



Needs, Moral Development, and the Triune Brain

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If a specific moral trait can be associated with a specific neural substrate, then the extent of moral development will be contingent upon the development of the neural networks within the substrate in which the moral trait resides. Similarly, if extrinsic and/or intrinsic inputs that target a specific neural substrate for processing effects the development of the substrate, then such inputs will also effect the attainment of the moral stage of development associated with the substrate. Since the higher levels of moral development are associated with spiritual states of consciousness (Kohlberg, 1976), then factors that inhibit the attainment of higher states of moral development will also inhibit the attainment of higher states of spiritual consciousness. Consequently, the attainment of spiritual states of consciousness and the associated behaviors can be affected by external and/or internal inputs.

With increased neural network development comes an increase in organizational complexity within the neural structure. With an increase in organizational complexity comes enhanced information processing (Schroder et al., 1967), as well as an increase in complex behavior. The drives for performing specific acts of human behavior are associated with specific neural substrates that vary in their levels of complexity. Since individual acts of human behavior require that the act be performed only after a comparison (processing) of the perceived wrongness or rightness of the act has been

made, and since a specific stage of moral development can be associated with a specific neural substrate, as will be shown later, then as the level of complexity of the neural substrate increases, so to will the level of moral complexity increase just as the complexity of behavior increases with neural complexity. Moral complexity shall be defined here as an increase in abstract thought/perception and the sub sequential interaction of the Self with its environment.

Each individual act of behavior that is influenced by a specific stage of moral development is the result of dominance by one of the four different minds that reside within the human brain, they are: the physical, the emotional, the intellectual, and the spiritual. Each individual Self is the synergistic quality of the four minds. The evolution of the Self is a progressive unidirectional vector that begins the transitional process at the oldest mind--the physical. Normal growth of the Self then proceeds through the emotional and intellectual minds and culminates at the spiritual mind. Placing the development of the intellectual mind before the spiritual mind is done for a couple of reasons. Many religions subscribe to the belief that the individual must first attain a state of intellectual perfection before spiritual perfection can be achieved (Letvik and Senzie, 1986, Wilber, 1986, Chirban, 1986). Also, the work of Maslow (1971) and Kohlberg (1976) contends that the intellect develops before the spiritual.

The Brain and Its Associated Behaviors

The human brain consists of 3-brains-in-1 (MacClean, 1973). The triune brain is composed of three neural substrates that are represented by the reptilian brain, the paleomammalian brain, and the neomammalian brain (ibid.). Each brain is connected to the others (ibid.). Each brain functions separately from the other two and is a bio-computer that has its own unique genetic programming, its own precise kind of problem solving intelligence, its personal understanding of Self in the universe, its own sense of time controlling how best to behave, its own meaning for being alive, its own memory of how best to survive, its own special actions to express itself, and its own mode of living Life (ibid.). All acts of human behavior are specific percentages of precisely identifiable

reptilian, paleomammalian, and neomammalian brain mappings that work in parallel towards the resolution of problem states.

Parallel processing between the different neural substrates is " . . . particularly effective for problems that involve global interaction between different parts of the problem" (p51, Tank and Hopfield, 1987). All human behavior is goal directed in that the individual desires to move from some initial state to a goal state. It is the continual communication and parallel processing capabilities that exist between the different neural substrates and their associated minds that enhance the individual's chances for success in goal directed behavior. For example, an individual may be driven to satisfy the physical survival needs that are associated with the reptilian brain. The setting of the goal and the generation of a heuristic necessary for attaining the goal are associated with the neomammalian brain, more specifically the frontal lobes. Yet, the drive to attain the goal was generated from within the reptilian brain. Consequently, the increased efficiency produced by the neomammalian intellect in the resolution of the problem state increases the probability of success for the attainment of the reptilian drives, and, therefore, the survival success of the organism.

The reptilian brain computes: aggressive behavior, fighting, fleeing, the selecting of leaders, compulsion, territoriality, repetition, ritual, reproduction, conformity, the establishment of social hierarchies, and the regulation of physical housekeeping duties (MacClean, 1973). The paleomammalian brain and its dominant component, the limbic system, are responsible for creating a plethora of emotions, most of which are concerned with the formation and preservation of the family and society (ibid.). Such behaviors include: greed, gluttony, selfishness, jealousy, reactionary emotions, social attachment, tribalism, fear, love, hate, pleasure--especially sexual, and sometimes paranoia. An individual whose life is dominated by the paleomammalian brain is usually afflicted with various addictions, and seeks pleasure (Letvik and Senzee, 1986).

The neomammalian brain, which is primarily composed of the frontal lobes, is responsible for many higher order cognitive skills that will be discussed later. Higher order cognitive skills can be broken down into the modalities of intellectual and spiritual thought--hence, the existence of the intellectual and spiritual minds. The four minds map to specific neural substrates of the triune brain. They are: physical (reptilian),

emotional (paleomammalian), intellectual (neomammalian), and spiritual (neomammalian).

Each neural substrate in which the minds reside is a composition of neural networks that may or may-not innervate other neural substrates. Neural net innervation allows for communication within the brain system. Communication exists between components that reside within a specific neural substrate and/or between components existing outside it (Nauta and Feritag, 1979). Neural pathways emanating from the hippocampus and amygdala (both of which are contained within the paleomammalian brain) loop (communicate) to both the neomammalian forebrain and the reptilian reticular activating system (ibid.). The amygdala is responsible for shunting energy forward into the neomammalian brain thus creating the "kindling effect" (Wada, 1976) or backwards into the reptilian brain (Lingo, 1987) and plays a major role in memory (Mishkin and Appenzeller, 1987). Since individual acts of mature behavior are responses to environmental inputs that associate with prior memory experiences produced by similar inputs, then it can be deduced that the amygdala acts as a driver of individual acts of behavior.

The level of excitement or inhibition of an established neural net determines its weight vector (McCulloch, 1965). Since neural substrates/components are composed of neural networks, then they are also of an excitatory or inhibitory nature and possess a cumulative weight vector. Consequently, behaviors, drives, and the levels of moral development that are associated with a specific neural substrate can be inhibited or excited by intrinsic and/or extrinsic inputs that target the neural nets/substrates for processing.

The study of flip flop circuits in amplifiers illustrates both the excitatory and inhibitory effects the three different neural substrates and their respective minds have upon each other, and the potential consequences upon individual behavior. In flip-flop circuits as the input increases so does the output, similarly as the input decreases so does the output (Tank, 1987). As extrinsic inputs excite a specific neural substrate (amplifier), then there will be an increase in behaviors under the influence of drives associated with the substrate. Such inputs may also act as role reinforcers since behaviors emanating from the neural substrate in response to environmental stimuli are

stored within the domain of prior experiences to be used for comparative purposes in the resolution of future problem states. Consequently, behaviors associated with a highly targeted neural substrate will be exhibited more frequently than behaviors associated with other substrates that lack prior experience about the inputs.

For example, in a long term continuous study of 875 third graders since 1960, it was concluded that larger doses of television violence produces children who are more likely to act aggressively, and children who think of the world as frightening (Eron, 1993). Continual exposure to reptilian behaviors ensures that such models will be stored as prior experiences and expressed in future individual acts of behavior. The brain, in essence, is producing conditioned responses to inputs that target the reptilian brain. Thus, the greater the amount of aggressive conditioning inputs, the greater the amount of aggressive outputs that manifest themselves in the form of aggressive behavior. The obvious conclusion is that the less that one is exposed to aggressive behaviors, the less that he or she will emulate such behaviors.

Consequently, many prior memory experiences are the result of social conditioning. The effect that social conditioning inputs have upon individual acts of behavior is also evident by the maintenance of sports within our society. By maintaining the institution of sports we encourage interpersonal "dueling" and teams ("tribes") to compete in winning the competition ("war"). When problems/conflicts do arise in an individual whose life has been dominated by sports, then these socially manufactured prior experiences will be used in future conflict resolution. Consequently, the most efficient way to resolve a problem/conflict will be perceived by the individual to involve the use of competition and/or aggression as modeled by the sports program. In other words, ". . . the brain can produce responses which are conditioned on the occurrence of particular stimulus configuration . . ." (Sommerhoff, p225)

Amplifiers composed of flip flop circuits also mutually inhibit each other to the extent that the result of a high output in one amplifier will drive down the input of the other amplifiers (Tank, 1987). Each amplifier drives the other one to be in the opposite state (ibid.). Likewise, if environmental inputs are processed by a specific neural substrate, then the neural networks contained within it will be placed in an excitatory state. The excitation of the neural substrate will, in turn, elicit the realization of the

associated drives and corresponding behaviors of the substrate, and increase the relative weight of its respective mind within the Self matrix. Consequently, according to flip flop circuit theory, an increase in the drives and behaviors associated with one mind, will inhibit the expression of drives and behaviors associated with the other minds.

By ordering the four different minds according to their biological age: physical, emotional, intellectual, and spiritual and working from the center out, flip flop circuit results exhibit themselves. In comparing the emotional mind to the intellectual mind it is easy to see that one is the antithesis of the other. The emotional mind is often equated with the irrational; in contrast, the intellectual mind is regarded as the seat of all rational thought. As the relative weight of irrational emotions increases, then the relative weight of rational intellect decreases. Hence, the emotional mind and the intellectual mind are diametrically opposed and inversely proportional, and emulate flip-flop circuit results.

The drives of the reptilian physical mind are the antithesis of the neomammalian spiritual mind. In religious literature the spiritual is often seen to transcend the physical (Letvak and Sven, 1986). When one compares the behavioral characteristics of the reptilian brain (aggression, fighting, and selfishness) with the neomammalian brain trait of spirituality (pacifism, peace, and altruism), the dichotomy appears. When the reptilian physical mind dominates, then the higher level of neomammalian spirituality is inhibited. The same individual can act out neither aggression and pacifism, nor fighting and peace simultaneously. Therefore, the physical mind, and the spiritual mind are diametrically opposed and inversely proportional.

At this point it needs to be restated that what we are concerned with is the behavior emanating from the drives associated with the dominant neural substrate. The quality of being human entails the interaction among the four minds. To assume that only one mind exists and drives the individual to performing specific acts is to assume incorrectly, since such an assumption would deny the individual brain of its synergistic Self, which is the very quality that provides us humans with our biological uniqueness. However, this is not to imply that a specific mind cannot dominate individual acts of behavior. Neural substrate dominance is determined by the element within the Self matrix with the greatest relative weight.

To assure survival and reproductive success the human brain will organize functionally in order to increase the individuals' probability of success. One way of insuring success is for one mind to associate with another mind in an attempt to increase efficiency in the resolution of problem states. This association defines the efficiency vector weight of the Self. To maximize the efficiency vector weight, the mind that dominates individual acts of behavior will work in parallel with the highest mind, in terms of evolutionary development, which it is most compatible with. For example, the reptilian physical mind will associate with the neomammalian intellectual mind and the paleomammalian emotional mind will associate with the neomammalian spiritual mind.

The four components of the Self (physical, emotional, intellectual, spiritual) form the tetrahedron Ψ (fig 1). Each node (Φ , E, I, Ω) of the tetrahedron Ψ has the capacity to act alone or in combination with other nodes in the resolution of problem states (fig 2) in an attempt to increase the survival efficiency of the organism. The center of gravity of the Ψ -tetrahedron is the Self (fig 3), which is the synergistic force that propels the biophysical self (matter) through space over time in reaction to or in interaction with extraneous environmental factors. The 4-d scalar matrix Ψ defines the Self as a driver/scalar in determining the direction of the omni-directional behavioral vector β_v . Omni in that there exist an infinite number of ways in which to act and directional to the extent that individual acts of behavior are goal directed.

Hence, Ψ is the transformative synergistic quality of (Φ , E, I, Ω) and is a higher quality form--the Self, and is the synergistic proper. The weight of each element within the Ψ -matrix is determined by both extrinsic and intrinsic environmental factors and is represented by \mathbf{x} , which is the domain of the Self.

Intrinsic factors are the result of:

1. Communication between Ψ -tetra nodes in the resolution of problem states.
2. Bio-genetic programs.
3. Level of biological and psychological development.
4. Traumas that imprint upon a neurological substrate during the physical development of the substrate that, in turn, maps to a specific Ψ -tetra node. The inhibitory effect that the effected node

will have upon surrounding Ψ -tetra nodes shall be defined as the bound energy of neurosis.

Extrinsic factors shall include:

1. The physical universe.
2. Social/cultural emanations that reinforce drive needs that are associated to specific neurological substrates to which the specific Ψ -tetra nodes map.
3. Inter personal/social/cultural templates that model how specific acts should be addressed determine how the self shall react in present/future relations to similar acts.

Furthermore, Ψ expresses itself in the material world via quantifiable behavioral acts represented by the behavioral vector β_u . The quantitatively verifiable β_u is a function of the qualitative Ψ .

Hence, for any extrinsic or intrinsic x_{in} input then

$$\Psi [\Phi(x_{in}) + E(x_{in}) + I(x_{in}) + \Omega(x_{in})] = \beta_u .$$

Furthermore,

$$\text{let } (\langle_1, \langle_2, \langle_3, \langle_4) =$$

$$(\Phi, E, I, \Omega)' (\langle_1(x_{in}), \langle_2(x_{in}), \langle_3(x_{in}), \langle_4(x_{in})) =$$

$$(\Phi(x_{in}), E(x_{in}), I(x_{in}), \Omega(x_{in})).$$

Let \mathfrak{S} represent the synergistic component that each of the domain elements (Φ, E, I, Ω) contributes to the overall synergistic quality of the Self (Ψ) such that:

$$\mathfrak{S} \Phi(x_n) + \mathfrak{S} E(x_n) + \mathfrak{S} I(x_n) + \mathfrak{S} \Omega(x_n) =$$

$$\mathfrak{S} \langle_1(x_n) + \mathfrak{S} \langle_2(x_n) + \mathfrak{S} \langle_3(x_n) + \mathfrak{S} \langle_4(x_n) =$$

$$\sum_{t=1}^4 \mathfrak{S}_t(x_n) = \Psi.$$

Therefore, the Self-matrix (Ψ) is defined as a 1 X 4 matrix where each element represents the relative weight of each mind in the composition of the individual Self. Therefore, each element represents the relative weight vector of each mind in driving individual acts of behavior. Thus, $\Psi = (\text{physical, emotional, intellect, spiritual})$ or $\Psi = (\varphi, \epsilon, \iota, \omega)$. For example, a Self-matrix of a lawyer may look like $\Psi = (.444, .011, .544, .001)$. The Self-matrix of the lawyer, while practicing his or her profession, can be described as an individual driven by reptilian aggression/competition and neomammalian intellect. A newborn's survival needs may be represented by the Self-matrix $\Psi = (.997, .003, .000, .000)$. In other words, the newborn is pure reptilian response.

Current social conditioning inputs that target the reptilian physical mind in males will induce an association between the physical mind and the intellectual mind. This act of social conditioning is crucial in explaining the dominance of males within society where an aggressive/competitive (reptilian) intellect (neomammalian) is the norm. A Self dominated by a reptilian brain that has a refined neomammalian intellectual brain results in highly efficient reptilian behaviors. Male behavioral roles that emulate such include: Lawyers, military leaders, politicians, business leaders, coaches, athletes, etc., and the capitalist system as a whole.

To maximize the efficiency vector weight a dominant paleomammalian emotional mind will work in parallel and associate with the neomammalian spiritual mind. Social conditioning inputs target the paleomammalian emotional mind in females. Consequently, to maximize success the female paleomammalian emotional mind will work in parallel with the neomammalian spiritual mind. This can be supported by the preponderance of women, as much as 75% in some cases, which make-up the number of participants that attend transpersonal and Buddhist functions (Tart, 1991).

From the above data one may infer that the female brain is more prone to evolutionary success since the spiritual mind is more complex than the intellectual mind due it being the last mind to evolve. Given that highly efficient reptilian behavior has made our species the most efficient of killers in the history of the planet, and the fact that the spiritual mind is governed by acts of peace and compassion, then the possible contributions of each toward the possible extinction of the species should be self-

evident. This is not to imply that the emotional neomammalian spiritual brain has attained the highest states of spiritual consciousness. On the contrary, the emotional-neomammalian spiritual Self will map to the lower stages of Wilber's hierarchy of spiritual consciousness (1986). The intellectual-neomammalian spiritual Self will map to even higher stages of spiritual consciousness. Finally, a neomammalian spiritual mind that does not associate with any of the lower minds will map to the highest of spiritual states.

Neural substrate dominance may be the result of a process similar to synaptic elimination and is referred to as process elimination. This is where what may have begun as a process innervated by many neurons (or networks) is reduced to one nerve (network) innervating it (Cowan, 1979). One factor that may determine the results of process elimination is "functional activity" (ibid.). As inputs target specific neural substrates, then to insure behavioral efficiency any nonessential or "nonfunctional" networks will be eliminated and/or inhibited so that only the networks that will increase the probability of success will remain intact and will subsequently experience an increase in their neural network vector weight. If aggressive behaviors are continually reinforced, then the reptilian substrate and its associated drives and corresponding behaviors will replace, and subsequently dominate, alternative behaviors due to process elimination in response to functional activity within the environment.

The Frontal Lobes and Human Behavior

The largest component of the neomammalian brain is the frontal lobes that are estimated to makeup as much as 33% of the total cortex. The law of proper mass states that the larger the tissue area, the more important the functions associated with it (Jerison, 1973). Accordingly, the stages of moral development and the minds that can be associated with the neomammalian brain will be the more important functions in determining the human quality and evolutionary success.

The role of the frontal lobes is many fold. When patients who had massive lesions to their frontal lobes were instructed to repeat the conditions of the problem,

they were either unable to so or would repeat only one of its elements (Luria, 1973). They were also unable to generate a cognitive model of the problem and were easily distracted (ibid.). The patients also did not attempt a preliminary investigation of the condition of the problem (ibid.). As a result, they immediately began to seek solutions impulsively and performed a series of fragmentary observations, totally unconnected with the content of the problems and without any plan (ibid.). Luria also found that patients were unaware of the meaninglessness of their solutions (ibid.).

Animals whose frontal lobes were removed surgically exhibited hyperactivity and were scattered and stimulus-bound (Fuster, 1980). Patients who suffered from frontal lobes disorders also exhibited apathy, and had difficulty in controlling their behavior (Stuss and Benson, 1986). Such patients also displayed a loss of will and continued to pursue a problem despite the evidence for error (Fuster, 1980). The frontal lobes also play a role in concentration during problem solving tasks (Mizuki, 1980), and appear to be the seat of the self and individual autonomy since they establish a point of view relative to environmental events that allows for the distinguishing between the self and others (Nauta, 1973).

All of the above studies were done on animals or humans who suffered trauma to or removal of the frontal lobes. Yet, if one were to perform a qualitative examination of our society, especially of the young, then it would appear that many individuals display the same types of behavior in varying degrees. It is estimated that 9% of the boys in America and 2% of the girls have been identified as hyperactive (Barkley, 1981). Up to 15% of the school aged population may suffer attention deficits (ibid.), boys are six times as likely to be afflicted. Specific problems associated with attention deficits emulate many of the frontal lobe lesion studies, they may include, but are not limited to: short attention span, restlessness, poor impulse control, destructiveness, over arousal, inability to delay gratification, aggression, belligerence, poor social problem solving skills, excitability, low average intelligence, lack of conscience, learning disabilities, under achievement for intelligence, and low self-esteem (ibid.). Up to 24% of our societies youth have been identified as possessing these afflictions (ibid.), these are the ones who are labeled as needing professional help. An individual suffering from antisocial personality disorder may display some of the following characteristics (Magid,

1990): need for stimulation, proneness to boredom, lack of guilt, lack of empathy, poor behavioral controls, impulsivity, irresponsibility, failure to accept responsibility for actions, and juvenile delinquency. Estimates are that 0.05% to 15% of the adult population may suffer from such afflictions (Rosenthal (1970) in Magid 1993).

Our contention is that the frontal lobes are not being utilized to their optimum capacity due to domination of the lower neural substrates, and the retarding of the organizational development of the neural nets contained within the frontal lobes. The result is that the individual exhibits behaviors that can only be associated with the drives of the lower two substrates of the triune brain. In essence, the neomammalian brain has been reduced to a state of environmentally induced quiescence, environmental to the extent that society provides reinforcers for specific types of behavior that inhibit higher modalities of thought. Hence, a societal induced pre-frontal lobotomy seems to have been occurred at the level of the psyche (psycho-lobotomy.)

One possible explanation for the discrepancy between the number of males who suffer from attention deficits versus girls, genetic influences aside, is that male stereotypes and their reptilian behavioral reinforcers exist pervasively within our patriarchal society. Most forms of entertainment revolve around male acts of competition and aggression. Consequently, since male conditioning inputs are more ubiquitous than female conditioning inputs, then the input weight vector is greater and thus elicits a reptilian response proportional to the input weight vector. The work of Changeux (1983) has shown that intrinsic communication from within the neurons environment affect the organization of any particular network (ibid.). Therefore, over stimulation of the male reptilian brain and its physical mind retards the progressive development of the Self due to an increase in the reptilian brain output weight vector that, in turn, lessens the input weight vector innervating the higher neural substrates thereby inhibiting the organizational development of the neural networks associated with the higher neural substrates. Consequently, process elimination of the higher neural substrates is inhibited due to a lack of functional activity.

The less organization contained within a substrate, the less complex its neural networks. Consequently, the less complex the neural networks, the less complex human behavior as drives, morality, and other attributes associated with the substrate

and its corresponding mind. The result is that inputs that target the lower level substrates and their associated behaviors render inactive the behaviors associated with the higher level neural substrates due to a lack of neural network organization resulting from functional activity.

Environmentally induced quiescence is supportive of neurology Nobel Laureate Sir John Eccles dormant brain hypothesis (1974). The Eccles hypothesis, which proposes that the human brain is 90% dormant, was proven experimentally by studying hydroencephalics (Lorber, 1981). The conclusion was that the human brain is "almost solely" dormant (ibid.).

The future success of our species may be contingent upon which neural substrates are targeted by environmental inputs and will dominate individual acts of behavior and the releasing of the dormant brain. Currently, society reinforces and encourages behavioral acts that revolve around the reptilian and paleomammalian brains and their respective minds. Consequently, our society is steeped in acts of aggression and violence, various addictions, pleasure seeking activities, and greed due to over stimulation of the neomammalian brain, while the intellectual and spiritual minds are rendered passive.

With a brain functioning predominantly from the lower neural substrates of the triune brain, then all consequential behaviors will reflect the level of moral development that can be associated with the neural substrate. Consequently, when a neural substrate is inhibited then the levels of moral development associated with the substrate are also inhibited.

Mapping Morality, and Needs to the Triune Brain

When we look at Kohlberg's stages of moral development, it is easy to see how each stage maps directly to a specific component of the triune brain. **Level I** consists of two different stages. In **Stage 1**, the "punishment-obedience orientation," the goodness or badness of an act is perceived as one of physical consequences. Those in power are seen as having superior power and should be obeyed. Since conformity is a behavior associated with the reptilian brain, then this stage maps to the reptilian

physical mind. **Stage 2**, the "instrumental relativist orientation," is concerned with the actor behaving in such a way as to benefit personally by acting in a certain fashion. The individual is driven by greed, a drive that maps to the paleomammalian emotional mind.

Level II also consists of two different stages. **Stage 3**, the "good boy-nice girl orientation," is where the individual is concerned with impressing others. Acceptance in this instance is driven by one of two factors: the need to be loved/liked by others or the fear of being rejected by others. Both of these emotions, love and fear, map to the paleomammalian emotional mind. **Stage 4** is the "respect for authority" phase. Here the individual feels that to maintain and preserve the social/family order that certain rules/laws must be obeyed. The drive to preserve society is generated within the paleomammalian emotional mind (MacLean, 1973).

Level III is composed of three different stages of morality. The "social contract orientation," **Stage 5**, is the level used to maintain the social order based on mutual agreement rather than blind obedience. This entails a degree of abstraction, since the individual is considering his/her acts in relation to others. Problem solving at this stage may entail the resolution of conflicts where laws may have to be disregarded in certain circumstances--say the saving of one's life. Therefore, this stage maps to the neomammalian intellectual mind. **Stage 6**, the "universal ethical principle orientation," entails the highest level of abstract problem solving since moral decisions are created in terms of self-chosen ethical principles. Or as Kant would say: "I am never to act otherwise than so that I could also will that my maxim should become universal law." (Kant, 1964). This stage maps to the neomammalian intellectual mind. **Stage 7** consists of the "universal-spiritual" phase. Obviously, this stage can be mapped to the neomammalian spiritual mind.

Similarly, each component of Maslow's hierarchy of needs can also be mapped to the triune brain and a specific mind. Maslow's lower level needs consist of physiological and safety needs, both of which can be attributed to the reptilian physical mind. Next are belongingness and love needs that are obviously aspects found within the paleomammalian emotional mind. Esteem needs can also be classified as an expression of the paleomammalian brain since esteem is reducible to either a love or hate of the Self.

What Maslow calls growth needs consist of the need for self-actualization, the desire to know and understand, and aesthetic needs. Self-actualization maps to the neomammalian intellectual mind since self-actualization is the realistic portrayal or accurate representation of the Self, both of which are qualities of the intellect. Or as Maslow states: "Self-actualizing people . . . seem to do what they do for the sake of ultimate, final values, which is for the sake of principles that seem intrinsically worthwhile." (p192, 1971). These values include truth, efficiency, justice, order, lawfulness, etc. (ibid.) All of which are intellectual pursuits. The need to know is obviously an aspect of the neomammalian intellectual mind. The aesthetic needs are concerned with a love of beauty or a doctrine in which beauty is the basic principle from which all other principles are derived. Beauty possesses a spiritual quality when considered in various religions. Consequently, the aesthetic needs map to the neomammalian spiritual mind.

Since the goal of development is to integrate particular functions to adapt to specific situations received as inputs (Piaget, 1971) and since each neural substrate and its correlated mind(s) possesses its own problem solving intelligence in reaction to inputs, then Piaget's model of cognitive development will map the organizational development of neural networks associated with a specific neural substrate. Since moral development can be mapped to specific neural substrates, then as neural networks increase in organizational complexity, so to does the level of moral development have the potential to increase proportionally. Therefore, the maximum rate at which moral development can occur is contingent upon the rate/level of neural network development. For example, the child who is currently developing the neural networks contained within the paleomammalian brain could not display a level of moral development that is associated with the higher neomammalian brain since neural networks contained within the latter have not yet functionally formed. When neurological growth is slowed or retarded via extrinsic or intrinsic factors then one's level of moral development will also be retarded.

The first stage of Piaget's model is the sensorimotor stage and deals with the acquisition of understanding via the senses and motor activity. This stage maps the organization of neural networks contained within the reptilian brain. Trauma incurred

during this phase of neural network development can adversely effect the organization of neural networks contained within the substrate and those associated with the higher neural substrates. For example, birth traumas or any other type of trauma incurred during this stage of development will leave the needs of the reptilian physical mind unresolved. Consequently, in expending energy trying to fulfill the perceived needs of the reptilian brain the individual will not evolve fully into the higher neural substrates. Extreme trauma during the reptilian phase of neural network development may result in autistic or psychotic like personalities that are void of paleomammalian emotions. This age of development is estimated to exist between the ages of birth and two years.

During the preoperational stage children center on the mastery of symbols. Since a symbol is any stimulus that elicits meaning (Hebb, 1968), and since meaning is something that is felt to be significant, then this level of cognitive development can be associated with the development of neural networks within the paleomammalian brain. This level of cognitive development is said to occur between the ages of two and seven. Accordingly we would expect to find the average two to seven year old displaying levels of moral development between the punishment-obedience stage and the law and order stage. Unless, of course, drives and needs associated with the reptilian physical mind are unfulfilled, in which case growth into the paleomammalian stages of moral development will be retarded. This is a crucial stage of development where the child develops his or her sense of belongingness and subsequential self-esteem. Traumas incurred during this stage of development retard the maturation of the paleomammalian brain. Not only does this fix one's level of moral development, but also produces a neurotic possessed with receiving love from others in order to gain the love and belongingness that was never experienced during this stage of development. Obviously, if one is fixated on fulfilling the love needs of the paleomammalian emotional mind, then he or she cannot evolve fully into the next higher neural substrate with its associated needs and morals until the needs of the paleomammalian emotional mind have been resolved and/or therapized.

The next stage, the concrete operational stage, is where the individual begins to solve problems that involve concrete objects. Since problem solving is an intellectual skill, this stage suggests the beginning stages of the organization of neural networks

within the neomammalian brain. This stage is most likely not associated with any of the neomammalian stages of moral development since it is the beginning phase of neomammalian maturation. This stage is estimated to occur between the ages of seven and eleven.

Finally, there is the formal operational stage. This is where the individual can form problems systematically, form hypotheses, and is able to deal with abstractions. Obviously, this is a mapping onto the neomammalian brain and the intellectual mind. Only after successfully completing this stage of cognitive development is it then possible for the individual to evolve into the spiritual mind. It thus becomes imperative that students be educated not for the sake of advancing career wise, a paleomammalian drive, but meaningfully to "know and understand," thus organizing the neural networks of the neomammalian intellect that act as a foundation from which the spiritual Self evolves. This stage is estimated to occur at age eleven.

Only after a specific degree of neural network organizational complexity has been attained within a neural substrate, will the associated level of moral development be realized. A trauma incurred at a lower level of cognitive development does not imply that the higher levels of cognitive development will not take place. Cognitive development will continue despite the severity of the trauma, thus suggesting a genetic component, but the organization of subsequent neural networks undergoing development may be severely retarded, and/or process elimination minimized to such an extent that the processing efficiency of the neural substrate is diminished significantly.

Kohlberg's model suggests transcendence in that each stage of moral development supersedes the previous stage. Once the individual attains a higher level of moral development, the preceding stages that led up to the present stage are replaced. Maslow's needs are transformations in the mathematical sense, since the individual may map from a higher need space back to a lower need space as needed. For example, if an individual is at the higher level need of self-actualization, then this stage may be temporarily abandoned to fulfill lower level physiological needs as in the case of being lost in the wilderness. Once survival has been assured, then the individual may map back to the self-actualization need space.

In moral development each brain works independently from the others due to the transcendent nature of Kohlberg's moral development model. In needs, each brain works in cooperation with the others due to the transformative nature of needs. Both emulate characteristics of MacLean's research on the triune brain, thus there is no contradiction with the empirical data in mapping moral development, and needs to the various neural substrates that compose the triune brain. In all models only if the lower stage levels have been fully satisfied may one transcend/transform into/onto the higher levels. Each lower level subsequently becomes a driver or function for the attainment of the next higher level.

Triune Brain	Mind Model	Kohlberg	Maslow	Piaget
neomammal	Spiritual	U n i v e r s a l - spiritual	Aesthetic	
neomammal	Intellect	Universal ethics	Desire to understand	Formal operations
neomammal	Intellect	Social Contract	Self-actualization	
neomammal				Concrete operations
paleomammal	Emotiona l	Law and order	Esteem	
paleomammal	Emotiona l	Good boy-nice girl	Belongingness and love	
paleomammal	Emotiona l	I n s t r u m e n t relativist		pre-operational
reptile	Physical	Punishment- obedience	Safety	
reptile	Physical		Physiological	Sensory motor

Table 1: Growth Chart.

Since the various stages of moral development map to specific neural substrates, then when extrinsic and/or intrinsic inputs are incessantly produced which target processing by a specific neural substrate, then the respective neural substrate and its associated stage of moral development assume a role of dominance because of functional activity. Individual acts of behavior are contingent upon the attained level of moral development. Consequently, with pervasive reinforcement of reptilian and paleomammalian behavioral responses within a society, we can only expect lower levels of moral development and the appropriate behaviors to be exhibited. To

educate/reinforce the utilization of higher levels of the triune brain will elicit higher levels of moral development and the associated behaviors. Currently, very few individuals are considered to have satisfied the lower growth need of self-actualization (Maslow, 1971) or reached the higher levels of moral development (Kohlberg, 1976). Therefore, very few individuals have evolved into higher states of spiritual consciousness that are associated with the final stages of Maslow's and Kohlberg's models.

The evolutionary advantage of attaining spiritual consciousness (or self actualization/peak experience) is moral elevation and intellectual illumination (Bucke, 1901, Maslow, 1971). Higher states of morality render insignificant the human appetite for, or participation in, acts of war, violence, greed, and hate. An illuminated intellect can help in the resolution of global environmental problems generated by providing for basic human needs. Therefore, the production of food without polluting, the creation of shelter without stripping the rain forests, and the curing of disease without incurring the wrath of overpopulation will be resolved intellectually. In both instances, behaviors that have the potential of causing the extermination of the species are transcended.

Conclusion

The individual brain is composed of three neural substrates. The four minds that compose the individual Self (physical, emotional, intellectual, and spiritual) map to specific neural substrates. Each stage of Kohlberg's moral development model and Maslow's hierarchy of needs can be associated with one of the four minds, and therefore both models can be mapped to a specific neural substrate. Piaget's cognitive development model suggests the neural network development of specific neural substrates. Higher levels of moral development can only be attained after all of the needs associated with the lower neural substrates and lower minds have been fulfilled and only after the neural substrate has developed fully.

With the evolution of the Self the individual is immersed in progressively higher modalities of thought and behavior that are driven by real or perceived needs, and the stage of moral development associated with the neural substrate that exhibits the highest degree of maturation or complexity. Two factors affect the evolutionary rate of the Self--

the extrinsic input weight vector and the intrinsic input weight vector. The extrinsic input weight vector is generated outside the individual brain and targets a specific neural substrate for excitation. Within our current society it is the reptilian and paleomammalian brains that are targeted. Continual stimulation of lower neural substrates inhibit individual growth into the higher neural substrates and therefore, retards the growth into the higher stages of moral development and the attainment of higher states of individual consciousness.

The intrinsic input weight vector is determined by individual traumas that leave the needs of the neural substrate in which the trauma occurred unfulfilled. Traumas thus generate a loop within the neural substrate in which it is embedded. The trauma loop is of the form **while** needs associated within a neural substrate exist (i.e., the need to be loved), then **do** behavior that will help attain these needs. Only by targeting the trauma and extricating it through therapy is the size of the intrinsic input weight vector reduced enough for the individual to exit the loop, thus releasing her or him to evolve into the next stage of growth needs and the subsequent level of moral development. Consequently, traumas can be seen as a deterrent toward the attainment of higher states of individual consciousness.

Proper education should be holistic to the extent of providing prior experiences that build the intellect upon a solid emotional foundation and motivate the individual toward attaining goals based on the need to "understand and know." Currently, the intellect is regarded as a means of attaining various ultimate ends based on the lower paleomammalian drive of greed--namely, money and power. Since not all students enter the educational process with their emotional needs having been met, the result of dysfunctional families, then it is the schools' responsibility to provide the tools by which the individual Self can end any loops that may exist within neural substrates that retard the growth into the neomammalian intellectual and spiritual minds and their associated stages of moral development. Therefore, education should establish the foundation neural pathways from which higher levels of moral development, and hence, higher states of individual consciousness emanate. To do otherwise is to deny the individual of his or her freedom and his or her right to an education of the Self.

Only when the socially produced extrinsic input weight vector that targets the reptilian and paleomammalian brains and generates perceived needs is reduced, will the Self also be free to evolve into the higher neomammalian minds. With the elimination of socially produced perceived needs, then the individual will no longer be enticed to fulfill the perceived lower level needs of greed, lustful sex, pleasure in general, aggressive acts, and other targets of the emotions. The individual thus gains his or her freedom since behavior is now based upon rational thought and is free from the influence of others. The various mediums of communication that exists within our society could begin by encouraging and reinforcing individual acts of behavior that revolve around the neomammalian brain and it's associated minds. What is needed is a revolution that will envelop the species with a higher state of consciousness. But, before an individual brain revolution can take place a revolution must take place within the institution of education as well as within society. A brain revolution where the pursuits of higher order intellectual and spiritual modalities of thought replace the lower level pursuits of needs associated with the reptilian and/or paleomammalian brains.



References

- Barkley, R. A., *Hyperactive Children*, New York: The Guilford Press, 1981.
- Bucke, R. M. , *Cosmic Consciousness*, Seacaucus, New Jersey: Citadel Press, 1973.
- Changeux, J. P., "On the 'Singularity' of Nerve Cells and Its Ontogenesis," In *Molecular Interactions Underlying Higher Brain Functions*, ed. J. P. Changeux. *Progress in Brain Research* 58:465-478, 1983.
- Chirban, J., "Developmental Stages in Eastern Orthodox Christianity," In *Transformations of Consciousness*. Boston: Shambhala, 1986.
- Cowan, W. M., "The Organization of the Brain," In *The Workings of the Brain*, ed. R.R. Llinás. New York: W. H. Freeman and Company, 1979.
- Eccles, J. C., Lecture: University of Colorado, University Memorial Center, Boulder, July 31, 1974.
- Eron, L. In newspaper article. 1993.
- Fuster, J.M., *The Prefrontal Cortex: Anatomy, Physiology, and Neuropsychology of the Frontal Lobe*, New York: Raven, 1980.
- Hebb, D. O. "Concerning Imagery." *Psychological Review* 1968, 75(6): 466-477.
- Jerison, H. J. , *Evolution of the Brain and Intelligence*, New York: Academic Press, 1973.
- Kant, I., *Groundwork of the Metaphysic of Morals*, Translated by H.J. Patton, New York: Harper Touchstone, 1964.
- Kohlberg, L., "Moral stages and moralization: The cognitive developmental approach." In *Moral Development and Behavior: Theory, Research, and Social Issues*, ed. T. Lickona. New York: Holt, Rinehart, & Winston, 1976.
- Letvik, S., & Senzee, A. W., *Toward a New Brain*, New Jersey: Prentice-Hall Inc,1986.
- Lingo, T. D., *The Self Transcendence Workbook*, Black Hawk, Colorado: Socrates Press, 1987.
- Lorber, J. "Is Your Brain Really Necessary?" *Science*, 1981, 210.
- Luria, A. R., *The Working Brain*, New York: Basic Books, 1973.

- MacLean, P. D., *A Triune Concept of the Brain and Behavior*, Toronto: University of Toronto Press, 1973.
- Maslow, A. H., *Motivation and Personality*, New York: Harper & Row, 1954.
- Maslow, A. H., *The Farther Reaches of Human Nature*, New York: Viking, 1971.
- McCulloch, W. S., *Embodiments of Mind*, Cambridge: MIT Press, 1965.
- Mishikin, M., & Appenzeller, T. "The Anatomy of Memory," In *The Workings of the Brain*, ed. R.R. Llinás. New York: W.H. Freeman and Company, 1990.
- Mizuki, Y., et al, "Periodic Appearance of Theta Rhythm in the Frontal Midline Area During Performance of a Mental Task." *Electroencephalography and Clinical Neurophysiology*, 49, 345-351, 1980.
- Nauta, W. J. H., "Connections of the Frontal Lobes with the Limbic System." In *Surgical Approaches in Psychiatry*, eds. L.V. Leitenen and K. E. Livingston. Baltimore: University Park Press, 1973.
- Nauta, W. J. H., & Feritag, M. "The Organization of the Brain." In *The Workings of the Brain*, ed. R.R. Llinás. New York: W. H. Freeman and Company, 1979.
- Piaget, J., *Biology and Knowledge*, Chicago: University of Chicago Press, 1971.
- Piaget, J., *The Development of Thought*, New York: Viking Press, 1977.
- Schroder, H.M., M. Driver, & S. Streufert. *Human Information Processing*. New York: Holt, Rinehart and Winston.
- Sommerhoff, *Logic of the Living Brain*
- Stuss, D. T., & Benson, D. F., *The Frontal Lobes*, New York: Raven, 1986.
- Tank, D. W., Hopfield, J. J. "Collective Computation in Neuronlike Circuits." In *The Workings of the Brain*, ed. R.R. Llinás. New York: W. H. Freeman and Company, 1987.
- Tart, C., "Influence of previous psychedelic drug experiences on students of Tibetan Buddhism: A preliminary exploration," *J. Transpersonal Psychology*, 23, 2, 139-174, 1991.
- Wada, J. A., "The Clinical Relevance of Kindling: Species, Brain Sites and Seizure Susceptibility." In K. E. Livingston and O. Hornykiewics (Eds.), *Limbic Mechanisms: The Continuing Evolution of the Limbic System Concept*. New York: Plenum Press, 1976.

Wilber, K. "The Spectrum of Development." In *Transformations of Consciousness*. Boston: Shambhala, 1986.