

The Dual Quadbrain Model and Modular Consciousness

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Abstract A multiple module model of human consciousness is needed because several powerful subconscious elements have been found which strongly influence behavior. Recognition of the existence of brain-mind modules is as old as written history. Recently, McLean's evolutionary Triune Brain model has been expanded to Morton's Dual Quadbrain Model of modular consciousness. The bilaterality of the cerebrum is necessary because the left hemisphere is specialized in top-down logic, which cannot occur in the same space as the right hemisphere's bottom-up orientation. These differences have led to the concept of hemisity, which is based upon which side of the anterior cingulate, part of the executive ego, was larger, thus determining the right or left brain-orientation of the individual. The cerebellum which is also bilateral, houses Freud's Superego with its life and social orientation, so often emulated in religion. It also houses the Thanatos, Reactive Mind, Pain Body, and mutated developmental arrest repair program (xDARP), source of conflict between mates leading to more than 50% to divorce in the US. Lastly, the brain core is also bilateral with Freud's ferocious wolf-Id on one side and the loyal and supportive dog-Id on the other. These produce the hostile or friendly ultimate brain output. With these seven brain modules active, we are a formidable society of seven.

Keywords Brain Mental Modules, Bilateral Brain, Hemisity, Subconscious, Unconscious, Preconscious

1. Introduction: Why a Multiple Mind Model of Consciousness is Needed

A single consciousness model of mind has never been able to account for the complexities of human behavior. Failure to understand, predict, or control behavior has resulted in enormous tragedy and suffering and has retarded brain research. That is, a single consciousness model has not accounted for the following: identity, volition, awareness, causality, responsibility, introspection, altruism, hypnosis, schizophrenia, hallucinogens, or spirituality. Furthermore, a single consciousness model cannot account for our many subconscious behaviors. "Yes, Tommy. We only use 10% of our brain. The other 90% uses us!" That traditional hidden 90%

is actually the sum of the subconscious activities of our evolutionarily evolved, bilateral four-layered brain.

2. Earlier Multiple Mind Models

In Greek-Platonic philosophy, the mind usually consisted of four parts: the soul, reason, the competitor, and appetite. In the religions of Judaism, Christianity, and Islam, there were often three consciousness elements: Me, the victim of fate; the Devil made me do it; and God help me! More recent psychological thought has used up to four consciousness elements. For example, Harvard Professor, William James [1] proposed the existence of the Material Self, the Social Self, the Spiritual Self, and Pure Ego. Early in the 19th century, Sigmund Freud [2] also felt there were four mind elements. They were Normal Consciousness, about which everyone knew, and three subconscious entities, which he called the Id, Ego, and Superego. Although he did not know the brain elements producing them, these have now become obvious, as described here.

Surprisingly, many neuroscientists today hold to the universal childhood belief in a single consciousness meme, which asserts that we know about and are responsible for everything we do and are. A notable exception was Paul McLean [3] at the National Institutes for Health in the USA who developed the Triune Brain Model, which consisted of three increasingly recent evolutionary layers. They were the Reptilian System, the Paleo-Mammalian (limbic) System, and the Neomammalian System, as illustrated in **Figure 1**.

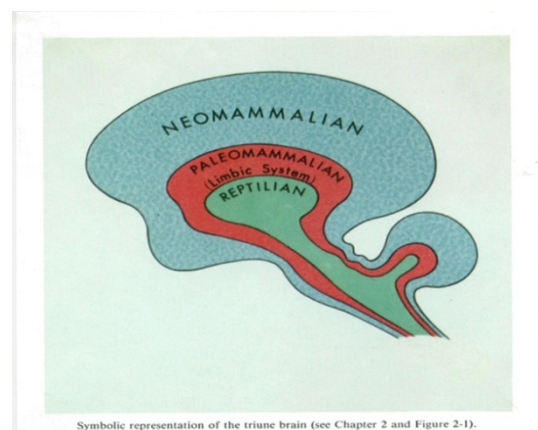
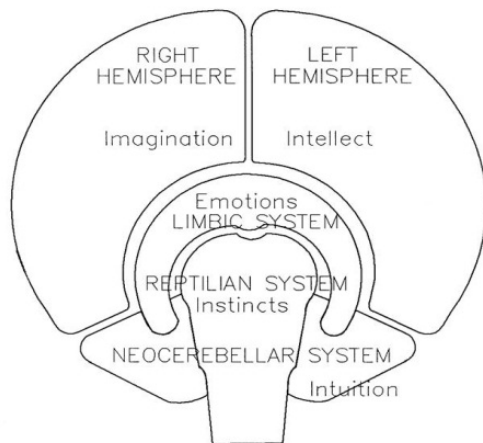


Figure 1. McLean's Triune Brain

3. The Quadrimental Brain Model

However, McLean's Triune Brain Model did not accommodate later discoveries of the many non-motor behaviors produced by the hindbrain cerebellum, an obvious major brain structure whose number of small cells totaled more than the entire rest of the brain. The neuronal activities of the cerebellum were not present in his model. For example, cerebellar autostimulation by institutionalized criminals remarkably reversed their murderous rage, turning them into cordial, socially appropriate individuals [4]. Further, the sites of Primary Memory have been found to be in the cerebellum [5]. The cerebellum is also required for language syntax generation [6]. Surprisingly, the cerebellum is also activated during faith healing, hypnosis, and during "control psychosis." Therefore, McLean's Triune Brain Model was expanded into the Quadrimental Brain Model by Bruce Morton [7] in 1985, (**Figure 2**). The four layers of this model included the 1. Cerebral System which "imagines and describes", 2. Limbic System which possesses ("has"), and controls, 3. Cerebellar System which "is" and knows, and 4. Striatum-Brain Core System which "does" the final output.

THE QUADRIMENTAL BRAIN



SOURCE OF HUMAN EXPERIENCE

Figure 2. The Quadrimental Brain

4. The Need to Move to a Dual Quadbrain Model

Yet, the entire vertebrate central nervous system is bilateral. That is, all of its structural elements are paired with each other on either side of the midline, like the two cerebral hemispheres are, for example. Each of these quadri-layered

bilateral elements of the quadrimental brain have been discovered not to be simple duplicates, but to provide a base for the two important elements for that level required brain function. That is, in general the left side appears specialized for self-survival conflicts against other organisms in the form of "win-lose" competition, if need be, fights to the death. The right sided members of the Quadrimental Brain appear to be dedicated to interactions at the next higher universe level, that of social relations within the family, where it is completely nonviolent in the form of "win-win or no deal."

The sole exception to brain bilaterality is the central pineal gland, an endocrine organ. That unique centrality led the French philosopher Rene Descartes in 1637 [9] to propose the pineal gland to be the seat of the soul. More recently, the hallucinogen DMT (dimethyl tryptamine) has been found in the pineal gland of sheep [10] and in human urine at particularly high levels in schizophrenics [8]. This gives substance to Descartes' seat of the soul idea and is consistent with the fact that DMT is also released under near-death circumstances to produce a profoundly altered state of consciousness, reminiscent of that produced in normal people by the administration of the endogenous hallucinogen DMT.

5. Bilaterality of the Cerebral Cortex

Awareness of sidedness in brain function appears to be as old as written history. For example, Diocles of Carystus in the 4th century BC wrote: "There are two brains in the head, one which gives understanding, and another which provides sense-perception. That is to say, the one which is lying on the right side is the one that perceives: with the left one, however, we understand." [11]. Although Diocles may have been the first to write about brain laterality, Marc Dax [12] was the first in the modern era to note a difference in function between the cerebral hemispheres. In 1836, he reported victims of stroke or other injury to the left hemisphere (LH), but not the right hemisphere (RH), could not speak. This hemispheric asymmetry for language was also thought to be tied to contra-lateral hand preference [13]. Among those 90% of humans who are right handed [14], language is located in the LH in over 95% of them [15]. Of the remaining about 10% of left-handed individuals, some 60% of these also have language in their left cerebrum [16]. Thus, the LH houses language ability in at least 9 out of 10 humans.

Nearly a century passed before reports of any further manifestations of hemispheric laterality. Then, a large study by Weisenberg and McBride [17] demonstrated a RH superiority for visuospatial skills. More recently, differences in cerebral structure and function were found in "split-brain" subjects. These individuals had been produced by treatment for intractable epilepsy by severing their corpus callosum, the only cerebral connection between the two hemispheres, thus limiting the spread of seizures from one side to the other [18, 19, 20].

Based upon the surprisingly different responses obtained by the interrogation of each of the disconnected hemispheres of split-brain subjects [19, 20, 21], investigators proposed that the right and left cerebral hemispheres are characterized by in-built qualitatively different and seemingly mutually antagonistic modes of data processing, necessarily separated from interference by the major longitudinal fissure of the brain [18, 22]. It is as if the brain uses opposite but complementary orientations to analyze what is going on in terms of survival.

In this model of the cerebrum (**Table 1**), the left hemisphere is specialized in top-down, deductive, cognitive dissection of local detail, while the right hemisphere orientation is a bottom-up, inductive, perceptual synthesis of global structure [18, 20]. Known laterality differences between them reinforced this context. That is, there are striking differences in input to each hemisphere, differences in internal neuronal-columnar architecture, and differences in hemispheric output [23, 24, 25, 26, 27].

Supporting the above view of opposite processing modes between the cerebral hemispheres is a large body of evidence, only briefly summarized here, that the left cerebral hemisphere in most right-handed individuals manifests facilities for language [16], has an orientation for local detail [28], has object abstraction-identification abilities [23], and appears to possess a hypothesis generating, event “interpreter” [20, 29, 30]. In contrast, the right hemisphere excels in global analysis [28, 31, 32], object localization [23], facial recognition [33] and spatial construction [34].

6. The Emergence of Hemisity

It is of interest that within this huge group of right-handed, LH-dominant speakers, the existence of two major human sub-populations has repeatedly been inferred, whose characteristic thinking and behavior styles differ in a manner that appeared to mirror the properties of the asymmetric hemispheres. That is, in some right-handed LH-languaged individuals, left hemisphere traits were proposed to be ascendant, producing a “left brain-orientated” thinking and behavioral style [31, 35]. Such left brain-oriented persons were top-down, important detail, deductive “Splitters.” Yet, in other right-handed, LH-languaged persons, right hemisphere traits are thought to be more prominent resulting in a contrasting Right brain-oriented style [36, 37], currently viewed as bottom-up, big picture, inductive “Lumpers”.

The original permanent assignment of the term “hemispheric dominance” to language laterality forced the creation of a different term that attempted to quantify these behavioral style differences within this huge group of right-handed LH-languaged individuals. That first attempt at this was under the term “hemisphericity” [38, 39] That approach created an enormous cul-du-sac in the literature of hundreds of papers, all ultimately debunked [40]. This was because individual hemisphericity was improperly defined as some unique point on a gradient between left and right brain extremes. Because, few were willing to place themselves at the extremes, this resulted in very weak evaluators, that of Zenhausern being the strongest [41].

Table 1. The Contrasting Orientations of the Cerebral Hemespheres

Left Cerebrum “Reporter”: Hears-Says	Right Cerebrum “Imagination”: Sees
Views the right foreground = <i>Important details</i>	Views entire background = <i>Big picture</i>
Wiring is local, convergent, top-down, serial	Is global, divergent, bottom-up, parallel
Deductive (general to particular): Understands	Inductive (particular to general): Conceptual
Stays within data limits: Literal, Surface view	Projects beyond limits: Intuitive-Metaphor
Sees Content: types within a universe level	Sees Context: hierarchies of univ. levels
“Splitter”: Reductive, breaks-down, extracts	“Lumper” Builds-up higher order processes
Abstract: digital, language, mathematics	Visual: analogue, imagination, projection
Symbolic: a word is worth a 1000 pictures	Visio-spatial: picture worth a 1000 words
Declarative-Auditory working memory	Visual-spatial working memory
Intelligence quotient, IQ: reports, interprets	Intelligence g-factor, evaluates, knows
Tool making: Technology	Tool using: Civilization

After a quarter of a century, of politically correct silence regarding hemispheric laterality, Morton [42] redefined hemispheric laterality in a more functional manner, called “hemisity”. He posited that brain laterality was not to be defined as on an individual gradient. Rather, one was born either genetically completely left brain-oriented or completely right brain-oriented. This produced robust data and led to the discovery by MRI of two neuroanatomical differences between right and left brainers. First, right brainers tend to have larger corpus callosi than left brainers

[41, 43]. Second, the asymmetric anterior cingulate was largest on the brain side of hemisity. The latter observation became the primary standard for hemisity and permitted the further calibration of the several pre-existing biophysical and questionnaire based assessors [44]. This led to a table (**Table 2**) of “either-or” left and right oriented behavioral choices, each approximately 80% accurate, but when combined producing 96% certainty of hemisity identity. This entire work has been integrated and reviewed [45].

Table 2. Thirty Behavioral Correlates of Hemisity

<u>LEFT BRAIN-ORIENTED PERSONS</u>	<u>RIGHT BRAIN-ORIENTED PERSONS</u>
<u>LOGICAL ORIENTATION</u>	
Analytical (stays within the limits of the data)	Sees the big picture (projects, predicts)
Uses logic to convert objects to literal concepts	Imagines, sees contexts, and metaphors
Decisions based on objective facts	Decisions based on feelings, intuition
Uses a serious approach to solving problems	Use playful approach to solving problems
Prefers to maintain and use good old solutions	Would rather find better new solutions.
<u>TYPE OF CONSCIOUSNESS</u>	
Daydreams are not vivid	Has vivid daydreams
Doesn't often remember dreams	Remembers dreams often.
Thinking often consists of words	Thinking often consists of mental images
Comfortable and productive with chaos	Slowed by disorder and disorganization
Can concentrate on many things at once	Ponders one thing in depth at a time
Often thinking tends to ignore surroundings	Observant, in touch with surroundings
Often an early morning person	Often a late night person
<u>FEAR LEVEL AND SENSITIVITY</u>	
Conservative and Cautious	Bold and Innovative
Sensitive in relating to others	Intense in relating to others
Tend to avoid talking about emotional feelings	Talks about own and others emotions
Suppresses emotions as overwhelming	Seeks to experience or express emotions
Would self-medicate with depressants	Would self-medicate with stimulants
<u>SOCIAL AND PROFESSIONAL ORIENTATION</u>	
Independent, hidden, private, and indirect	Interdependent, open, public, and direct
Avoids seeking evaluation by others	Seeks frank feedback from others
Usually tries to avoid taking the blame	Takes blame, blames self, or apologizes
Does not praise others nor work for praise	Praises others, works for praise of others
<u>PAIR-BONDING STYLE AND SPOUSAL DOMINANCE</u>	
After an upset with spouse, needs to be alone	After spousal upset, needs closeness
Tolerates mate defiance in private	Cannot tolerate mate defiance in private
Needs little physical contact with mate	Needs a lot of physical contact with mate
Tends not to be very romantic or sentimental	Tends to be romantic and sentimental
Prefers monthly larger reassurances of love	Likes daily small assurances of love
Thinks-listens quietly, keeps talk to minimum	Thinks-listens interactively, talks a lot
Does not read other people's mind very well	Good at knowing what others think.
Often feels their mate talks too much	Feels mate doesn't talk or listen enough.
<u>Lenient parent, kids tend to defy</u>	<u>Strict, kids obey and work for approval</u>

In terms of modular consciousness, the conclusion regarding differences between the cerebral hemispheres is that under normal conditions, our conscious thinking is restricted to that of our left hemisphere Reporter and right hemisphere Imagination. As to the origin of an individual’s hemisity, it appears to be genetically determined before birth [46, 47].

7. Laterality of the Executive Ego Determines Hemisity Subtype

Hemisity results from localization of the Executive Ego within either the left or right cingulate cortex, (Table 3), with consequent reduced access to the skills of the more distant asymmetric hemisphere. One of its functions is to chose whether to use “win-lose” violent competition-oriented brain elements of the “Id” to solve life’s inevitable problems, or to use “win-win” cooperating brain elements of the “Superego” to enhance survival.

In the last two millennia, the ego has evolved to become enormously developed [48]. Its top down discriminations have expanded into all areas of life. Its specialty is deductive distinction, that is, how things differ from each other. This has produced an explosion in mathematics and quantitative science, which has freed us from having to be a primary food source. This breakthrough has fueled the ongoing exponential growth of the population, the development of science, and is currently fueling our flights to the Moon and Mars.

In terms of modular consciousness, the ego makes these discrimination at least a one second before we, up in the cerebrum, become aware of its choices [49, 50]. We then simply go along and rationalize its decisions, as if we made the choice ourselves (Figure 3). The ego is also the source of the hexadyad primary emotions [51], by which it motivates other brain elements to act. If it doesn’t succeed, it also contains an extensive group of ego defenses of the Id [52, 53] to rationalize its failures.

Table 3. The Side-Dependent Properties of the Unilateral Executive Ego

<p>LP = a Left Brain-Oriented Person Left anterior cingulate is the largest in LPs Can reach R-brain via corpus callosum. Left limbic system: thinks it controls everything Produces Ego Defenses of Id, confabulates Asks: how is this different than earlier-similar events? Distinguishes differences by deduction</p>	<p>RP = a right brain-oriented person Right anterior cingulate is the largest in RPs Can reach L-brain via corpus callosum Right limbic system: Dyslexia if memory on left. Knows faces, expressions, body talk Asks: how is this the same as earlier-similar events? Detects similarities by induction</p>
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Figure 3. Who is in Control, Executive Ego or Intellect? A Hint from a Hawaiian Shirt

Table 4. The Bilateral Cerebellar Social Brain

Thanatos: is, Hates	Eros: IS, Loves (Superego)
xDARP Memory: is too charged to access	Primary Memory
Our “Dark Side” Intellect	Our “Higher Intelligence”
Evil, Devil-within, Insanity	Good, God-within, Wisdom
Diabolic, Superstitious	Inspired Source, Religious
Rejects what IS, Resists it.	Accepts what IS, Chooses it as perfect
Angry, Failing, at Effect	Happy, Successful, at Cause
Victim in one’s Universe	God in one’s Universe
Sees no possibility, Nightmares	Sees possibility, Visions
Negative, Pessimistic	Positive, Optimistic
Parasitic, Wasteful	Synergistic, Conservative
Avoids work, Chaotic	Works hard, orderly
Irresponsible, Lies, Cheats, Steals	Responsible, Honest, Ethical, Non-violent
Revengeful, Mutilates, Kills	Guilt, Conscience

As indicated above, the laterality of the ego shows itself in terms of a person’s inborn hemisity [45]. If the larger side of the cingulate cortex is on the left, the person will be a left brain detail-oriented conservative person. If it is on the right, the person will be a right brain oriented big picture oriented.

This brings to three the brain modules discussed thus far: the Intellect, the Imagination, and the Executive Ego.

8. Laterality of the Cerebellum: The Divine Superego and the Diabolic Thanatos

Next, we turn to the physical and social behavior produced by bilateral cerebellum, the brain structure containing more neurons and glia than the entire rest of the brain. In a way, the cerebellum appears to operate as a second independent brain system. It uses the regularity of its structure to contain one’s primary memory [5] in the form of a continuous time track that began prenatally and keeps recording until death. This enormous record gives it knowledge of time and the sequence of events, to establish causality and morality. Its skill is in the simultaneous coordination of multiple elements, for example, the coordination of an organism’s muscles, tendons, and bones to produce the infinity of efficient and graceful movements required for life and its expression. This early manifested itself in the coordinated behavior of large groups of social organism: the swarming of bees or locusts, the schooling of fish, the flocking of birds, migration of reindeer, and the trouping of monkeys.

Later, the cerebellum was found to be required for language syntax, that is, the coordination of thousands of words about “who did what to whom” to produce meaning via accurate, specific descriptions. Thus, the cerebellum

functions in non-motor associative learning, working memory, visuo-spatial abilities, verbal fluency, syntax, reading, and writing [6]. Many of these non-motor activities have been localized to the right side of the cerebellum, which is connected to the left cerebral language hemisphere [6] (**Table 4**).

In addition to these God-like traits, separate non-Id based antisocial character of the cerebellum has also been noted. This has been termed the Todestrife by Freud and Thanatos by others [2], the Reactive Mind, by Hubbard [54] and the Pain Body by Tolle [55]. These repetitive behaviors have recently been recognized as the action of a mutated developmental arrest repair program (xDARP) (Morton, 2011). This broken program, unaware of its lost capacity, compulsively still attempts to repair early childhood developmental arrests. It does so by dogged repetition of the following specific behaviors, which are the source of endless conflict between friends and lovers, and lead to the incredible >50% divorce rate we presently have in the US.

xDARP-induced repetitive behaviors of the perpetrator include the following: 1. By subconscious infatuation, it locates, and seduces a “parent figure” target from the present environment, often of the opposite sex. When, the target finally expresses their love and acceptance of the xDARP-activated person, often marrying them, the xDARP feels safe to act. It does so by, 2. age regression, 3. transferring upon the victim the unresolved childhood conflict that led to their original developmental arrest-deficit. Then it, 4. Sets up the ancient conflict again to finally gain control. It then, 5. Acts out, by compulsively repeating the developmental theme, and, 6. escalates the struggle to gain control of their “parent figure” target. After a few months of this, the target begins to think that something is wrong, that these endlessly repeated unresolved conflicts appear to be

increasingly insane. This; often activates the victim’s own xDARP and in the resulting intense conflict, their marriage crashes and burns. This irreversibly damages their children to repeat the cycle in the next generation.

9. Laterality of the Brain Core

Lastly, we come to the bilateral brain core Id (**Table 5**). The left side can act as a ferocious wolf, fighting enemies to the death. Or, under other conditions, the right side of the brain core serves to cooperate, like man’s best friend, the dog, or a servant; where the Ego’s wish is its command. These

two brain core Ids are the final output effectors of the entire brain.

To sum up:

1. Right cerebral Imagination
2. Left cerebral Reporter
3. Bilateral limbic Executive Ego
4. Cerebellar Superego
5. Cerebellar xDARP
6. Brain core wolf Id
7. Brain core dog Id

Seven conscious brain modules [45]. Thus, we each are a formidable Society of Seven (**Figure 4**).

Table 5. The Bilateral Brain Core:

Left Pons	Right Pons
Self-preservative instincts and drives	Species preservative instincts and drives
Punished Avoidance	Rewarded Approach
Sensitive Introvert	Intense Extrovert
Defensive Aggression	Sex-Reproduction
Sympathetic Nervous System Stress Response	Parasympathetic Nervous System Rest and Repair
Antisocial, Rejects others as aliens	Social, Accepts others as family
Immediately gratifying	Defers self-gratification
Defies Authority	Defers to Authority
Adversarial, Rigid	Cooperative, Adapts
Must be right, win, dominate, look good	Must tell the truth, assist, serve at all costs
Win-lose rules, winner takes all	Win-win or no deal, winnings shared
Size based peck order	Leadership based upon excellence
Follows winners, bullies losers	Honors wisdom first, then
Type A, PTSD, Alexithymia	honors others as oneself.

THE DUAL QUADBRAIN OF MAMMALS

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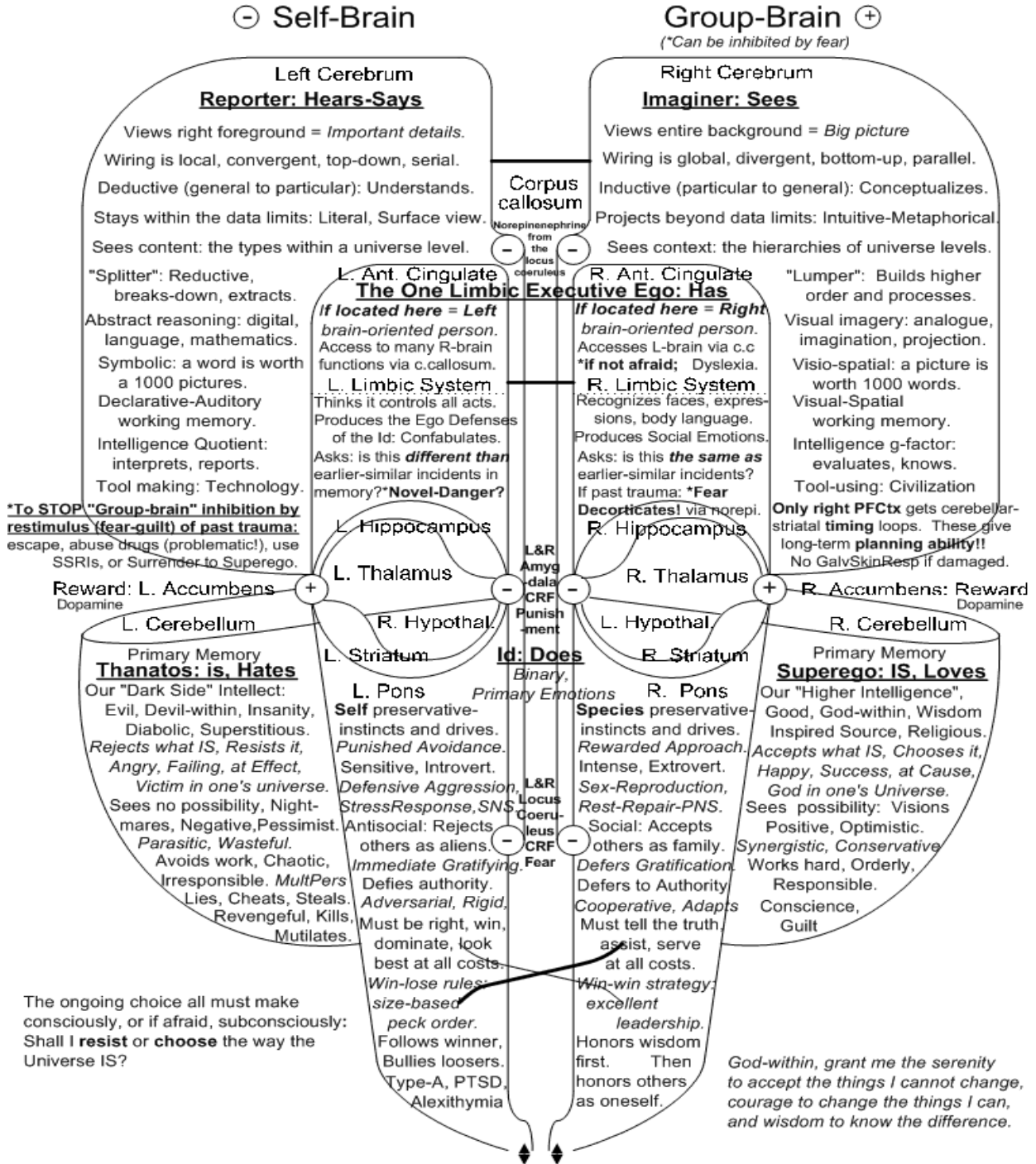


Figure 4. The Dual Quadbrain of Mammals

10. Who is in Control? Whoever it is that Gains Access to One's Seat of Consciousness

Whoever of our seven consciousness modules occupies our brain's seat of control at a given time determines our behavior. We cannot easily tell who that is, except by our

associated thoughts and behavior. I may be playing my guitar and singing sweetly to my darling with my right hemisphere Imagination, when along comes another guy who pats her fanny. I next find myself in a violent rage with my wolf Id activated to kill. Yet, it's all the same to me. Thus, it is usually a variation of the "Great Controversy" between the self-oriented Id and the family oriented, non-violent self.

Clearly, awareness of modular consciousness is an essential tool toward peace and harmony. This topic has been also described in in a book length format [56].

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