth is the Light that shines in the pathways of created essence whether perfected or not. Since truth can commune with the essence of nothing and everything, eternal past and eternal future, and most assuredly now, Truth always was and always will be regardless of any path that Truth takes in existence. The variant paths are the personal god created by the four elements when one element acts as a shadow to the total enlightenment of the Journey of Truth.