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The cognitive ‘Duality Principle’: A resolution of major scientific conundrums

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Abstract: A logical analysis of the psychophysical (and perceptual illusions) experimental designs has indicated the superiority of cognitive computational processes over mere physical stimulation in determining our perception of the world (the ‘cognitive reality’). However, since the psychophysical laws rely on a higher-ordered ratio-scale cognitive computation of the relationship between two different physical stimuli, the cognitive Duality Principle asserts that our knowledge of any physical relationship depends on -- and is constrained by -- the existence of a higher-ordered cognitive computational system that is external to the physical interacting system. It is hypothesized that the ignorance of the basic Duality Principle (that constrains the cognitive reality) has led to the formation of various modern scientific conundrums (such as the logical-mathematical ‘liar paradox’, the quantum- ‘uncertainty principle’ and ‘particle-wave duality’, Relativity’s ‘constancy of the speed of light’, Darwin’s ‘natural selection process’ and the Neuroscientific ‘materialistic reductionism’). Finally, the Duality Principle’s resolution of these scientific conundrums may call for a reformalization of quantum mechanics as a hierarchical-positivistic wave theory, an alternative conceptualization of Relativity Theory that isn’t based on the constancy of the speed of light, and a hierarchical-dualistic cognitive reconceptualization of logic-mathematics, Evolutionary Theory and Neuroscience.

The existence of the ‘cognitive reality’

In a previous article (Bentwich, 2002a), the existence of the ‘cognitive reality’ was suggested, whereby our perception (and knowledge) of the physical world is entirely constrained by complex cognitive computational processing, rather than is caused by mere physical stimulation. The existence of the cognitive reality was initially supported through a logical analysis of the perceptual illusions experimental design. This logical analysis indicated that our perception of the ‘test-items’ (dependent variable) is determined by the manipulation of the differential ‘cognitive cues’ (independent variable) rather than by the constancy and equality of the physical test-items, thereby supporting the existence of the cognitive reality.

However, the perceptual illusions experimental design doesn’t differentially manipulate the physical stimulation, thereby not allowing to contrast the relative effect of physical stimulation vs. cognitive computation on our perception of the world. Hence, a logical analysis of the psychophysical laws (that directly contrast the impact of physical stimulation and cognitive psychophysical computation on our perception of the world) was next performed. The psychophysical laws indication that an increase in the physical intensity of the stimulus (the independent variable) doesn’t lead to a change in perception (dependent variable)- unless it exceeds the cognitive computational psychophysical ratio- directly supported the existence of the ‘cognitive reality’. Finally, the existence of the cognitive reality was also supported by the basic neuroscientific ‘information processing model’, as well as by various ne

uropsychological deficiencies. Utilizing the large theoretical neurocognitive body of knowledge underlying visual p erception, it was shown that our sole perceptual-knowledge of the physical world is entirely constrained by a set of highly complex cognitive computational transformations of the original two-dimensional, inverted, fragmented, fl uctuating array of retinal colors and shapes. Hence, the superiority of cognitive computational processing over me re sensory stimulation in determining our perception and knowledge of the physical world (the cognitive reality) w as supported both through a logical-empirical analysis of the psychophysical (and perceptual illusions) experiment al paradigms and the fundamental neuroscientific 'information processing model'.

The Cognitive Duality Principle

However, a closer reexamination of the computational basis underlying the cognitive reality- particularly p ertaining to the psychophysical laws, indicates the existence of a fundamental cognitive "Duality Principle". A logic al analysis of the psychophysical laws experimental design (Bentwich, 2001) indicated that our ability to perceive (or know of) any change in physical stimulation critically depends on transcending a cognitive computational thres hold (rather than is directly produced by an increase/decrease in the intensity of the physical stimulation). Thus, fo r instance, Weber's psychophysical law (1834) indicates that our ability to detect any change in physical stimulati on depends on the cognitive computation of a proportional increase/decrease in physical stimulation. However, b ased on the fundamental principles of measurement theory (Narens, 1985), it is clear that in order to compare the physical intensity of the first and second stimulus, it is necessary to encode both stimuli within a higher-ordered rat io-scale cognitive computational system. Thus, a basic tenet of the cognitive 'Duality Principle' is that in order to determine the physical relationship between any two sensory stimuli (or events), it is necessary to have a higher-o rdered cognitive ratio-scale computational system. Obviously, such a higher-ordered cognitive computational pro cessing system isn't contained within the actual physical stimulation since the ratio-scale encoding of the sensory s timulation involves a computational transformation.

Since the cognitive Duality Principle constrains the psychophysical laws, which in turn critically determine our knowledge of any physical change in the world, then the Duality Principle actually constrains the 'cognitive re ality' (as defined in the previous article). This is because our knowledge of any physical relationship in the world c ritically depends on the cognitive psychophysical computation of a proportional increase or decrease in physical s timulation. However, the psychophysical computation (of a proportional increase/ decrease in physical stimulatio n) necessarily relies on a higher-ordered ratio-scale cognitive encoding system- that is external to the original sens ory stimuli. Therefore, the Duality Principle asserts that our basic ability to determine any physical relationship (be tween at least two stimuli) critically depends on the existence of a higher-ordered (ratio-scale) cognitive computat ion that is external to the two interacting stimuli. Finally, since the Duality Principle constrains all (of our) knowled ge of change in the physical world (e.g., the cognitive reality), the violation of the Duality Principle may result in an apparent inability to determine any type of physical (or logical) relationship, or to seemingly paradoxical empirical findings. As a matter of fact, it is hereby hypothesized that the ignorance of the Duality Principle (constraining the cognitive reality) has led to the emergence of several major modern scientific conundrums- within the disciplines o f Logic-Mathematics, Physics, Evolutionary Theory, and Neuroscience.

More specifically, it is suggested that the Quantum- 'uncertainty principle' and 'particle-wave duality', the logical-mathematical- 'liar paradox' and 'Gödel's incompleteness theorem', Relativity's assumed 'constancy of th e speed of light', Darwin's basic evolutionary 'natural selection' principle, and the basic neuroscientific materialisti c-reductionistic tenet- are all instances that arise from the ignorance (or violation) of the basic Duality Principle th at constrains the cognitive reality. It is hypothesized that each of these scientific conundrums arises from an ignora nce of Duality Principle's insistence upon the existence of a higher-ordered (ratio-scale) cognitive computation th at is external to the studied interacting physical system.

The Quantum Uncertainty Principle's Violation of the Duality Principle

Thus, for example, it is hypothesized that the famous Quantum 'uncertainty principle' (Heisenberg, 1927) arises from the lack of a higher-ordered cognitive ratio-scale measuring system- to the interacting 'probe' and 'ta rget' subatomic entities. The uncertainty principle states that it is not possible, in principle, to transcend a given ac curacy level for the simultaneous measurement of the target's location and energetic values (or of its time and mas

s). The rational for this meta-physical assertion is that the very interaction of the subatomic probe and target entiti es produces an interdependency (or complimentarity) between the measured values of the target's spatial location and energy (or its mass and temporal positioning). This is because in order to increase the spatial accuracy measu rement of the target's position it is necessary to shorten the probe's wavelength, which in turn intensifies the prob e's disturbance of the target's original energetic value (Figure 1). The far-reaching implications of the Quantum un certainty principle lie in its conceptual rather than technological crux, implying that hypothetically- even in a thousa nd years, with the advent of much more sophisticated subatomic measuring technologies- it would not be possible to transcend this conceptual complimentarity measurement constraint. This is due to the presumable basic subato mic experimental constraint, whereby in order to know of the target's location (or any other physical property), it is necessary to send an interacting probe that would necessarily alter its complimentary measurement value. Henc e, one of the pronounced theoretical implications of the 'uncertainty principle' had been the only probabilistic pre dictive nature of Quantum Mechanics (instead of hitherto acceptable positivistic scientific determinism) (Cramer, 1986).

Figure 1: The Quantum Uncertainty Principle's Violation of the Duality Principle

Note: The Quantum uncertainty principle violates the Duality Principle through the lack of a higher-ordered cognitiv e computation to the probe-target interacting system. This is because the complimentary accuracy limitation (e.g., of say measuring simultaneously both the spatial and energetic values of a target entity) arises from the direct interacti on of the probe with the target entity- if we increase the spatial accuracy of the probe target (as depicted by the bold er wave in the figure), we necessarily decrease the energetic accuracy of our measurement (due to the shorter wavele ngth's higher disturbance of the energetic value of the target). It is suggested that the "uncertainty principle's" con ceptual constraint of the accuracy level of simultaneous complimentary physical properties arises merely due to the l ack of the Dualistic higher-ordered contextual measurement of the probe-target interaction.

However, a re-examination of the basic subatomic experimental design underlying the rational of the unce rtainty principle may indicate that it violates the basic Duality Principle that was shown to constrain our knowledg e of the world (the cognitive reality). This is because the basic subatomic experimental design wherein a probe wa ve is sent to measure the physical properties of a target- evidently doesn't include a third higher- ordered (ratio-s cale) cognitive measurement system that is external to the interacting target and probe entities. Thus, for example, the physical measurement of the target's spatial position depends entirely on the amount of time that it takes for a particular probe wavelength to reach the target and bounce of to the surrounding measuring tube. However, since the cognitive computation of the target's spatial localization entirely depends on its physical interaction with the pr obe wave- rather than on a higher-ordered ratio-scale measuring system (that may measure the relative physical p roperties of both the target and probe entities)- it violates the cognitive Duality Principle. Therefore, it is suggeste d that the hitherto subatomic design's violation of the Duality Principle (through the lack of a higher-ordered rati o-scale cognitive computation to the probe-target physical interaction) may have led to the apparent "uncertainty" regarding the simultaneous measurements of complimentary physical properties.

In order to demonstrate the emergence of the quantum "uncertainty principle" from the violation of the co gnitive Duality Principle an equivalent perceptual phenomena will be hence analyzed. Imagine that you are placed within a train in a dark night, and that your only knowledge of the external world comes from a small peeking hole that allows you to see only the lights of approaching luminary objects, such as trains or tiny pin-point of light (Figu re 2). Because of the external darkness, you cannot perceive any contextual cues from the environment (such as t

he train tracks, the trees, the horizon, etc.) Based on the cognitive 'size constancy principle', it is clear that such a non-context cognizant observer (as yourself) would not be able to differentiate between a far-rapidly approaching train and a near but slowly approaching pin-point of light!? This is because according to the size constancy principle, the cognitive computation of depth depends on the comparison of the retinal image size of the object (e.g., the train or the pin-point of light) with their surrounding distal contextual cues (such as the relative size of trees, people, etc.). Based on the comparison of distal contextual cues and the semantic size constancy (of the train or pin-point of light), the cognitive computational system is capable of distinguishing between the distant (fast) train and the near (slow) pin-point of light. However, the cognitive computation of the differential depth and velocity (of the far-fast train vs. the near-slow pin-point of light) is entirely dependent on the existence of the higher-ordered ratio-scale contextual cues. In the absence of such higher-ordered contextual cues the cognitive computational system can't discern between the far-fast train and the near-slow pin-point of light (since both produce equivalent spatial-temporal retinal image size increase).

Figure 2: Equivalent "Perceptual Uncertainty" Induced by the Lack of Higher-ordered Cognitive Contextual Cues.

Note: It is hypothesized that a non-contextual cognizant train observer may not be able to differentiate between a far-fast approaching train and a near-slow approching pin-point of light. Moreover, to determine the precise spatial value of the approaching (train or pin-point of light) object, the non-contextual cognizant observer would need to shoot at it a fast "bullet" that would necessarily alter its "complimenatry" energetic value (thereby inducing a parallel perceptual "uncertainty principle"). Needless to say that such "perceptual uncertianty" may be resolved through the recognition of the Duality Principle's assertion for the necessity to include a higher-ordered contextual cognitive cues to the observer- (approaching) object physical interaction.

Viewed from the perspective of the cognitive Duality Principle, the spatial-temporal relationship between the observer and the approaching (train or pin-point of light) object- may only be determined externally to this interacting system. Therefore, in the lack of external contextual cues to the observer-approaching object interaction, it is not possible to determine (positivistically) the spatial-temporal values of the approaching object. However, it is clear that this "uncertainty" regarding the precise spatial-temporal configuration of the approaching (train or pin-point of light) object is immediately clarified- with the introduction of the higher-ordered contextual cognitive computational cues. Furthermore, it is important to note that under the constrictive non-contextual cognizant conditions of the train-observer, the only viable means for the observer to determine the spatial-temporal value of the approaching object is through shooting some type of a "bullet" a the approaching at it (Figure 2). Thus, for example, the non-contextual cognizant observer may compute the spatial localization of the approaching object through the time it takes the bullet to hit the target object (evidenced either by the spark of collision or through a more accurate ricocheting of the bullets splinters reaching back to the observer's train). However, in complete corollary to the assumed "complimentarity" of the quantum "uncertainty principle", such an intrusive measurement interaction of the bullet with the (train or pin-point of light) object would necessarily alter its original velocity. Thus, it seems that it is only given the violation of the basic cognitive Duality Principle, that the apparent "uncertainty" regarding the simultaneous measurement of "complimentary physical properties" emerges- in both the quantum and perceptual domains. Finally, it will later on be argued that the non-contextual cognizant observer's "uncertainty" regarding the identification of the far-fast train vs. slow-near pin point of light is also metaphoric of quantum mechanics' only probabilistic distribution of particle measurements along the wave function (since the identity of different spatial-temporal localized particles may be confused in the absence of the higher-ordered contextual measurement ordained by the cognitive Duality Principle).

Thus, it is hereby suggested that the hitherto quantum assumed "uncertainty principle" arises from the lack of a higher-ordered observer to the interaction between the probe and target entities, within current physical subatomic experimental designs. Therefore, it is hypothesized that the introduction of a third higher-ordered ratio-scale measuring agent that is external to the probe-target interaction may circumvent the hitherto assumed "uncertainty principle". Thus, for example, an alternative subatomic experimental design could be utilized, whereby the probe entity would consist of an unstable radioactive material that would produce an explosion once it hits the target (Figure 3). In such a novel subatomic experimental design, it should be possible (in principle, at least) to increase the simultaneous measurement accuracy of both the spatial localization and energetic values of the target. This is because the use of a third higher-ordered measurement system for the target-probe interaction (which consists of the target-probe explosion ricochet measurement) eliminates the interdependency of the (spatial-temporal) complimentary measurements. Thus, for instance, we could shorten the radioactive probe's wavelength (or produce a more powerful and accurate radioactive explosion)- that would allow us to increase the accuracy of both the spatial position and energetic value of the target (through the higher-ordered cognitive computation of the intersection of the ricochets).

Figure 3: Hypothesized Non-Complimentary Subatomic Experimental Design

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Hence, it is suggested that perhaps the hitherto assumed Quantum "uncertainty principle" may actually arise from the ignorance of the basic duality principle constraining the cognitive reality. It is hypothesized that the introduction of alternative dualistic subatomic experimental paradigms that utilize a third higher-ordered ratio-scale measurement of the probe-target interaction may enable us to transcend the uncertainty principle's assumed constraining of the simultaneous accuracy measurement of complimentary physical properties. Finally, it is also suggested that along with the duality principle's resolution of the hitherto "particle-wave duality" Quantum conundrum (later to be discussed), a possible positivistic reformalization of Quantum Mechanics as a positivistic wave theory, may be sought.

The Duality Principle's Resolution of the Liar Paradox and Gödel's Incompleteness Theorem

In the scientific disciplines of Logic-Mathematics, both the Liar paradox and Gödel's Incompleteness Theorem loom as unresolved conundrums that have failed Whitehead and Russell's famous "Mathematical Program" (to construct mathematics and the other scientific disciplines purely on the basis of logic) (Epstein, 2001; Quesada, 1997). It is hereby suggested that both the Liar paradox and Gödel's Incompleteness Theorem arise primarily from the ignorance of the hierarchical structure of the cognitive duality principle. This is because both the Liar paradox and Gödel's Incompleteness Theorem attempt to determine logical-mathematical relationships between (at least two) interacting entities- from within this interacting system, which is contrary to the Duality Principle's insistence upon placing the cognitive computation externally to the two interacting entities.

The Liar Paradox is a special type of self-referring syllogism (e.g., "this sentence is a lie") that leads to a logical inconsistency, when we attempt to determine its truth-value. This is because if this sentence is true, then its semantic meaning implies that it is false (thereby leading to logical inconsistency). Conversely, if the truth-value of the sentence is false, then it implies that its semantic meaning has to be reversed implying that the sentence is true (which again leads to logical inconsistency). The liar paradox's logical inconsistency represented a major hindrance to the development of the "Mathematical Program" (Whitehead & Russell, 1910, 1912, 1913), because it debilitated the major tool for reformulating mathematics purely on the basis of the logical recursive mechanism of group theory- namely: "Set Theory". Indeed, were it not for the logical inconsistency produced by the liar paradox, Whitehead and Russell were able to derive all of the varied mathematical operations and laws solely on the basis of the logical function of group belongingness. As a matter of fact, it is precisely because of the Liar's paradox (and its variants) inherent threat to logical consistency, that an axiomatic reformalization of set theory was ensued.

However, although the hierarchical axiomatization of set theory has formally banned the occurrence self-referral logical inconsistencies (such as the Liar Paradox), it wasn't able to repair the Mathematical Program's atte

mpt to infer mathematics (and the other sciences) from logic. This is because the introduction of an “arbitrary axiomatic” restriction of self-referral logical conjunctures doesn’t represent a natural logical extension of set theory. Within logic, there doesn’t seem to exist any intrinsic constraint to the capability of a set to include itself as an item within that set (such as in “the set of all sets”). Not only doesn’t recursive logic limit self-referral grouping but more importantly, there exist numerous semantic (e.g., ‘real-life’) categories that require self-referral statements- which do not necessarily lead to logical inconsistency. Thus, for instance we may think of highly meaningful self-referral utterances such as “this sentence is beautiful” or our basic human consciousness of “existing as an independent I”- do not lead to any logical inconsistency. Therefore, the axiomatic negation of self-referral statements may only rid logic from its unresolved Liar paradox conundrum- but at the high expense of admitting to the “irrationality” of Logic-Mathematics as well as the ignorance of important aspects of human cognition and semantics.

However, a closer reexamination of both the Liar Paradox and Gödel’s Incompleteness Theorem indicates that they may arise from a violation of the basic Duality Principle constraining the cognitive reality. This is because the truth-value of any syllogism is determined by the consistency relationship between its assumption and conclusion segments, which (according to the Duality Principle) may only be computed by a higher-ordered cognitive system. Thus, for example, the (classical) syllogism:

If A ---> B
A
B

is considered to be a true (or logically consistent) statement, because the same pattern of A-B relationship exists both in the first assumption- and in the second assumption and conclusion of the syllogism. Hence, perhaps a better way of formalizing the logical inference of the given syllogism would be:

if A---> B
A
B

Such novel formalization of logical inference clearly indicates that the truth-value of any syllogism (or logical conjuncture) is determined by the consistency relationship between the A-B pattern of interaction in the first assumption and the conclusion segment of the syllogism (as depicted under the novel separation line drawn above). Since the pattern of A-B interaction is consistent in the assumption and conclusion segments of the syllogism (given above), the syllogism is considered to be true.

Note, however, that according to the Duality Principle, in order to determine whether or not the A-B pattern is consistent across the assumption and conclusion segments of the syllogism, it is necessary to measure both within a higher-ordered ratio-scale cognitive computational system (Figure 4). Thus, the truth-value of the syllogism is derived from a higher-ordered cognitive computation of the consistency in the A-B interaction across its assumption and conclusion segments. Therefore, the Duality Principle asserts that the truth-value of any logical syllogism (or conjuncture) may only be determined by a higher-ordered cognitive computational system- that is external to that syllogism. But, a closer analysis of the Liar Paradox clearly indicates that it violates the Duality Principle by inserting the (higher-ordered cognitive) truth-value as an integral part of the syllogism itself. This is because within the Liar Paradox “this sentence” may be considered to be the A segment, whereas “is a lie” is the B segment of the syllogism. However, contrary to the basic constraint of the cognitive duality principle, the truth-value of the syllogism doesn’t exist externally to the syllogism but is rather embedded within it as an integral part of the A-B interaction (e.g., as the B segment of this syllogism). Hence, it is suggested that the liar paradox’s inclusion of the higher-ordered cognitive computational truth-value within the A-B interaction of the syllogism violates the basic Duality Principle (constraining the ‘cognitive reality’).

Figure 4: The Hierarchical-Dualistic Organization of All Logical-Mathematical Inference

Note: The truth-value of any logical-mathematical conjunction is determined through the higher-ordered cognitive c omputation of the consistency in the A-B relationship across the assumption and conclusions segments of the syllo gism.

In order to enumerate the precise violation of the cognitive Duality Principle enacted by the Liar Paradox, let us compare the 'standard' (non self-referral) syllogism, a non-paradoxical self-referral syllogism and the Liar p aradox (which is a self-referral paradoxical syllogism); As suggested above, the truth value of the 'standard' (no n-self referral) syllogism is determined by the consistency relationship that exists between the A-B interaction in th e (first) assumption and (extended) conclusion segments of the syllogism, which is computed by a higher-ordered cognitive computation (that isn't a part of the syllogism itself). In self-referral non-paradoxical (legitimate) syllogis ms (such as "this is a sentence; It is beautiful; therefore, this sentence is beautiful" or "I exist; This I is hungry; The refore, I am hungry"), the syllogism contains semantic information that refers to itself. However, the truth-value of this self-referral syllogism doesn't lead to any logical inconsistency because its truth-value is determined by a high er-ordered cognitive computation- rather than is contained within the syllogism itself. It is only when a self-referral syllogism actually attempts to insert the higher-ordered dualistic cognitive computation of the truth-value into the (A-B) interaction of the syllogism that the Duality Principle is violated, thereby leading to an inability to determine its logical truth-value.

Therefore, the logical inconsistency created by the Liar Paradox arises not from its self-referral characteri stic but rather from the insertion of the dualistic cognitive computational truth-value into the (A-B) interaction of th e syllogism. Hence, contrary to the hitherto axiomatic abolition of self-referral logical-mathematical conjunctures (within axiomatic set theory), the Duality Principle's resolution of the Liar Paradox points at the intrinsic hierarchic al cognitive computational structure of all logical-mathematical inference (as well as doesn't omit alternative meani ngful self-referral syllogisms).

More Generally, it is suggested that Gödel's Incompleteness Theorem extends the basic cognitive hierarc hical-dualistic constraint of all Logical-Mathematical inferences. This is because Gödel's Incompleteness Theore m points at the inability to prove the logical consistency (or truthfulness) of any logical-mathematical system from within that system. So far, Gödel's Incompleteness Theorem was viewed as the final conceptual "tombstone" to Whitehead and Russell's visionary "Mathematical Program" because it indicated that the validity of any logical-m athematical formal system couldn't be proven from within that system. Therefore, Gödel's Incompleteness Theor em was considered as a conceptual proof for the "irrationality" of Logic-Mathematics, that is the inability to base mathematics and the other sciences upon the basis of a finite logical inference.

However, the Duality Principle has indicated that any logical (or mathematical) inference is based on- and constrained by- a higher-ordered cognitive computation of the truth value's consistency relationship between the A-B interaction in the assumption and conclusions segments of the logical syllogism (or mathematical argument). Therefore, the Duality Principle constrains logical-mathematical inference as necessarily based upon a higher-orde red cognitive computation, which per definition may not be included within the logical-mathematical (A-B) interac ting syllogism. But, since Gödel's Incompleteness Theorem points precisely at the higher-ordered placement of th e truth-value of any formal mathematical system as external to that system, it actually supports the assertion that o

ur knowledge of the world (the cognitive reality) is constrained by the cognitive Duality Principle. Hence, instead of the Liar Paradox and Gödel's Incompleteness Theorem hindering Whitehead and Russell's Mathematical Prog ram (to base Mathematics and the other sciences on the foundation of Logic), they actually point at the need to b ase the Mathematical Program upon the cognitive Duality Principle. Given the basic hierarchical-dualistic constrai ning of all logical-mathematical inferences (suggested above), a novel reformalization of Logic-Mathematics as ba sed on the cognitive Duality Principle is wanted.

Darwin's 'Natural Selection' Process as Violating the Cognitive Duality Principle

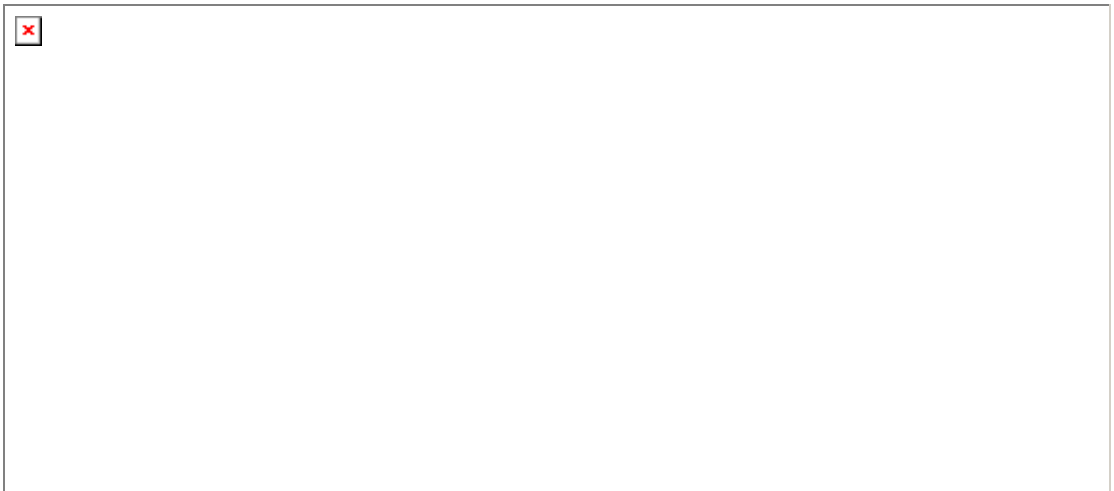
Intriguingly enough, the Liar Paradox's ignorance of the Duality Principle's insistence upon placing the "tr uth-value" of any logical inference externally to the interaction of a syllogism is hypothesized to also constrain Dar win's Natural Selection Process (underlying Evolution Theory). The Liar Paradox was hypothesized to arise from the attempt to determine the consistency relationship between the A-B interaction in the assumption and conclusio ns segments of the syllogism from within that interaction. Based on the Duality Principle's constraining of the 'cog nitive reality' (and in line with Gödel's Incompleteness Theorem), it was suggested that the resolution of the Liar Paradox lies in the hierarchical-dualistic organization of all logical-mathematical inferential systems. Hence, a basic hierarchical-dualistic constraint of all logical inferential systems was hypothesized, whereby in order to determine t he (truth-value) consistency relationship between any A-B interacting system it is necessary to have a higher-orde red cognitive computation that is external to that interacting system.

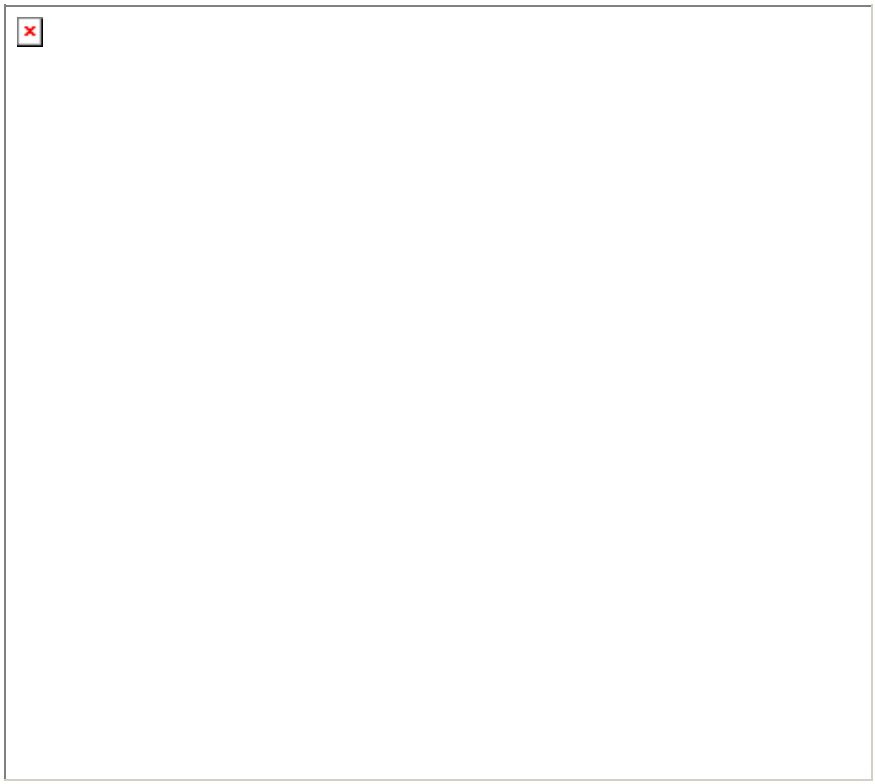
Darwin's Natural Selection Process hypothesized that the evolution of the various biological species origi nated from the "survival of the fittest"- that is, the genetic proliferation of those individual organisms that (through chance mutations) have developed the behavioral traits that most fit the environment (which enabled them to survi ve better than any of their specie peers). However, a closer examination of the logical rational underlying the Dar winian Natural Selection Process may reveal that it too violates the basic cognitive constraint set by the Duality Pr inciple. This is because, as in the case of the logical Liar Paradox, the determination of the compatibility (or consis tency) relationship that exists between an individual organism (Organism 1: Traits A1, A2, A3) and its multifacete d systemic environment {(Organism 2: Traits A2, B2, C2)…(Organism N: Traits An, Bn, Cn)}may only be deter mined by a higher-ordered cognitive computational system that is external to the organism-environment interactio n (Figure 5). Indeed, Darwin's explanation of which "environmentally successful" individual organisms were "sele cted" as the forefathers of any given specie is based on a retrospective cognitive computation rather than exists wi thin the individual organism-environment interaction (say in the present). The "survival of the fittest" means that the species that have retrospectively been found to survive- must have been the "fittest" (to the environment). Clearly, we see that such a definition is circular:

Who survives? "The fittest"- to the environment.

Who, then are "the fittest" to the environment? Those that survive!?

Figure 5: Darwin's Natural Selection's Violation of the Cognitive Duality Principle





Note: The Darwinian 'Natural Selection' process ignores the Duality Principle's insistence upon a higher-ordered cognitive computation of inter-organism (environmental) compatibility (Panel I), as well as intra-organism higher-ordered cognitive computation of the compatibility of a series of random genetic mutations with a (prospective) formation of interrelated systemic organs (Panel II).

Indeed, the self-referring circular structure of Darwin's Natural Selection Process precisely parallels the problematic Liar Paradox- both ignoring the Duality Principle's insistence upon placing the truth-value of any logical inferential A-B system externally to the interacting system. Simply put, the Duality Principle asserts that in order to determine whether or not the behavioral traits of any given organism fits the environment, it is necessary to have a higher-ordered cognitive computation that is external to the organism-environment interacting system. Such a higher-ordered cognitive computation could not take place within the organism- environment interacting system, and therefore could not intrinsically guide the "natural selection" of "the organisms that fit most the environment". Hence, it is hereby suggested that Darwin's "Natural Selection Process" violates the Duality Principle's basic constraint of our possible knowledge of the world (the 'cognitive reality') through a circular logical attempt to determine the organism-environment compatibility relationship from within that relationship.

Since the Duality Principle points at the hierarchical structuring of our cognitive computational knowledge of the world, it implies that the determination of the compatibility that may exist between a specific organism (or specie) and its environment may only be computed cognitively externally to the organism- environment interaction. Thus, whereas there is sufficient empirical (genetic and fossil) evidence to support the genealogic evolution of the species, the Duality Principle merely points at the necessity to replace Darwin's "Natural Selection Process" with a higher-ordered Intelligent cognitive guiding principle. The necessity to introduce such a higher-ordered cognitive intelligent computational source (that is external to the organism- environment interacting system) is further supported by the systemic dynamics (Aleksander, 1984) of both the inter- and intra- organism changes that characterize the evolution of the species. From an inter-organisms systemic perspective, each of the species (in a given environment) is constantly interacting with all of the other (higher-and lower ordered food-chain) organisms within that environment. Therefore, if we wish to speak about the compatibility of any given specie to its environment, we must

base it upon the higher-ordered (cognitive dualistic computation) of the inter-organism systemic dynamics. In other words, the "evolutionary compatibility" of any given specie to its environment may only be derived from a higher-ordered cognitive computation of the systemic interaction between a dynamically changing set of interdependent species. Hence, it becomes evident that Darwin's Natural Selection Process ignores this higher-ordered systemic organism- environment dynamics- where the "environment" includes all of the other dynamically interacting organisms (Anderson & Arbib, 1976)- but instead focuses merely on the "isolated" compatibility of a single organism to its "non-dynamical-systemic" environment. It is therefore clear that the Natural Selection's analysis of the presumably inherent compatibility that exists between any given organism and its environment needs to be replaced by a higher-ordered cognitive systemic inter-organism dynamics.

Finally, the intra-organism dynamic evolutionary change that is involved in the development of complex organs (such as an eye, a wing, or the nervous system) may not be accounted for by Darwin's series of co-incidental genetic mutations that produce a better "organism-environment compatibility". As pointed above, the intra-organism genetic compatibility to the environment may not be determined from within the organism- environment interacting system (because it violates the Duality Principle's insistence upon a higher-ordered cognitive computational source that alone may determine such organism-environment compatibility). Therefore, the development of complex intra-organismic organs or systems must be explained by a higher-ordered cognitive intelligent source that is external to the organism-environment interacting system. The involvement of such a higher-ordered intelligent cognitive source in producing increasingly more complex intra-organism systems is particularly warranted, given the infinitesimal probability of the occurrence of thousands of successive independent mutations all leading to the evolution of a complex interdependent organism system. Furthermore, it is clear that the prospective development of an interconnected complex biological system- that may increase the survival chances of a species only after its entire completion- can't be accounted for through a simple organism-environment (survival) compatibility at any single point in time along its evolutionary course.

Furthermore, the necessity to anchor the development of increasingly complex intra-organism biological systems within a higher-ordered intelligent cognitive source is also supported by the observation that the evolution of the species is geared towards an ever-growing increase in the biological complexity and intelligence level of the organisms. Thus, although ants, bees, or sharks may possess better survival skills than apes or humans (at least from a purely biological standpoint), Evolution has led to progressively more complex and intelligent life-forms- rather than merely to an arbitrary production of better survival skills. This is also where the age-long debate between Darwin and Lamark that has been renewed by modern immunological learning empirical findings)- again, points at the necessity to introduce a higher-ordered intelligent cognitive learning evolutionary mechanism (Steele, Robyn, & Blanden, 1998). According to Darwin's Natural Selection Mechanism, the entire cognitive knowledge learned by a single organism during its lifetime can not, in principle, be genetically transmitted to the next generations. This is because the Natural Selection Process allows only for the mutations of surviving organisms to be passed onto the next generation 'gene pool' (but not for an impact of the organism's cognitive learning experiences). In contrast, Lamark hypothesized that Evolution proceeds through the organism's acquisition of ever-refined cognitive learning skills- that are then genetically transmitted to its offspring's. Modern findings in the fields of Immunology and the evolution of Human language point at a quickened learning curve that is hard to explain merely by means of Darwin's traditional "Natural Selection Process". This is because the acquisition of novel immunological responses to genetically unknown antigens (Stolen, 1996; Warr & Cohen, 1991) as well as the historically unexplained "boom" in the evolution of the human frontal and temporal cortex (involved in language processing) are not likely to have developed as a result of successive coincidental genetic mutations. Instead, the introduction of a higher-ordered cognitive source that is capable of learning new important information related to the environment, while at the same time being capable of envisioning the development of ever-more complex and intelligent life forms seems to offer greater possibilities for explaining the various evolutionary phenomena discussed. Thus, it is suggested that Darwin's Natural Selection Process that violates the basic cognitive Duality Principle should be replaced with a hierarchical-dualistic cognitive Principle that directs the evolution of increasingly more complex and intelligent organisms.

The Quantum "Particle-Wave Duality" Violation of the Hierarchical Duality Principle

A further violation of the cognitive hierarchical Duality Principle is hypothesized to pertain to the Quantum "particle-wave duality". The particle-wave duality refers to the recognition of a series of Quantum phenomena, w

hereby different measurements may yield either a prototypical localized “particle” or spatially dispersed “wave” p hysical properties. Conceptually, the major difference between the subatomic “particle” and “wave” entities is that whereas the particle is localized in space and time, possesses definite mass and energetic values, the wave repres ents a fluctuating multi spatial-temporal dispersed values (and hence also doesn’t posses a singular “mass” or “tim e” values). Typically, the particle is recognized through its spatial-temporal, energetic or mass localized ‘traces’ th at may be measured through special IDSs. In contrast, the wave is typically recognized through its “interference p attern”, whereby the peaks and ebbs along its spatial-temporal dispersion summate and cancel each other (to cre ate stripes of light and darkness along the photographic plate). Thus, the particle and wave subatomic entities are traditionally differentiated functionally- through their distinctive spatial-temporal localized vs. dispersed measurem ents (as described above).

However, in Quantum Mechanics, there are several different experimental phenomena that seem to indica te that subatomic measurements may produce alternate (probabilistic) “particle” or “wave” characteristics- often depending upon the particular way we choose to measure them. Perhaps, the most famous example for this partic le-wave duality is the double-slot experiment, in which a beam of “photon” (light) particles is shot towards a IDS through single or double slots (of a shielding surface). The empirical findings indicate that when a single photon pa rticle is shot at a time (over many successive trials) it produces the typical localized (accumulated) “particle” patte rn when only a single slot is open (Figure 6). However, when two slots are open simultaneously, the typical “wav e” interference pattern emerges- even though only one photon has been released at any given moment (which imp lies that somehow that single particle has been able to divide itself into two waves that interfered with each othe r)?! This apparent logical paradox, wherein a singular photon produces the localized spatial-temporal “particle” m easurement when one slot is open as opposed to a spatial-temporally dispersed interference effect that is typical of “wave” measurement appears to becomes even more odd when micro-sensors are inserted to either slots. It is found that even when the two slots are open but a micro-sensor is inserted into one of them- the photon someho w detects the presence of the micro-sensor and “chooses” to pass only through the other unobserved slot- thereb y producing again only a “particle” localized signature.

Figure 6: The Duality Principle’s Resolution of the ‘Particle-Wave Duality’

Despite the apparent logical inconsistency of these empirical findings (whereby the spatial-temporal locali zed “particle” and dispersed “wave” phenomena seem to alternate haphazardly), Quantum Mechanics has incorp orated the “particle-wave duality” as a most fundamental axiom. Thus, for example, the basic Quantum “wave fun ction” represents the probability of measuring a particle at a specific spatial-temporal localization. The particle is a ssumed as a dispersed “potentiality” all along the wave function- before the Quantum measurement- but is instant aneously “collapsed” into only a single localized measured spatial-temporal point?! No wonder Einstein was baffl ed by Quantum Mechanics’ violation of any rational positivistic explanation… Till this day, there has not yet been offered a logical solution for the seemingly paradoxical particle-wave duality, but instead it has formed one of the basic tenets of probabilistic Quantum Mechanics.

However, according to the Duality Principle, in order to determine the relationship between the (seemingl y contradictory conceptual definitions of) the localized “particle” and dispersed “wave” physical entities, it is nece ssary to measure both of them within a higher-ordered (ratio-scale) cognitive computation system. Since the only mutual ratio-scale measurement of both the “particle” and “wave” entities relies on their differential spatial-tempor al (localized vs. dispersed) physical features, their physical relationship should be computed on the basis of their s patial-temporal definitions. In other words, instead of assuming that the (localized) “particle” and (dispersed) “wa ve” represent distinct “objective” physical phenomena (that are probabilistically interchangeable), their physical rel ationship should be analyzed in terms of their higher ordered spatial-temporal cognitive computation. Viewed fro m the higher-ordered cognitive computation of their spatial-temporal localization, it becomes clear that the “particl e” physical entity is characterized by a singular spatial-temporal measurement- of a single spatial point (s1) at any given moment in time (t1). In contrast, the physical entity of the “wave” is characterized by the measurement of at least two simultaneous spatial-temporal points (e.g., s1t1 and s2t1).

Therefore, based on the cognitive computation of the singular- vs. multi- spatial-temporal measurement of the “particle” and “wave” physical entities, the Duality Principle suggests that they merely represent hierarchical th

ree-dimensional vs. two-dimensional functional measurements of the same subatomic physical reality. This is beca use the singular spatial-temporal “particle” measurement (of s1t1) necessarily produces a two dimensional line mo vement that characterizes the particle’s line movement (including localized spatial- temporal, energy and mass valu es) (Figure 7). Conversely, the multi spatial-temporal measurement leads to the “wave’s” characteristic physical p roperties of spatial displacement (of s1 and s2 from t1 to t2), amplitude (e.g., the minimal and maximal oscillation s of s1 and s2 across t1 or t2) and even the ‘interference’ of two waves (which relies on the interaction of at least two sets of oscillating minimal and maximal spatial points across time). Thus, the Duality Principle suggests that th e principle difference between the (localized) “particle” and (dispersed) “wave” physical entities actually arises fro m their hierarchical two-dimensional (s1t1) vs. three- dimensional (s1t1, s2t1; s1t2, s2t2) functional measuremen t.

Figure 7: The Hierarchical-Dualistic Conceptualization of the ‘Particle-Wave Duality’

Hence, according to the cognitive hierarchical Duality Principle- not only there isn’t any qualitative conce ptual difference between the two-dimensional “particle” and three-dimensional “wave” functional measurements b ut more importantly the two dimensional “particle” measurement is embedded within the higher-ordered three-di mensional “wave” (multi spatial-temporal) displacement. In other words, it is hereby hypothesized that the aggreg ate of all singularly localized spatial-temporal (two-dimensional functional) “particle” measurements in fact constitu tes the multi spatial-temporal (three-dimensional functional) “wave” displacement. Again, the introduction of an an alogous perceptual cognitive phenomenon may prove helpful; It is important to note that when we view the advan cement of the “wave” motion from the beach (which offers us a multi spatial-temporal perspective) we can easily detect a “three-dimensional” (functional) motion of the wave (which seems to displace an entire spatial volume of water across time). If, on the other hand, we choose to focus our attention solely on the singularly localized surfs t hat are spread along the three-dimensional movement of the wave, then the only motion we are capable of detecti ng is in fact the two-dimensional (upward and downward) movement of these localized surfs. Note that as in the hypothesized subatomic two-dimensional “particle” composition of the three-dimensional “wave” displacement, th e three-dimensional sea wave actually consists of the numerous two dimensional functional motions of the various spatial-temporal localized surfs. Finally, it should be noted that although the various localized surfs dispersed alon g the three-dimensional movement of the wave all share the two-dimensional functional physical properties (e.g., of being singularly localized in space and time), they nevertheless represent different and unique physical propertie s. Thus, for example the measurement of the physical properties of the first and fifth surf along the three-dimensio nal wave movement would yield different values. However, if an observer was somehow occluded from seeing th e multi spatial-temporal three-dimensional wave movement- but instead only a single (haphazard) surf movement- then the only possible conceptualization of such a (contextually-blind) observer would be that there seem to be a probabilistic appearance of the *same* surf along different spatial-temporal points of a “potential wave function” (w hich is extremely similar to the current probabilistic quantum conceptualization).

The suggested analogy between the inability of a non-contextual (three-dimensional “wave”) observer to differentiate between distinct surfs dispersed along the wave movement and the quantum “probabilistic wave funct ion” may have far reaching theoretical implications. This is because it is hypothesized that in both cases, the three-dimensional wave movement is comprised of numerous distinct two-dimensional “particle”/surf localized objects. Furthermore, as outlined above, the hierarchical-dualistic structuring of the two-dimensional localized “particle”/su rf measurement as embedded within the higher-ordered three-dimensional multi spatial-temporal “wave” measure ment necessarily dictates that it isn’t possible to identify the three-dimensional wave motion based on a singular t wo dimensional measurement. Therefore, it is hypothesized that the inability to detect the three-dimensional (subat omic/sea) wave movement based on a singular two-dimensional “particle”/surf measurement- when combined wit h the hitherto assumed quantum “uncertainty principle”- may lead to the formation of an apparent “probabilistic w ave function”. This is because the hitherto assumed “uncertainty” regarding the simultaneous measurement of com plimentary physical properties (such as the spatial localization and energetic value of any given “particle”) necessa rily implies that distinct yet analogous two dimensional “particles” along the three-dimensional wave motion may b e mistaken for a singular probabilistically appearing “particle”. In other words, it is hereby suggested that the com bination of an inability to detect the underlying three-dimensional “wave” motion through singular two-dimensional

localized “particle” measurement along with the “uncertainty principle’s” interdependence of complimentary spatial-energetic measurement accuracy has led to the artificial formation of the apparent quantum “probabilistic wave function”.

Therefore, the Duality Principle replaces the hitherto Quantum “particle-wave duality” with a hierarchical organization of the three-dimensional multi spatial-temporal “wave” measurement as consisting of numerous distinct localized spatial-temporal two-dimensional “particle” measurements. When combined with the previous hypothesized possible transcendence of the “uncertainty principle” (through the incorporation of a third higher-ordered observer to the particle-wave interaction), the Duality Principle points at a positivistic subatomic three-dimensional wave theory (that may incorporate two-dimensional localized “particle” measurements). This is because the introduction of a positivistic measurement of the spatial-temporal value of any given “particle” (that would replace the probabilistic Quantum “uncertainty principle”), it should be possible to localize any particular two-dimensional “particle” along the three-dimensional “wave” motion.

The Michelson-Morley’s Constancy of the Speed of Light as a Violation of the Duality Principle

Another remarkable example for the Duality Principle’s basic constraining of the “cognitive reality” is hypothesized to be given by the Michelson-Morley’s assumed constancy of the speed of light (which serves as the basis for Relativity Theory). The famous Michelson-Morley experiment attempted to differentially mobilize two separate light beams relative to the (then assumed) stationary all-pervading “ether”. The rational of the Michelson-Morley experimental design was that if indeed, the speed of light exists relative to the stationary all-pervading ether then a differential mobilization of the two light beams relative to the ether should produce different measurable light velocities. Thus, the Michelson-Morley experimental design involved the mobilization of a special Michelson Interferometer that contained two perpendicular equal distanced light-mirror paths that converge at a single mutual Interference Detection Surface (IDS) (Figure 8).

Figure 8: The Michelson-Morley’s Violation of the Cognitive Duality Principle

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The basic rational underlying the mobilization of the Michelson Interferometer in parallel to the Earth’s motion through the hypothesized stationary ether is that although the internal light traveling distances of the two beams is equal (and constant), their external (ethereal) light traveling distances are not. This is because (as may be seen in Figure 8) while the light traveling distance of the beam traveling between A and B remains unchanged due to the external mobilization of the Michelson Interferometer in parallel to the Earth’s movement, the light beam traveling between A and C traverses a lengthened external Pythagorean diagonal (which equals the square root of the summation of the square of AB and AC light paths). Since the two light beams ultimately register on the same IDS (situated within the Michelson Interferometer), and based on their hypothesized differential external ethereal traveling distances, their summation was predicted to produce an interference pattern (that is due to their out-of-phase spatial detection by the photoelectric plate). Furthermore, since the rotation of the Michelson Interferometer relative to the axis of the Earth’s movement (through the hypothesized Ether) should alter the external differential light traveling distance of the AB vs. AC beams (as depicted in Figure 8), different angles of rotation were predicted to produce changing patterns of interference. Finally, it should be noted that the predicted alterations in the pattern of interference were considered as empirical evidence for a differential measurement of the speed of light. This is because if the velocity of the light is measured relative to the all-pervading stationary ether, then the AC light beam that is mobilized perpendicularly to the ether should travel a longer ethereal distance and should therefore reach the IDS later than the AB light beam that is mobilized parallel to the ether (as depicted by the dashed lines in Figure 8). Thus, an alteration in the pattern of interference (as a function of the rotational degree of the Michelson Interferometer) would be seen as indicating the dependency of the measured speed of light on the differential mobilization of the two light beams relative to the all-pervading stationary ether.

Hence, the Michelson-Morley’s empirical findings indicating an invariance in the pattern of interaction (re

gardless of the rotational degree of the Michelson Interferometer) was seen as an indication that the speed of light isn't relative to the ether, and further interpreted by Einstein as indicating that the speed of light is constant for obs ervers traveling at different speeds relative to the light beam. However, a closer examination of the logical rational underlying the Michelson-Morley experimental design may indicate that it violates the basic Duality Principle cons training the 'cognitive reality'. This is because according to the Duality Principle, in order to determine the physica l relationship between any two A and B entities, it is necessary to have a higher- ordered cognitive observer (or measuring-computational system) that is external to the A-B interacting system. Thus, in order to determine the p hysical relationship between the Michelson Interferometer's differential (ethereal) mobilization of the two light bea ms and their measured velocity, it is necessary to have a higher- ordered (cognitive) observer that is external to th e mobilized Interferometer- light beams interacting system. The Michelson-Morley experimental design differential ly mobilizes the external (ethereal) light traveling distances of the two beams that are encased within the Michelso n Interferometer. However, the Michelson- Morley experimental design only allows for the comparison of the ligh t-beams' internal traveling distances, as measured from the standpoint of the interference plate that is situated with in the mobilized Interferometer. Therefore, even if the two light-beams would have traversed differential distances (as can only be measured by an external cognitive observer to the mobilized Interferometer), the internal interfere nce plate could not detect such differences.

Hence, the internal interference measurement of (the hypothesized) differential light-traveling distances of t he two beams violates the Duality Principle thereby not allowing us to cognitively ascertain whether the measured speed of light for observers moving at different speeds is the same or different. Actually, the Duality Principle's in sistence upon an external measurement of the velocity of an object that travels within a moving system represents by no means a novel concept in Physics. In fact, the "Galilean Transformations" (Born, 1962) formulated precisel y this principle. According to the Galilean Transformations, the calculation of the velocity of an object traveling wi thin a mobilized system is derived from the computation of that object's internal velocity summated with the exter nal velocity of the mobilized system (that can only be determined by an external observer to the mobilized syste m). However, since the experimental hypothesis of the Michelson- Morley experiment was that the velocity of lig ht is relative to the all-pervading stationary ether, then the necessity to place an external observer (Galilean) obser ver to the mobilized Interferometer was ignored. In retrospect, it seems quite obvious that the logical inference of the Michelson-Morley experimental design was flawed. Simply stated it stated that:

If the speed of light is relative to the ether, (and)

If two light beams are mobilized differentially relative to the ether (than)

The measured velocity of the two light beams should be different.

However, given the lack of an external measurement of the differential mobilization of the two light-beams relative to the Interferometer (that is required by the cognitive Duality Principle as well as the Galilean Transformations), a n alternative logical inference emerges;

If the speed of light is relative to the motion of an observer, (and)

If there is no measurement of the differential motion of the two light beams relative to an external observ er (but only of their internal equal traveling distances), than

The internally measured speed of light for the two beams should be equal.

In other words, the main logical flaw of the Michelson-Morley experimental design was that it assumed that the e ther is all-pervading, and therefore that there is no need to measure the velocity of the light beams relative to the mobilized Interferometer externally to the Interferometer-light beams interacting system (as the Duality Principle d emands).

Hence, it is suggested that the constancy of the Interferometer's internally measured interference pattern a rises from the ignorance of the Duality Principle's (and the Galilean Transformation's) insistence to measure the lig ht beams' speed- externally to the beams-Interferometer mobilized system. In fact, an alternative novel experimen tal design is hereby suggested that places the higher-ordered dualistic cognitive observer externally to the different ially mobilized light beams (depicted in Figure 9). The novel Interferometer differs from the (hitherto used) Michel son Interferometer in its placement of the interference detection surface externally to the differentially mobilized lig ht beams. Based on the Galilean Transformations, the stationary interference plate that is placed externally to the mobilized Interferometer mobilized system would measure differential light traveling distances for the two (mobiliz ed) light-beams, thereby yielding different velocities of light. Thus, it is hypothesized that the novel Interferomete

r's placement of the interference plate external to the mobilized light-beams will actually produce different velocity of light, contrary to the basic assumption underlying Einstein's Relativity Theory.

Figure 9: The Novel Hypothesized Hierarchical-Dualistic Interferometor

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This is because Relativity Theory is based on the theoretical assumption that the speed light is equal for all observers (regardless of their traveling velocity). To a large extent, the historic findings of the Michelson- Morley experiment served as the empirical basis supporting Relativity's theoretical assumption regarding the constancy of the speed of light (for all traveling observers). Therefore, if the introduction of the novel Interferometer the Michel son-Morley will indeed show that the speed of light depends on the velocity of the observer (as indicated by the dependency of the pattern of interference on the mobilization of the light-beams), then that would challenge one of the basic assumptions underlying Relativity Theory. However, since many of Relativity Theory's theoretical predic tions have been empirically validated (for instance regarding the energy- mass equivalence or the dilation of time f or observers traveling at higher speeds, etc.), then the Michelson- Morley's violation of the Duality Principle is hy pothesized only to challenge the constancy of the speed of light as the basis for Relativity Theory (rather than dou bting Relativity Theory itself).

Neuroscientific Materialistic Reductionistic Monism Ignorance of the Duality Principle

Another example for an ignorance of the Duality Principle that leads to a constraining of our understandin g of the world (the cognitive reality) involves the basic Neuroscientific materialistic reductionism. The basic assum ption underlying modern Neuroscience is that the entirety of cognitive, psychological, emotional, sensory, or even our conscious awareness of individual existence- are all underlie and produced by an "objective" material neuroc hemical activity in the brain (Frackowiak, Friston, Frith, Dolan, & Mazziotta, 1997; Posner & Raichle, 1994; Rol and, 1993). Hence, the basic Cartesian assertion- "I think, therefore I exist"- which viewed the human mind as th e most "real" and certain" knowledge that we may have of the world- has been reversed within the modern Neur oscientific material reductionism. Thought, emotion, sensation and even consciousness are considered to be only s econdary phenomenological (illusory) representation of the "real objective" physical-material neurochemical activi ty in the brain.

Thus, the basic Cartesian qualitative split that seems to exist between the immaterial mind and the material body (that is often referred to as "the binding problem") has found its modern Neuroscientific materialistic-reducti onsitic "solution" through the negation of the validity of the entire spectrum of phenomenological human conscious ness. Simply put, the Neuroscientific materialistic-reductionistic monism declares that our only "valid knowledge" of the world (or ourselves) is the "objective material" neurochemical activity occurring in the brain- at the expense of discarding the most basic human conscious phenomenology, perception and cognition. However, as shown in t he previous article regarding the existence of the 'cognitive reality' (Bentwich, 2001)- not only has modern Physic s relinquished the notion of an "objective physical reality" (in favor of a subject-based physical measurement of th e physical world) (Panel I in Figure 10)- but more importantly, the analysis of the perceptual illusions and psycho physical experimental paradigms has pointed at the superiority of cognitive computational processes over mere ph ysical stimulation in determining our perception of the physical world (e.g., the 'cognitive reality') (Panel II in Figu re 10).

Figure 10: The Higher-Ordered Cognitive Computation of the Physical Stimulation-Neurochemical Activation Dualistic Interaction.

Note: The Neuroscientific Materialistic Reductionism, which discards conscious perception (as secondary "illusory" phenomenology), ignores the subject-based measurement of modern Physics (e.g., Relativity Theory and Quantum Mechanics, Panel I). Furthermore, The existence of the Cognitive Reality indicates that our perception (and knowled ge) of any physical phenomenon is entirely determined- and constrained by- the higher-ordered cognitive comoputa tional processes (Panel II). Finally, since the cognitive Duality Principle arises from the higher-ordered cognitive psy chophysical computation of any physical-sensory relationship, the resolution of the Cartesian 'binding problem' is n ecessarily based on a heirarchical cognitive computation that is external to the sensory stimulation- neurophysiologi cal brain activation (physical) interaction (Panel III).

The contingency of our knowledge of the physical world upon cognitive computational processes become s even more critical with the Duality Principle's constraining of the 'cognitive reality'. As shown earlier, since the c ognitive Duality Principle sets the most basic constraint for our psychophysical perception (and knowledge) of the physical world, it follows that all of our ontological knowledge of the world- including of the existence of neurons, neurochemical activation in the brain, etc.- is entirely dependent and constrained by the Cognitive Duality Principl e. But according to the Duality Principle, the determination of any physical relationship- such as for instance the in teraction between a specific sensory stimulation and its resulting activation of specific neurons in the brain- may o nly be computed by a higher-ordered cognitive processing that is external to the signal-brain neuron interacting sy stem (Panel III in Figure 10). Therefore, the Duality Principle asserts the hierarchical structuring of all sensory-neu rophysiologic activation within a higher-ordered cognitive computational processing that is necessarily external to

the material interaction between sensory stimulation and neurophysiologic brain activation. Thus, in parallel to the Duality Principle's indication that the logical- mathematical solution for any formal syllogism may only be found wi thin a higher-ordered cognitive computational processing (thereby elucidating Gödel's Incompleteness Theorem), it is suggested that all sensory-neurophysiologic interaction is necessarily contingent upon the higher-ordered cogn itive thought processes.

Hence, basing the cognitive reality upon the Duality Principle necessitates the reversal of materialistic-red uctionistic monism in favor of a hierarchical-dualistic structuring of (immaterial) cognitive processes as constrainin g our most basic ontological knowledge of any sensory-neurophysiologic (material) brain activation. Thus, again t he superiority of cognitive computational processes over mere physical-material sensory stimulation or neurophysi ologic brain activation attests to the basic cognitive constraint of our knowledge of the world (e.g., the "cognitive reality"). In fact, when fully understood, the Duality Principle's constraining of our knowledge of the physical worl d may lead- not only to a revision of the current Neuroscientific materialistic-reductionistic monism- but more imp ortantly, to a reformalization of the most basic physical concepts of space, time, energy, mass, causality, etc. Onc e, the Duality Principle is recognized as setting the most basic constraint for the 'cognitive reality', its various theo retical revisions- of the Quantum "uncertainty principle" and "particle-wave duality", the logical "liar paradox" and "Gödel's Incompleteness Theorem", Relativity Theory's assumed "constancy of the speed of light", Darwin's "N atural Selection Process", and the Neuroscientific "materialistic-reductionistic monism"- may open the way for a n ovel reformalization of these important scientific disciplines.

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