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# Theoretical Validation of the Computational Unified Field Theory (CUFT)

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"No better destiny could be allotted to any physical theory, than that it should of itself point out the way to the introduction of a more comprehensive theory, in which it lives on as a limiting case"

(Einstein, 1916)

## 1. Introduction

A previous article (Bentwich, 2011c) hypothesized the existence of a novel 'Computational Unified Field Theory' (CUFT) which was shown to be capable of replicating quantum and relativistic empirical phenomena and furthermore may resolve the key inconsistencies between these two theories; The CUFT (Bentwich, 2011c) is based upon three primary postulates including: the computational '*Duality Principle*' (e.g., consisting of an empirical-computational proof for the principle inability to determine the "existence" or "non-existence" of any hypothetical 'y' element based on its direct physical interaction with another exhaustive set of 'x' factors) (Bentwich, 2003 a,b,c; 2004; 2006a); the existence of an extremely rapid series (e.g.,  $c^2/h$ ) of '*Universal Simultaneous Computational Frames*' (USCF's) which comprise the entire corpus of the physical spatial universe at any given minimal (quantum temporal 'h') point (which is computed by a '*Universal Computational Principle*', 'U'); and the existence of three '*Computational Dimensions*' - e.g., of 'Framework' ('frame' vs. 'object'), 'Consistency' ('consistent' vs. 'inconsistent') and Locus ('global' vs. 'local'); Taken together these three basic theoretical postulates give rise to the CUFT's '*Universal Computational Formula*':

$$\frac{c^2 x'}{h} = \frac{s \times e}{t \times m}$$

which fully integrates between the four basic physical properties of 'space', 'time', 'energy' and 'mass' and is capable of replicating all known quantum and relativistic phenomena, while resolving the apparent contradictions between Quantum Mechanics and Relativity Theory (such as for instance the existence of the relativistic speed of light limit as opposed to the quantum entanglement's instantaneous phenomenon).

Moreover, even beyond the capacity of the CUFT to replicate all known quantum and relativistic phenomena as well as resolve their key theoretical inconsistencies (and differences), the CUFT was postulated to broaden the scope of our theoretical

understanding of physical reality thereby qualifying as a potential candidate for a 'Theory of Everything' (TOE) (Brumfiel, 2006; Einstein, 1929, 1931, 1951; Ellis, 1986; Greene, 2003). Specifically, based on the (abovementioned) integrated postulates of the 'Duality Principle', existence of the 'Universal Simultaneous Computational Frames' (USCF's) and three (Framework, Consistency and Locus) Computational Dimensions the CUFT describes the four basic physical properties of 'space', 'time', 'energy' and 'mass' as emerging (secondary) computational properties that arise as a result of various 'Framework x Consistency x Locus' combinations - as computed (by the Universal Computational Principle, 'U') based on the rapid series of USCF's...

However, in order to fully validate this new (hypothetical) 'Computational Unified Field Theory' (CUFT), it is necessary to further extend its theoretical framework to bear on (at least) two important aspects: i.e., to identify particular instances in which the predictions of the CUFT *critically differ* from those of both Quantum and Relativistic models, and to demonstrate the potency of the CUFT in broadening our understanding of key scientific phenomena (e.g., while demonstrating the need to perhaps reformulate these key scientific computational paradigms based on the CUFT's new broader theoretical scientific framework);

Hence, the current chapter comprises two segments : the first critically contrasts (at least) three specific instances in which the critical predictions of the CUFT significantly differs from that of both quantum mechanics and Relativity theory; and the second, which delineates the application of one of the three major theoretical postulates of the CUFT (namely: the 'Duality Principle') in the particular cases of three key scientific (computational) paradigms (including: Darwin's 'Natural Selection Principle' and associated 'Genetic Encoding Hypothesis' and Neuroscience's basic materialistic-reductionistic 'Psycho-Physical Problem');

We therefore begin by identifying (at least) three specific empirical predictions of the CUFT which may critically differ from those predicted by the existing quantum and relativistic theoretical models;

- a. Contrasting between the CUFT's *Universal Computational Formula's* '1' and '2' derivatives and their corresponding relativistic and quantum empirical predictions;
- b. Contrasting between the CUFT's critical prediction regarding the differential number of times that a "massive" compound (or atom/s) will be presented (consistently) across a series of subsequent USCF's relative to the number of times that a "lighter" compound (or atom/s) will be presented across the same number of (serial) USCF's, and the corresponding predictions of Quantum or Relativistic theories.
- c. Critically contrasting between the CUFT's prediction of the possibility of reversing any given object's spatial-temporal sequence (e.g., based on a computation of that object's serial electromagnetic values across a series of USCF's and reversal of these recorded values based an application of the appropriate electromagnetic field to that object's recorded serial USCF's electromagnetic values) - and the *negation* of any such capacity to reverse the 'flow of time' by both Quantum and Relativistic theories

## 2. The CUFT's universal computational formula's relativistic & quantum derivatives

The first (of these three) differential critical predictions for which the CUFT's empirical predictions may differ significantly from those of both quantum and relativistic theoretical models is based upon the CUFT's Universal Computational Formula:

$$\frac{c^2 x'}{h} = \frac{s \times e}{t \times m}$$

Specifically, whereas Relativity theory recognizes the equivalence of mass and energy (e.g.,  $E = Mc^2$ ), the unification of 'space' and 'time' as a four-dimensional continuum, and its curvature by mass - *Relativity Theory does not allow for the complete unification* (or transformation) of all of these *four basic physical features* (e.g., within one computational formula); In contrast, the CUFT's defines each of these four basic physical features in terms of their (particular) combination of three Computational Dimensions, e.g., 'Framework' ('frame'/'object'), 'Consistency' ('consistent'/'inconsistent') and 'Locus' ('global'/'local') which are all anchored in the *same singular* (higher-ordered D2) *rapid series of 'Universal Simultaneous Computational Frames'* (USCF's). Thus, for instance it was shown (Bentwich, 2011c) that the computational definition of 'space' and 'energy', or of 'mass' and 'time' constitute exhaustive computational pairs delineating a *frame's* - or an *object's* - consistent vs. inconsistent computational measures (e.g., across a series of subsequent USCF's, respectively); (In fact, it was precisely this '*computational exhaustiveness*' of these frame- or object- consistency measures that was suggested to offer an alternative explanation for the currently accepted quantum's probabilistic interpretation of the "collapse" of the 'probability wave function'.)

Indeed, it is hereby hypothesized that this unique capability of the CUFT's Universal Computational Formula to comprehensively unify between all four basic physical features (e.g., 'space', 'time', 'energy' and 'mass') - not only goes beyond the capacity of the existing (relativistic or quantum) theoretical models, but also produces particular (verifiable) empirical predictions that may critically from those offered by either quantum or relativistic theoretical models:

Thus, it is suggested that the two previously outlined (Bentwich 2011c) computational derivatives of the Universal Computational Formula:

$$\frac{s}{t} = \frac{m}{e} \times \frac{c^2 x'}{h} \quad (1)$$

$$t \times m \times \left(\frac{c^2 x'}{h}\right) = s \times e \quad (2)$$

may (in fact) provide precisely such (differential) critical predictions of the CUFT as opposed to their (respective) relativistic (1) and quantum (2) predictions.

This is because according to the CUFT's Universal Computational Formula's (1) derivative a (relativistic or quantum) object's 'space' value divided by its 'time' value is equivalent to that object's 'mass' value divided by its 'energy' value - multiplied by the square of the speed of light ( $c^2$ ) divided by Planck's constant ('h') (e.g., and based on the higher-ordered D2 'Universal Computational Principle's computation of the given series of USCF's); In the case of the CUFT, the computational rationale for this equivalence of ' $s'/t' = 'm'/e' \times (c^2/h \times 'x')$ ' stems from its stipulation that the ratio between an object's 'frame-consistent' ('s') and 'object-inconsistent' ('t') values should be the same as between that object's 'object-consistent' ('m') and 'frame-inconsistent' ('e') values - multiplied by the rate of universal computation (e.g.,  $c^2/h$ ) (e.g., as delineated in the previous publication: Bentwich, 2011c). However, when contrasting this particular CUFT's Universal Computational Formula (I) with its counterpart in Relativity Theory we find that even though relativistic theory possesses specific

equivalences between 'energy' and 'mass' (e.g., the famous 'E = Mc<sup>2</sup>') and the unification of 'space-time' as a 'four-dimension' continuum, it fails to account for any such comprehensive equivalence of 's'/t' = 'm'/e' x (c<sup>2</sup>/h x ''); In fact, if we focus on the (above) relativistic 'energy-mass' equivalence ('E = mc<sup>2</sup>') we can notice that the CUFT's Universal Computational Formula's (I) derivative 's'/t' = 'm'/e' x (c<sup>2</sup>/h x '') in fact *contains this 'energy-mass' equivalence but goes beyond that equivalence* to incorporate also its precise (hypothetical) relationship with the (ratio between) 'space' and 'time' as well as with the (hypothetical) rate of universal computation (e.g., c<sup>2</sup>/h x ''); These broader CUFT Universal Computational Formula's (I) relationships between 'space' and 'time' and the (hypothesized) 'universal computational rate' (c<sup>2</sup>/h x '') - and Relativity's (known) 'energy-mass equivalence' could be represented in this manner:

$$'e' \times 's'/t' = 'm' \times c^2/h \times 't'$$

In this way, we can see that the CUFT Universal Computational Formula's (1 derivative) contains (and replicates) Relativity's core 'energy-mass equivalence' ('E = mc<sup>2</sup>'), but also goes beyond that particular relationship as embedded within a broader more comprehensive (singular) Universal Computational Formula's unification of the four basic physical features (e.g., of 'space', 'time', 'energy' and 'mass'). As such, the above first derivative of the Universal Computational Formula (1) points at a particular empirical instant in which one of the CUFT's critical predictions *differs* from those offered by Relativity Theory.

A second instance in which the CUFT's (critical) empirical prediction may differ from that of Quantum Mechanic is in the case of the CUFT Universal Computational Formula's (2) derivative - as it relates to an extension of quantum's (current) particular complimentary relationships between a subatomic object's or event's 'spatial' and 'energetic' or 'temporal' and 'mass' values: According to the current quantum mechanical account of Heisenberg's 'Uncertainty Principle' (Heisenberg, 1927) there exist (strict) complimentary relationships between an object's (or event's) 'spatial' and 'energetic' values or between its 'temporal' and 'mass' properties - e.g., such that their simultaneous measurement accuracy level cannot (in principle) exceed Planck's minimal 'h' value... theoretically, this is due to the (currently prevailing) 'probabilistic interpretation' of quantum mechanics which posits that it is due to the direct physical interaction between the subatomic 'probe' and 'target' elements that the probability wave function "collapses" - giving rise to a particular 'complimentary' spatial-energetic' or 'temporal-mass' value, and therefore that any increase in the accuracy measurement of any of these pairs' complimentary values (e.g., 'e' vs. 's'; or 't' vs. 'm') necessarily also brings about a proportional decrease in the measurement accuracy of the other complimentary pair's dyad); Hence, the current (probabilistic interpretation of) Quantum Mechanical theory posits a strict complimentary relationship between any subatomic target's (simultaneous) measurement of its 'spatial' and 'energetic' values or between its 'temporal' and 'mass' values - as necessarily constrained by the Uncertainty Principle:

$$'e' \times 's' \leq 'h';$$

or

$$'t' \times 'm' \leq 'h'.$$

In contrast, the second (2) derivative of the CUFT's Universal Computational Formula further broadens these apparently disparate quantum complimentary relationships (e.g., of



an object's 'spatial' and 'energetic', or 'temporal' and 'mass' values) – to form a direct computational equivalence, e.g., based on the hypothesized 'mechanics' of a Universal Computational Principle's higher-ordered 'D2'/'1' integrated computation of a rapid series of USCF's that singularly define each of these 'complimentary computational' pairs;

$$t \times m \times \left(\frac{c^2 x'}{h}\right) = s \times e$$

Specifically, the CUFT's Universal Computational Formula's (2) derivative hypothesizes that due to the fact that each of the four basic physical properties (e.g., of 'space', 'time', 'energy' and 'mass') is defined based on the same three fundamental (hypothesized) Computational Dimensions (i.e., of 'Framework' ['frame'/'object'], 'Consistency' ['consistent'/'inconsistent'] and 'Locus' ['global'/'local']) – which are all produced by the same *singular* (higher-ordered 'D2'/'1') rapid series *USCF's series*, then each of these complimentary computational pairs (i.e., of 'space' and 'energy', or 'mass' and 'time') exhaustively defines an object's given computational (USCF's based) measurement (Bentwich, 2011c). Thus, for instance, the CUFT hypothesized (Bentwich, 2011c) that an object's (or event's) 'temporal' value (e.g., which represents an 'object-inconsistent' USCF's Index) exhaustively compliments that object's 'mass' ('object-consistent') value, and likewise that an object's ('frame-consistent') 'spatial' USCF's measure exhaustively compliments its ('frame-inconsistent') 'energetic' measurement. Moreover, based (again) on the unification of all of these four basic physical properties as (secondary) computational combinations of the same three basic (abovementioned) Computational Dimensions (e.g., of 'Framework', 'Consistency' and 'Locus'), it was hypothesized that the computational relationship (i.e., multiplication) between an 'object-inconsistent' ('t') and 'object-consistent' ('m') measures should be equivalent to the (multiplication) relationships between a 'frame-consistent' ('s') and 'frame-inconsistent' ('t') values – i.e., while taking into considerations their production by a higher-ordered (D2)

Universal Computational Principle's ('1') rapid universal computational rate (e.g.,  $\frac{c^2 x'}{h}$ );

Hence, the (2) derivative of the CUFT's Universal Computational Formula is expressed by the above:

$$t \times m \times \left(\frac{c^2 x'}{h}\right) = s \times e$$

But, note that this second derivative of the CUFT's Universal Computational Formula goes beyond the (abovementioned) current Quantum Mechanical Uncertainty Principle's complimentary measurement constraint stipulation:

$$'e' \times 's' \leq 'h';$$

or

$$'t' \times 'm' \leq 'h'.$$

This is because whereas the CUFT's (2) derivative explicitly stipulates that the multiplication relationship between the complimentary pair of {'t' and 'm'} is *equivalent* to that of {'e' and 's'} (i.e., while taking into account its delineated relationship with the hypothetical rate of universal computation:  $\frac{c^2 x'}{h}$ ), current quantum mechanical (probabilistic) formulation only

allows for a (partial) direct (multiplication) relationship between each of these complimentary pairs (e.g., independently).

Hence, an empirical contrast between the CUFT's Universal Computational Formula's (2) derivative and its corresponding quantum predictions also points at (potentially) significant differences between these theoretical models;

### 2.1 The CUFT's differential USCF's presentations of "massive" vs. "light" elements

Another interesting instance in which the predictions of the CUFT and Relativistic or Quantum models may critically differ is associated with the CUFT's computational definitions of an object's (relativistic or subatomic) "mass" value; Based on the CUFT's previous (Bentwich, 2011c) computational definition of an object's "mass" as the number of 'object-consistent' presentations across any series of USCF's - it was shown that the computation of the number of such 'object-consistent' ("mass" measure) from the 'global' ('g') framework of a relativistic object may indeed produce an increased 'mass' measure relative to its 'local' "mass" measure. This was due to the greater number of times such a relativistic object would be presented from the 'global' perspective relative to its 'local' perspective' based on the increased number of ('global') pixels such a relativistic object would have to traverse across a given series of USCF's (e.g., which would nevertheless not affect its 'locally' measured number of presentations).

However, a further extension of the CUFT's basic computational definition of an object's "mass" (e.g., as the number of 'object-consistent' presentations across a certain given number of USCF's) - when viewed from the 'local' framework perspective and when contrasting between relatively "massive" objects and "lighter" objects may in fact point an another interesting instance in which the critical predictions of the CUFT and Relativistic or Quantum models may differ significantly; This is because since the CUFT defines the "mass" of an object as the number of 'object-consistent' presentations across a series of USCF's, then when we compute a (relatively) "massive" object as opposed to a (relatively) "light" (relativistic) object - i.e., from the 'local' framework perspective, we obtain that the more "massive" object is necessarily presented a greater number of times across the same given number of USCF's than the "lighter" object! This means that according to the CUFT's critical prediction, we should obtain a difference in the number of (consistent) presentations of any two objects that (significantly) differ in their "mass" value... Thus, to the extent that we are capable of measuring a sufficiently minute number of consecutive USCF's, the CUFT predicts that more "massive" objects should appear consistently on a larger number of such consecutive USCF's - as opposed to (relatively) "lighter" objects which should appear less frequently across such a series of consecutive USCF's; More specifically, it is predicted that if we chose to examine the number of (consecutive) USCF's in which a (relatively) more "massive" compound (or element) appears - relative to a less "massive" compound (or element), then according to the CUFT we should expect to detect the more "massive" compound (or element) on a larger number of (consecutive) USCF's relative to the less "massive" compound or element; In contrast, according to the existing quantum or relativistic models of physical reality, the difference between more "massive" objects and less "massive" objects arises from the number of atoms comprising such objects, or differences in the weight of their nucleus etc.; However, there are no such known (quantum or relativistic) differences across elements (compounds or atoms, etc.) which possess differential mass values in terms of the "frequency" of their presentations (i.e., across a series of subsequent USCF's)...

Obviously, with the discovery of the CUFT's (hypothetical) far more rapid rate of USCF's computation (e.g.,  $c^2/h$ ) than the currently assumed quantum or relativistic (direct or indirect) relationships, and augmented by the CUFT's USCF's emerging (secondary computational) properties of "mass", "space", "energy" and "time" – such a critical contrast between the CUFT's empirically predicted *greater* number of (object-consistent) presentations of (relatively more) "*massive*" relative to a *lesser* number of (object-consistent) presentations for "*lighter*" objects, and the complete lack of such a prediction by either quantum or relativistic models may test the validity of the CUFT (as opposed to either quantum or relativistic theories).

## 2.2 Reversibility of USCF's spatial-temporal sequence

Another (intriguing) critical prediction of the CUFT which (significantly) differs from the current quantum or relativistic models of physical reality is regarding the potential capacity to alter the "spatial-temporal sequence" of any given (quantum or relativistic) phenomenon; The critical issue is that according to both quantum and relativistic theories the "*flow of time*" may only proceed in *one direction* (e.g., from the 'past' towards the 'future' – but not vice versa), which is often termed: the "arrow of time"; This is because from the standpoint of Relativity Theory there exists a strict 'speed of light' limit set upon the transmission of any signal or upon the speed at which any relativistic object can travel – which therefore prohibits our capacity to "catch-up" with any signal emanating from an event in the 'past'- or with any actual- event/s that has happened in the 'past'; The only tentative (hypothetical) possibility to re-encounter any such 'past' space-time events from the standpoint of Relativity is in a case in which there is an extreme curvature of space-time (due to the presence of extremely massive objects) which may create closed 'space-time loops' that may allow past signals to "turn around" and arrive back to the observer... But, even in this (rare) hypothetical instance, our hypothetical capacity would be only to *witness* a light signal that has *emanated from an event* that took place in the 'past' – rather than any "real" capacity to "*reverse*" the spatial-temporal sequence of events or occurrences associated with the flow of time... Hence, from the perspective of Relativity Theory, we cannot "reverse" the flow of time – e.g., cause spatial-temporal events (or objects) to occur in the "reversed" order...

Likewise, from the perspective of Quantum Mechanics, there seems to exist a clear limit set upon our capacity to "reverse" the "flow of time" – due to the fact that our entire knowledge of any subatomic 'target' (phenomenon) is strictly dependent upon- (and is therefore also constrained by-) that 'target' element's direct (or indirect) physical interaction with another subatomic 'probe' element. Hence, according to the (current) probabilistic interpretation of Quantum Mechanics, the determination of the (complimentary) 'space-energy' (s/e) or 'temporal-mass' (t/m) values of any given subatomic 'target' phenomenon (or phenomena) can only be determined *following* its direct (or indirect) *physical interaction/s* with another subatomic 'probe' element; But, note that according to such (probabilistic interpretation of) Quantum Mechanical theory the subatomic 'target' element is dispersed 'all along' a 'probability wave function' *prior to its interaction with the probe element* – but "collapses" into a single (complimentary) 'space-energy' or 'temporal-mass' value immediately following its direct (or indirect) physical interaction with the 'probe' element. This means that according to current (probabilistic) quantum mechanical theory, there exists a clear "unidirectional" (asymmetrical) 'flow of time' – i.e., one in which the determination of any subatomic (target) phenomena can be determined only *following the collapse of the probability wave function'* which takes place as a result of the direct (or indirect) physical interaction between the



(probability wave function's) 'target' and other subatomic 'probe' element (Born, 1954); Now, as shown previously (Bentwich, 2011b) the computational structure (implicitly) assumed by the (above) probabilistic interpretation of quantum mechanics produces a 'Self-Referential Ontological Computational System' (SROCS) – which was shown to inevitably lead to both 'logical inconsistency' and 'computational indeterminacy' that are contradicted by known quantum empirical findings and which therefore also pointed at the computational 'Duality Principle' (e.g., asserting the existence of a conceptually higher-ordered 'D2' computational level that is capable of computing the simultaneous "co-occurrence" of any exhaustive hypothetical 'probe-target' pairs series). But, even beyond the Duality Principle's challenging of the current (implicit SROCS computational structure underlying) the probabilistic interpretation of Quantum Mechanics, note that it is precisely this SROCS assumed computational structure – which prohibits the capacity of any "collapsed" target element (or phenomenon) to "revert back to its 'un-collapsed' probability wave function state"! Therefore, it becomes clear that from the perspective of (probabilistic) Quantum Mechanical theory we cannot reverse any spatial-temporal quantum event/s, phenomenon or phenomena...

In contrast, the CUFT postulated the existence of a (conceptually higher-ordered) rapid series (e.g.,  $c^2/h \times \text{" "}$ ) of 'Universal Simultaneous Computational Frames' (USCF's) which give rise to all (secondary) computational properties of 'space', 'time' 'energy' and 'mass'; Specifically, the computational definition of "time" was given through a measure of the number of instances that an object is presented *inconsistently* across a given series of USCF's – relative to the USCF's displacement of the speed of light:  $t : \sum o_j\{x,y,z\} [\text{USCF}(n)] \neq o(i..j-1)\{(x),(y),(z)\} [\text{USCF}(1..n)] / c \times n\{\text{USCF's}\}$

Therefore, the less instances in which a given object is presented 'inconsistently' (across a given series of USCF's), the less 'time' passes for that object – e.g., as may be observed from a 'global' framework in the case of its measurement of a high speed relativistic observer or in the case of a 'massive' object etc.

In much the same way, an object's "spatial" or "mass" or "energy" values– are all derived based on differential (e.g., 'frame-consistent', 'object-consistent' or 'frame-inconsistent', respectively) secondary computational measures of the various combinations of the three (abovementioned) Computational Dimensions. As a matter of fact, all of these four basic physical features of 'space', 'time', 'energy' and 'mass' were entirely integrated within the singular 'Universal Computational Formula' (Bentwich, 2011c) which outlined their intricate relationships with the singular (conceptually higher-ordered 'D2/'") rapid series ( $c^2/h$ ) of USCF's. One final key factor associated with the CUFT's conceptualization of the "flow of time" may arise from its replacement of any (hypothetical) 'causal-material' ( $x \rightarrow y$ ) relationship between any two hypothetical 'x' and 'y' factors – by a conceptually higher-ordered 'D2 a-causal' computation which can compute the "co-occurrences" of any two such given 'x' and 'y' elements at any given spatial-temporal point/s (for any particular USCF(i) frame).

This is because when we take into consideration the CUFT's integrated postulates of the Duality Principle's (conceptual) proof for the inability to determine the "existence" or "non-existence" of any (hypothetical) 'y' element based on its direct physical interaction (e.g., at  $di1...din$ ) with another (exhaustive set of) 'x' factor/s; and the existence of a (rapid series of) 'Universal Simultaneous Computational Frames' (USCF's) which are *computed simultaneously for all of the exhaustive pool of 'spatial pixels' that exist per any given (discrete) USCF(i)* (e.g., by the Universal Computational Principle, '"') – this leads to the CUFT assertion that there

cannot exist any real "causal" relationship/s between any two hypothetical 'x' and 'y' elements (Bentwich, 2011c)... Instead, the CUFT postulated that all (exhaustive series) of 'universal spatial pixels' must be computed simultaneously as part of a particular (discrete) USCF(i) frame. Therefore, the CUFT also asserted that the appearance of any "material-causal" relationship between any two given 'x' and 'y' elements may only arise as a result of a certain (apparent) '*spatial-temporal patterns*' emerging across a series of USCF's - rather than as the result of any "real" (e.g., direct or indirect) physical interaction/s between the 'x' and 'y' factors (e.g., constituting a given SROCS quantum or relativistic paradigm); Therefore, the CUFT's standpoint (and ensuing empirical critical predictions) with regards to the issue of the "flow of time" may differ significantly from the strict 'unidirectional' and 'unaltered' "flow of time" assumed by both quantum and relativistic models; This is due to the fact that according to the CUFT, the computational "time" measure of any object - i.e., whether it relates to the 'passage of time' (e.g., including the possibility of 'time dilation') or to the 'direction of time' (e.g., including the currently assumed "arrow of time" by relativistic and quantum theories) is entirely contingent upon the number of inconsistent presentations of that object across a given series of USCF's, as well as the particular USCF's spatial-temporal "sequence" underlying the development of a given phenomenon (or particular 'sequence of events'); In order to explicate the CUFT's critical prediction regarding the possibility to "reverse the flow of time" - i.e., at least as it applies to a particular given object, let us analyze the (standard) "flow of time" as it applies say to the developmental processes taking place in a small plant (or ameba); According to the CUFT, the "*flow of time*" associated with such a small plant's growth essentially comprises a particular *sequence of spatial-temporal as well as energetic-and mass- changes* taking place in the particular plant - *across a series of USCF's*. In fact, based on the CUFT's postulated (higher-ordered 'D2') series of discrete USCF's that are comprised of an exhaustive universal pool of "spatial-pixels" (being computed for each individual USCF), a further postulate of the CUFT is that each of this exhaustive pool of 'universal spatial pixels' constitutes a particular *electromagnetic value* which is specific to a given spatial point within a particular USCF frame (e.g., as a single electromagnetic value). Thus, the "flow of time" associated with the growth of this given plant essentially comprises a particular series of specific electromagnetic value/s that are localized to particular 'universal spatial pixel/s' appearing at any particular (series of) USCF's frames...

But, if the above description of the CUFT's 'mechanics' underlying the "flow of time" is accurate, then based on the (earlier mentioned) computational definition of 'time' as the number of 'object-inconsistent' presentations (across a series of USCF's) and of the "flow of time" as the particular sequence of 'electromagnetic-spatial pixels' series underlying a given sequence of events (or phenomenon), then it should be possible (in principle, at least) to "reverse the flow of time" for a given object (e.g., such as for the abovementioned developing plant) through a manipulation of the sequential order of electromagnetic-spatial pixel values of that plant across a series of USCF's... Let there be a particular sequence of spatial-electromagnetic pixels points across a series of USCF's that exhaustively define that plant's growth curve; Now, based on the CUFT's strict definition of the "flow of time" for that given (developing) plant which comprises the particular sequence of spatial-electromagnetic pixels (series) across the given series of USCF's frames, it should be possible to exert a differential electromagnetic field manipulation of each of the given spatial-electromagnetic pixels per each of the USCF's frames so as to produce a "reversal" of the "flow of time" - i.e., the spatial-electromagnetic pixels series' values arranged in the reversed order (such that instead of a USCF's series running from '1... to n' it would run from 'n... to 1')!

The key point to be noted (here) is that whereas both relativistic and quantum theories assume a strict "*unidirectional*" and "*unaltered*" flow of time, the CUFT's computational definition of 'time' as the number of 'object-inconsistent' USCF's presentations and of the "flow of time" (direction) strictly depending on the *particular sequence of 'spatial-electromagnetic pixel' values* allows the CUFT to predict a (differential) critical prediction whereby it may be possible to "reverse the flow of time" of a given object through a manipulation of the sequence (e.g., order) of the series of the particular 'spatial-electromagnetic universal pixels' comprising the series of USCF's object presentation... Note that according to the CUFT there does not seem to exist any "objective", "unidirectional", or "unaltered" "flow of time" underlying the (quantum or relativistic) physical phenomena, but only a particular configuration of a certain sequence of 'spatial-electromagnetic universal pixels' that is presented in a particular sequence (e.g., comprising a given series of USCF's). Therefore, to the extent that we are able to manipulate (e.g., technologically) the 'spatial-electromagnetic pixels' values of an object across a series of USCF's (such that it follows the "reversed order" of the original USCF's series) then we have in fact "reversed the flow of time" for that particular object (or event)...

Moreover, from a purely technological standpoint, the process by which such a potential reversal of the (original) sequence of 'spatial-electromagnetic universal pixels' may be achieved (i.e., through a manipulation of the electromagnetic value/s of a given object's 'spatial-electromagnetic universal pixels' in order to produce the "reversed" spatial electromagnetic universal pixels' USCF's sequence) does not necessarily require the capacity to identify, compute and manipulate each and every individual USCF (i...n) frame, but instead necessitate the identification (computation) and manipulation of a "sufficiently large" number of USCF's from within a given pool of consecutive USCF's. (Due to the novelty of the possibility to manipulate the series of spatial-electromagnetic pixels values comprising a given object's "flow of time" the determination of the particular number or rate of such 'sampled' specific spatial-electromagnetic universal pixels (across a certain number of USCF's) that is necessary to accurately reverse that object's "time flow" sequence would have to be tested experimentally.)

Finally, it is clear that to the extent that these particular CUFT's empirical predictions regarding the possibility to "reverse the flow of time" for any given object (or event) based on the manipulation of its specific sequence of 'spatial-electromagnetic universal pixels' may be validated experimentally, this may open the door for a series of potentially far reaching scientific and technological advances in our understanding of the physical universe, as well as in some of its potential human clinical and other potential applications; Thus, for instance, if it may be possible to "reverse the flow of time" for a relatively small object it should be possible (e.g., at least in principle) to "reverse the flow of time" for an entire organism or for a particular (healthy or pathological, young, diseased or aged) cell/s, tissue/s or organ/s... Likewise, based on an extension of the identification of any given object's precise 'spatial-electromagnetic universal pixels' composition (e.g., across a certain series of USCF's) and the potential for altering that object's (single or multiple) pixels values through an electromagnetic manipulation of its particular pixels' values - it should be possible (e.g., again at least in principle) to also "encode" comprehensively the particular spatial-electromagnetic values pixels of any object, cell/s tissue/s or even an entire organism or physical object and subsequently either alter its composition (or condition), or even "de-materialize" it based on the application of appropriate electromagnetic field (that may 'counteract' the particular

'spatial- electromagnetic pixels' values of that object or certain elements within it) and subsequently "materialize" it elsewhere based on the appropriate application of the precise electromagnetic field that can produce that object's particular spatial-electromagnetic values (e.g., at any accessible point in space) (Bentwich, 2011a)...

Thus, a critical contrasting of three particular instances in which the CUFT's empirical predictions may significantly differ from the corresponding predictions offered by contemporary Quantum or Relativistic theories may validate the Computational Unified Field Theory - as not only replicating all known quantum and relativistic empirical phenomena as well as bridging the gap between their apparent theoretical inconsistencies (Bentwich, 2011c), but in fact may demonstrate the advantage of the CUFT over existing Quantum and Relativistic theoretical models (e.g., while incorporating all known quantum and relativistic phenomena within a broader novel theoretical framework); Hence, as outlined earlier, the aim of the second half of this chapter is to broaden the validation of the Computational Unified Field Theory (CUFT) through the application of one of its key theoretical postulates, namely: the computational 'Duality Principle' to a series of key (computational) scientific paradigms. Once again, to the extent that the computational-empirical analysis of each of these key scientific paradigms may be shown (below) to be constrained by the CUFT's postulated 'Duality Principle', this would both extend the construct validity of the CUFT (to other key scientific disciplines), as well as call for these scientific paradigms' reformulation based on this (novel) more comprehensive Computational Unified Field Theory (of which the Duality Principle is one of three principle theoretical postulates). Needless to say that given the new (hypothetical) Computational Unified Field Theory's aim - to not only unify between Quantum Mechanics and Relativity Theory (e.g., as shown previously: Bentwich, 2011c) but to fulfill the requirements of a 'Theory of Everything' (TOE) (Brumfiel, 2006; Einstein, 1929, 1931, 1951; Ellis, 1986; Greene, 2003), a demonstration of the potential applicability of the CUFT to a series of key scientific paradigms may be significant as part of its theoretical validation process;

### 3. The 'Duality Principle': Potential resolution of key 'Self-Referential Ontological Computational Systems' (SROCS) scientific paradigms

*To the extent that a series of key scientific paradigms can be shown to be constrained by the Computational Unified Field Theory's (CUFT) postulated 'Duality Principle' (Bentwich, 2011c), there emerges a need to re-formalize each of these central scientific paradigms based on the Duality Principle's higher-ordered 'D2 A-Causal' computational framework as embedded within the broader Computational Unified Field Theory.*

As noted previously (Bentwich, 2011c), one of the three principle theoretical postulates underlying the CUFT is the computational 'Duality Principle' which constrains any 'Self Referential Ontological Computational System' (SROCS) of the general form:

$$PR\{x,y\} \rightarrow ['y' \text{ or } 'not\ y'] / di1 \dots din$$

Indeed, it was shown (there) that Quantum Mechanics' probabilistic interpretation which is based on the assumption whereby the determination of the complimentary values of any subatomic 'target' element solely depends on its direct (or indirect) physical interaction with another 'probe' element (at the 'di1' to 'din' computational levels), thus:

$$SROCS: PR\{P, t\} \rightarrow ['t' \text{ or } '\neg t'] / di1 \dots n.$$



Likewise, Relativity's computational structure was also shown to constitute precisely such a SROCS computational structure:

$$\text{SROCS: PR}\{P, \text{Odiff}\} \rightarrow [P \text{ or } \neg P] / \text{di1...din}$$

wherein it is assumed that the determination of the "existence" or "non-existence" of any (specific) relativistic 'Phenomenon' (e.g., 'spatial-temporal' or 'energy-mass') is solely based on that Phenomenon's direct (or indirect) physical interaction with a differential series of relativistic observer/s.

Moreover, it was shown that both of these quantum and relativistic SROCS paradigms also necessarily contain the "negative" case of a 'Self-Referential Ontological *Negative* Computational System' (SRONCS) which inevitably leads to 'logical inconsistency' and ensuing '*computational indeterminacy*' - i.e., a principle *computational inability* of such a SROCS/SRONCS computational structure to *determine* whether any particular (quantum) 't' or (relativistic) 'P' value- "*exists*" or "*doesn't exist*"; However, since in both of these (quantum and relativistic) cases there is robust empirical data indicating the *capacity* of these quantum or relativistic computational systems to determine the "existence" or "non-existence" of any such particular 't' or 'P' value/s, then the (novel) computational '*Duality Principle*' asserted the *conceptual inability to compute* the "existence" or "non-existence" of any (particular) relativistic "P" or quantum "t" value *from within their direct physical interaction with another relativistic (differential) observer/s or with another subatomic 'probe' element* - but only from a conceptually higher-ordered 'D2' computational level which is irreducible to any direct (or indirect) physical interactions between any such quantum 'probe-target' or relativistic 'observer-Phenomenon' interactions;

Indeed, according to this new hypothetical computational 'Duality Principle', the only possible determination of any such quantum or relativistic relationships can be carried out based on such conceptually higher-ordered 'D2' computation which computes the "co-occurrences" of any relativistic ('spatial-temporal' or 'energy-mass') 'observer-Phenomenon' values, or the "co-occurrences" of any quantum (computational) complimentary ('spatial-energetic' or 'temporal-mass') 'probe-target' values... In fact, based on the identification of such a (singular) conceptually higher-ordered 'D2 A-Causal' computational framework which underlies both quantum and relativistic models of physical reality the (hypothetical) 'Computational Unified Field Theory' (CUFT) was hypothesized which postulated the existence of a series of extremely rapid 'Universal Simultaneous Computational Frames' (USCF's) that give rise to all quantum and relativistic physical phenomena (and may also point at new hypothetical critical physical predictions as described above which may arise from the discovery of the singular 'Universal Computational Principle' which computes this rapid series of USCF's).

More generally, the incorporation of the computational 'Duality Principle' as one of the three central postulates of the 'Computational Unified Field Theory' (CUFT) has pointed at the possibility that to the extent that other (key) scientific paradigms may also constitute such SROCS computational structures, then they should also be constrained by the 'Duality Principle' and the CUFT (e.g., of which the Duality Principle forms an integral part). Specifically, it was suggested that there may exist a series of key scientific paradigms (including: Darwin's Natural Selection Principle and associated 'Genetic Encoding' hypothesis and Neuroscience's basic 'materialistic-reductionistic' Psycho-Physical Problem) which may all comprise such basic SROCS computational structure, and therefore may be constrained by the 'Duality Principle'; Again, to the extent that each of these key scientific



(computational) paradigm may be shown to constitute a SROCS structure and therefore be constrained by the Duality Principle, then these scientific paradigms will have to be reformulated based on the Duality Principle's conceptually higher-ordered 'D2 a-causal' computational framework – thereby becoming an integral part of the CUFT's delineation of the 'D2' rapid series of the USCF's...

Therefore, what follows is a delineation of the SROCS computational structure underlying each of these key scientific paradigms – which shall therefore inevitably point at the Duality Principle's assertion regarding the (conceptual) impossibility of determining the "existence" or "non-existence" of any SROCS' (particular) 'y' element from within its direct or indirect physical (or computational) interaction with any exhaustive series of 'x' factor/s (e.g., that are particular to that specific SROCS scientific paradigm); Instead, the application of the Duality Principle to each of these scientific SROCS paradigms may point at the existence of a conceptually higher-ordered 'D2' computational framework which computes an 'a-causal' "co-occurrence" of a series of 'x-y' pairs (e.g., which alone can explain the empirical capacity of these scientific paradigms to determine the "existence" or "non-existence" of any particular 'y' element);

According to the hypothesized computational Duality Principle (Bentwich, 2011c), any empirical scientific paradigm that is based on such a SROCS computational structure may inevitably lead to both 'logical inconsistency' and 'computational indeterminacy' that are contradicted by that (particular) scientific paradigm's empirically proven capacity to determine whether any specific 'y' element "exists" or "doesn't exist"; This empirically proven capacity of the given scientific paradigm to compute the "existence" or "non-existence" of the 'y' element points at the Duality Principle's asserted conceptually higher-ordered 'D2' computational framework which computes the "co-occurrences" of any (hypothetical) series of [ $x-y(st-i)$ ; ...  $x-y(st-i+n)$ ] pairs; Indeed, this conceptually higher-ordered computation of the "co-occurrence" of any such 'x-y' pairing (proven by the Duality Principle) was termed: '**D2 A-Causal Computation**'. This is due to the fact that according to the Duality Principle the only possible means through which these empirically validated scientific paradigms are able to compute the "existence" or "non-existence" of any given 'y' element is through a conceptually higher-ordered 'D2 a-causal' Computation which determines the "co-occurrences" of any 'x-y' pair/s (e.g., but which was principally shown to be irreducible to any hypothetical direct or even indirect 'x-y' physical interactions)...

Indeed, as shown in the previous article (Bentwich, 2011c), since the Duality Principle's constraint of the SROCS computational structure is *conceptual* in nature – e.g., in that any SROCS computational structure is bound to produce both logical inconsistency and subsequent computational indeterminacy (e.g., which are contradicted by empirical evidence indicating the capacity of their corresponding computational systems to determine whether the particular 'y' element "exists" or "doesn't exist"), then it was shown that the Duality Principle's assertion regarding the need to place the computation of the "existence" or "non-existence" of the particular 'y' element at a conceptually higher-ordered 'D2' level overrides (and transcends) any direct or *indirect* physical relationship between the 'y' and 'x' elements (e.g., occurring at any hypothetical exhaustive computational level/s, 'di1...din'). This is because even if we assume that the computation determining whether the 'y' element "exists" or "doesn't exist" takes place at an intermediary (second) 'di2' computational level (or factor/s), then this does not alter the basic computational (causal-physical) SROCS structure; This is due to the basic materialistic-reductionistic working hypothesis underlying all key scientific SROCS paradigms wherein the sole determination of the "existence" or "non-existence" of the (particular) 'y' element is determined solely based on the direct

physical interaction between the 'y' element – e.g., as signified by the “causal-arrow” within the (above mentioned) SROCS computational structure: SROCS:  $PR\{x,y\} \rightarrow [y \text{ or } \neg y]/di1$ . Thus, whether we attribute the computation of the “existence/non-existence” of the 'y' element as taking place at the same 'direct physical interaction' (e.g., of the 'x' and 'y' elements at the 'di1' computational level) or whether we attempt to 'rise higher' to an additional hypothetical computational level/s (or factor/s etc.) the basic 'materialistic-reductionistic' assumption underlying the SROCS computational structure inevitably ties the direct physical 'x-y' interaction with a 'causal-material' determination of the “existence” or “non-existence” of the (ensuing) 'y' element (e.g., occurring either at the 'di1' or 'di2' computational levels). In other words, whether we assume that the determination of the 'existence/non-existence' of the 'y' element takes place at the same (di1) computational level as the direct physical 'x-y' interaction or whether we assume that the determination of the “existence”/“non-existence” of the 'y' element occurs (e.g., somehow) through one or more intermediary computational levels (di2...din) or factor/s the basic SROCS computational structure which assumes that it is this direct physical interaction between the 'x' and 'y' element which solely can determine whether the 'y' element “exists” or “doesn't exist” is therefore inevitably constrained by the computational Duality Principle:

Moreover, the Duality Principle's computational constraint asserts the conceptual inability to determine whether the (particular) 'y' element “exists” or “doesn't exist” from *within* any direct or indirect *physical interaction* between that 'y' element and any other 'x' factor (at any 'di1... 'din' computational levels), but *only from a conceptually higher-ordered 'D2' computational framework* which can only determine an 'a-causal' computational relationship/s between any hypothetical 'x' and 'y' factor/s; Indeed, as shown in the previous article (and noted above), such conceptually higher-ordered 'a-causal D2' computation cannot (in principle) be reduced to any direct or indirect physical 'x-y' interactions but instead involves an association of a series of 'x-y' pairs occurring at different 'spatial-temporal' points, thus: D2:  $\{[x1, y1]st1; [x1, y1]st2 \dots [xn, yn]stn\}$ . In other words, the (novel computational) Duality Principle effectively constrains- and replaces- any scientific SROCS paradigm (e.g., of the general form: SROCS:  $PR\{x,y\} \rightarrow [y \text{ or } \neg y]/di1$ ) – with a conceptually higher-ordered 'D2' computational framework of the form: D2:  $\{[x1, y1]st1; [x1, y1]st2 \dots [xn, yn]stn\}$  which is based on the (higher-ordered 'D2') computation of the co-occurrences of certain  $\{x-y\}sti\dots n$  pairs (occurring at different spatial-temporal points). Indeed, it is suggested that such higher-ordered D2 computational metamorphosis replaces (and transcends) the strict materialistic-reductionistic working hypothesis underlying the current SROCS' scientific paradigm's focus with a conceptually higher-ordered 'non-material', 'non-causal' associative computational mechanism. Therefore, based on the Duality Principle's (above) computational-empirical proof for the basic computational constraint imposed on any scientific SROCS paradigm – e.g., which must necessarily be replaced by an alternative conceptually higher-ordered 'a-causal D2' computation, then any (existing or new) scientific paradigm that can be accurately demonstrated to replicate the (above mentioned) SROCS computational structure must be replaced by the Duality Principle's asserted conceptually higher-ordered 'D2' computational framework: D2:  $\{[x1, y1]st1; [x1, y1]st2 \dots [xn, yn]stn\}$ .

### 3.1 Darwin's natural selection principle & genetic encoding hypothesis

We therefore first examine the key scientific paradigms of Darwin's '*Natural Selection Principle*' (Darwin, 1859) (e.g., and its closely related 'Genetic Encoding' and 'Protein

Synthesis - Genetic Expression' hypotheses) in order to show that they all (in fact) constitute such 'Self-Referential Ontological Computational System' (SROCS) computational paradigms which are necessarily constrained by the computational 'Duality Principle'; In a nutshell, it is hypothesized that Darwin's evolutionary theory comprises three (intimately linked) scientific SROCS paradigms which are: the (primary) 'Natural Selection' SROCS, the (secondary) 'Genetic Encoding' (plus associated random mutations assumption) SROCS, and (tertiary) Protein Synthesis (phenotype) - Genetic Expression SROCS computational paradigms;

- i. **Natural Selection SROCS:** Darwin's 'Natural Selection' principle comprises a SROCS paradigm since it asserts that the "existence" or "non-existence" of any given organism (e.g., 'o' - and by extension, also all of its potential descendent organisms constituting a single specie) is solely dependent upon its direct (or indirect) physical interaction with an exhaustive series of 'Environmental Factors' ('E<sub>{1...n}</sub>')

$$\text{SROCS I [Natural Selection]: PR}\{ E_{\{1...n\}}, o\} \rightarrow ['o' \text{ or } '\neg o']/di1.$$

But, as we've seen (above), such SROCS computational structure inevitably leads to both 'logical inconsistency' and 'computational indeterminacy' - in the case of the SRONCS: PR{ E<sub>{1...n}</sub>, o } → '¬o'/di.

This is because such a SRONCS asserts that the direct physical interaction between a given organism and an (exhaustive series of) Environmental Factors gives rise to the "non-existence" of that organism, which essentially implies that that particular organism both "exists" and "doesn't exist" at the same 'di1...din' computational level - which obviously constitutes a 'logical inconsistency'. But, due to the SROCS/SRONCS computational structure (e.g., which assumes that the only means of determining whether the organism "exists" or "doesn't exist" is through the direct physical interaction 'di1' between the organism and its exhaustive Environmental Factors), then such 'logical inconsistency' inevitably also leads to 'computational indeterminacy' - i.e., a principle inability of the SROCS/SRONCS scientific paradigm to determine whether that organism ('o') "exists" or "doesn't exist"! However, since there exists ample empirical evidence indicating the *capacity* of evolutionary biological systems to determine whether any given organism ('o') "exists" (e.g., survives) or "doesn't exist" (e.g., is extinct), then the Duality Principle asserts the conceptual computational inability of Darwin's Natural Selection principle to determine whether any given organism "exists" or "doesn't exist" based on its (strictly) assumed materialistic-reductionistic SROCS/SRONCS computational structure (e.g., direct physical interaction between the organism and an exhaustive set of Environmental Factors); Instead, the computational Duality Principle asserts that the only means for determining the evolution of any given biological species is based on a conceptually higher-ordered 'D2' computational framework which computes the "co-occurrences" of a series of any (hypothetical) organism/s and corresponding Environmental Factors, thus:

$$D2: [\{E_{\{1...n\}}, o\}st_1; \{E_{\{1...n\}}, o\}st_2 \dots \{E_{\{1...n\}}, o\}st_n].$$

Note that as in the above mentioned generalized format of the SROCS computational structure (e.g., PR{x,y}→['y' or '¬y']/di1), the computational constraint imposed by the Duality Principle is *conceptual* - i.e., it applies regardless of whether we're dealing with any 'direct' or 'indirect' physical relationships between the 'x' and 'y' factor/s; In the same manner, we can see that even if we assume that the interaction between any given organism

('o') and any exhaustive hypothetical Environmental Factors ('E<sub>{1...n}</sub>') comprises more than one Environmental Factor/s ('E<sub>{1...n}</sub>') or more than one (intermediary) computational level/s, the computational *structure* of Darwin's 'Natural Selection' SROCS paradigm inevitably leads to both 'logical inconsistency' and 'computational indeterminacy'; This is due to the fact that the fundamental 'materialistic-reductionistic' working hypothesis underlying the Natural Selection SROCS paradigm unequivocally stipulates that the determination of the "existence" or "non-existence" of any given organism ('o') is solely (and strictly) computed based on the direct (or even indirect) physical interaction/s between the organism and any exhaustive hypothetical series of Environmental Factors. Therefore, even if we assumed that Darwin's Natural Selection principle involves multiple Environmental Factors ('E<sub>{1...n}</sub>') and/or multiple computational levels ('di1'...'diz'), thus:

$$\text{PR}\{ E_{\{1...n\}}, o\} / di1...din \rightarrow ['o' \text{ or } '\neg o'] / diz$$

then it still (inevitably) replicates the same SROCS computational structure that invariably produces the above mentioned 'logical inconsistency' and 'computational indeterminacy' (which give rise to the Duality Principle's above mentioned computational constraint). This is due to the fact that regardless of the number of (hypothetical) intervening (or mediating) Environmental Factors or computational level/s ('di1'...'diz'), the SROCS strict 'materialistic-reductionistic' computational structure assumes that the determination of the "existence" or "non-existence" of the organism is solely determined based on the direct physical interaction between the organism and its Environmental Factors.

Likewise, even if we assume that Darwin's Natural Selection process operates via innumerable organism-environment interactions taking place at different 'spatial-temporal' points {st1...stn), then due to the (abovementioned) 'materialistic-reductionistic' implicit assumption embedded within the SROCS/SRONCS computational structure (i.e., which assumes that the "existence" or "non-existence" of the organism 'o' is *solely determined* based on any direct or indirect physical interactions between that organism and an exhaustive set of Environmental Factors), this does not alter the basic SROCS/SRONCS computational structure which was shown (above) to be constrained by the Duality Principle:

$$\text{PR}\{ E_{\{1...n\}}, o\} / sti1...sti \rightarrow ['o' \text{ or } '\neg o'] stn / di1... diz$$

Essentially, this Natural Selection (primary) SROCS computational structure asserts that the determination of the "existence" or "non-existence" of any particular organism ('o') is solely determined based on its single- or multiple- spatial-temporal interactions with an exhaustive set of Environmental Factors (and even that hypothetically the actual computation or determination of the "existence" or "non-existence" of the particular organism {'o'}) may take place at a later spatial-temporal point than the actual direct or indirect physical interaction between the organism and the exhaustive set of Environmental Factors);

Note, however, that this basic SROCS/SRONCS computational structure embeds within it the fundamental 'materialistic-reductionistic' implicit assumption wherein there cannot be any other factor/s outside the direct (or indirect) physical interaction/s between the organism and the (exhaustive set of) Environmental Factors which determines or computes the "existence" (e.g., survival) or "non-existence" (e.g., extinction) of that organism; This strong (implicit) 'materialistic-reductionistic' assumption underlying the SROCS/SRONCS computational structure is represented by the **causal** '→' connecting between the direct (or



indirect) physical interaction between the organism and the Environmental factors and the determination of the "existence"/"non-existence" of the particular organism... Therefore, based on this strict 'materialistic-reductionistic' assumption underlying Darwin's Natural Selection SROCS paradigm -the direct (or indirect) physical relationship between the organism and its Environmental Factors and its (strict) *causal effect* in determining the "existence" or "non-existence" of that organism must necessarily constitute a *singular computational level* (e.g., di1...dix), regardless of the number of (hypothetical) spatial-temporal points that occupy either the direct or indirect 'organism-Environmental Factors' interaction/s or the specific spatial-temporal point/s at which the determination (or computation) of the "existence" or "non-existence" of the organism take place!

Therefore, from a purely computational standpoint, both the direct physical interaction between the organism and its Environmental Factors (at 'di1') and the determination of the ensuing "existence" or "non-existence" of that organism (e.g., assumed to take place at any hypothetical level 'di1'...'diz') - must be considered to occur at the *same computational level* (e.g., at either 'di1'...'diz')! Indeed, it is precisely this materialistic-reductionistic SROCS/SRONCS paradigmatic structure which assumes that the determination of the "existence" or "non-existence" of the particular organism occurs at the *same computational level* (e.g., at either 'di1'...'diz') as the direct physical interaction between that organism and an exhaustive set of Environmental Factors which was shown (above) to inevitably lead to both 'logical inconsistency' and 'computational indeterminacy', which were shown to be contradicted by robust empirical findings - thereby pointing at the Duality Principle's assertion regarding the need for a conceptually higher-ordered 'D2' computational level that can compute the "co-occurrences" of any spatial-temporal pairing of any given organism and its corresponding Environmental Factors:

$$D2: [\{E\{1...n\}, o\}st1; \{E\{1...n\}, o\}st2 \dots \{E\{1...n\}, o\}stn].$$

Hence, based on the Duality Principle's logical-empirical analysis of the SROCS/SRONCS computational structure underlying Darwin's Natural Selection scientific paradigm, the Duality Principle has proven the conceptual computational inability to determine the "existence" or "non-existence" of any (hypothetical) organism based on any direct or indirect physical interaction/s between that organism and any (hypothetical) exhaustive set of Environmental Factor/s (at the same di1...dix computational level)- but only from a conceptually higher-ordered 'D2' computational level which simply computes the "co-occurrences" of any hypothetical series of spatial-temporal 'organism-Environmental Factors' pairing...

It is also worthwhile to note that the Duality Principle's proof for the conceptual computational inability of Darwin's Natural Selection Principle's SROCS computational structure to determine the "existence" or "non-existence" of any (hypothetical) organism ('o') from within its direct or indirect physical interaction within any (hypothetical) exhaustive series of Environmental Factors (e.g., at any 'di1... dix' computational level) also *negates* the existence of any "*causal-material*" relationship between the particular organism and any (exhaustive set of) Environmental Factors; This was previously shown (Bentwich, 2011c) through a thorough analysis of the Duality Principle's proof for the existence of a D2 'A-Causal' computational characteristics - which replaces the SROCS (implicit) 'material-causal' relationship between any two (hypothetical) 'x' and 'y' elements (e.g., at any di1...din computational level) with the D2's computation of the "co-occurrences" of any (hypothetical) series of 'x-y' pairs. The Duality Principle's conceptual proof for the principle inability of any



(exhaustive series of) Environmental Factors to *causally* determine the "existence" or "non-existence" of any particular organism based on any hypothetical single- or multiple- level/s of computation or single- or multiple- spatial-temporal points was also shown (above) based on the Duality Principle's proof for the basic (implicit) material-causal assumption underlying the SROCS computational structure which inevitably leads to both 'logical-inconsistency' and 'computational indeterminacy' which are contradicted by robust empirical evidence (e.g., indicating the *capacity* of evolutionary-biological systems to determine the "existence" or "non-existence" of any particular organism). Hence, a key emerging property of the Duality Principle (e.g., in this case as it applies to Darwin's Natural Selection SROCS paradigm) is that it replaces the basic (implicit) **material-causal** assumption embedded within the SROCS computational structure with a *conceptually higher-ordered* '**D2 A-Causal**' **computational framework** which merely computes the "co-occurrences" of any (hypothetical) series of '*organism-Environmental Factors*' pairs – i.e., but which cannot (in principle) possess any 'material-causal' relationship between them...

Interestingly though (as noted above), despite the Duality Principle's conceptual computational proof that Darwin's Natural Selection Principle (computational structure) constitutes a SROCS and is therefore constrained by the Duality Principle, i.e., indicating the conceptual computational inability to determine the "existence" or "non-existence" of any (hypothetical) organism ('o') based on any of its direct or indirect material-causal interaction/s with any exhaustive set of Environmental Factors  $E_{\{1...n\}}$  (but only from a conceptually higher-ordered 'D2 a-causal' computational framework) – it seems that Darwin's evolutionary theory further contingents Darwin's Natural Selection Principle's SROCS paradigm upon two other (hierarchical-dualistic) SROCS paradigms, i.e., the (abovementioned) 'Genetic Encoding' hypothesis and 'Protein Synthesis' SROCS paradigms;

**ii. Organism Phenotype - Genetic Encoding SROCS:** It is hypothesized that Darwin's (above mentioned) Natural Selection SROCS paradigm is anchored in- and based upon an additional (secondary) '*Organism Phenotype - Genetic Encoding*' SROCS paradigm:  
 $PR\{G_{\{1...n\}}, o-phi\} \rightarrow [ 'o-phi' \text{ or } '-o-phi' ] / di1...din.$

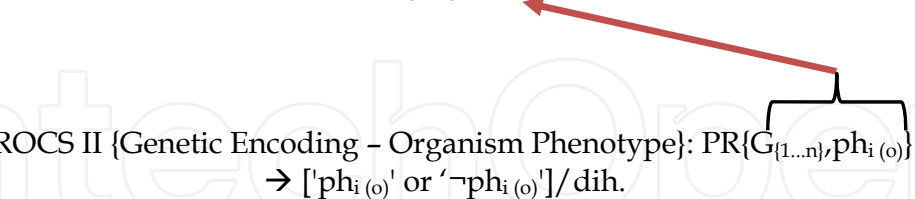
wherein the "existence" or "non-existence" of any particular phenotypic property of any given organism ('o-phi') (e.g., appearing in Darwin's Natural Selection primary SROCS paradigm) is assumed to be solely determined based on its direct (or indirect) physical interaction/s with any exhaustive set of Genetic factors (e.g., at the 'di1...din' computational levels). Note that from the (entire) dualistic relationship existing between the 'organism' and the Environmental Factors in Darwin's Natural Selection Principle SROCS paradigm – only the 'organism ('o') element is utilized within the secondary '*Organism Phenotype - Genetic Encoding*' SROCS paradigm:

$$PR\{G_{\{1...n\}}, o-phi\} \rightarrow [ 'o-phi' \text{ or } '-o-phi' ] / di1...din.$$

In other words, the "existence" or "non-existence" of any particular organism possessing a specific phenotypic property is totally contingent upon its direct (or indirect) physical interaction with an exhaustive series of relevant Generic factors; It is to be noted that the implicit assumption underlying this 'hierarchical-dualistic' computational structure is the (tacit) contingency that exists between Darwin's (primary) Natural Selection Principle's *organism's particular phenotypic property* (e.g., which interacts directly or indirectly with the exhaustive set of Environmental Factors, thereby solely determining the "existence" or "non-existence" of that particular organism) – and the exhaustive set of relevant Genetic Factors which together (solely) determine the "existence" or "non-existence" of that particular

phenotypic property! Thus, it may be said that there exists a dual 'hierarchical-dualistic' computational structure which constitutes Darwin's entire evolutionary theory that can be broken down to two interrelated SROCS computational structures, thus:

$$\text{SROCS I \{Natural Selection\}: PR\{E_{\{1...n\}}, 'o-phi'\} \rightarrow ['o-phi' \text{ or } '\neg o-phi']/ di1.$$

$$\text{SROCS II \{Genetic Encoding - Organism Phenotype\}: PR\{G_{\{1...n\}}, phi_{i(o)}\} \rightarrow ['phi_{i(o)}' \text{ or } '\neg phi_{i(o)}']/ dih.$$


However, to the extent that it can be proven that this (secondary) 'Genetic Encoding - Organism Phenotype' computational structure replicates and constitutes a SROCS computational structure, then it automatically follows that both the primary and secondary SROCS paradigms comprising Darwin's (currently accepted) evolutionary theory must be replaced (and transcended) by a conceptually higher-ordered 'D2' computational framework; Thus, we now set to evince that Darwin's (secondary) Genetic Encoding- Organism's Phenotype computational structure constitutes a SROCS paradigm and is therefore also necessarily constrained by the (same) computational Duality Principle:

$$PR\{G_{\{1...n\}}, phi_{i(o)}\} \rightarrow ['phi_{i(o)}' \text{ or } '\neg phi_{i(o)}']/ dih.$$

As shown above, this computational structure precisely replicates the generalized SROCS structure of the form:  $PR\{x,y\} \rightarrow ['y' \text{ or } '\neg y']$ , which was shown to inevitably lead to both 'logical inconsistency' and ensuing 'computational indeterminacy' in the case of the 'Self-Referential Ontological Computational System' (SRONCS).

This is simply because if it is assumed that the "existence" or "non-existence" of any particular phenotypic property (' $phi_{i(o)}$ ') is solely dependent upon its direct physical interaction with any exhaustive series of 'Genetic Factors' (' $G_{\{1...n\}}$ '), then in the case of the (abovementioned) SRONCS paradigm the specific phenotypic property ' $phi_{i(o)}$ ' appears to both "exist" and "not exist" at the same ' $dih$ ' computational level:  $PR\{G_{\{1...n\}}, phi_{i(o)}\} \rightarrow '\neg phi_{i(o)}/ dih$ , which obviously produces a 'logical inconsistency' - which also inevitably leads to an (apparent) 'computational indeterminacy', e.g., an apparent inability of the computational system to determine whether that particular phenotypic property "exists" or "doesn't exist"... But, since there exist ample empirical evidence indicating that genetic (computational) system do in fact possess the capacity to determine whether any given phenotypic property ' $phi_{i(o)}$ ' "exists" or "doesn't exist" within a given organism, then we must conclude that the (currently assumed) SROCS computational structure is invalid!

As shown previously, it is important to note that the computational constraint imposed by the Duality Principle is *conceptual* in nature - i.e., it applies to any single- or multiple-hypothetical computational levels that may be involved in any direct or even indirect (e.g.,  $dih1...dihn$ ) physical interactions between the particular phenotypic property and any exhaustive series of 'Genetic Factors' ( $G_{\{1...n\}}$ );

As shown (above), the reason for this *conceptual* computational constraint imposed on the 'Genetic Encoding' SROCS by the Duality Principle stems from the existence of an implicit '*materialistic-reductionistic*' assumption embedded within the SROCS computational structure which is represented by the 'causal arrow'  $\rightarrow$  which connects between any direct physical interaction between the exhaustive set of 'Genetic Factors' and the particular phenotypic

property (at 'dih1') and any single- or multiple- direct or indirect physical interactions or computational levels that may mediate between this direct 'Genetic Factors - phenotype' physical interaction (at dihn) and between the determination of the "existence" or "non-existence" of the particular (relevant) phenotypic property; Therefore it may be appropriate to represent the conceptual constraint imposed by the Duality Principle upon the (secondary) Genetic Encoding-phenotype SROCS structure in this manner:

$$PR\{G\{1\dots n\},\phi(o)\}_{di1} \rightarrow ['\phi(o)' \text{ or } '\neg\phi(o)']_{dih1\dots dihn}.$$

wherein any (hypothetical) direct or indirect physical interaction between an exhaustive set of Genetic Factors and the particular phenotypic property ' $\phi(o)$ ' - which can take place either at their direct physical interaction level ('dih1') or at any subsequent (indirect) computational level/s (e.g., 'dihn') *causally leads* to the determination of the "existence" or "non-existence" of that particular phenotypic property ' $\phi(o)$ ' at a hypothetical 'dihz' computational level;

However, even for this (expanded) Genetic Factors - phenotypic property SROCS computational structure it becomes clear that the (abovementioned) 'materialistic-reductionistic' implicit assumption embedded within it - inevitably leads to both 'logical inconsistency' and subsequent 'computational indeterminacy' that are contradicted by robust empirical findings indicating the *capacity* of biological evolutionary systems to determine the "existence" or "non-existence" of any particular phenotypic property in any given organism... This is due to the fact that despite the hypothesis that the determination of the "existence" or "non-existence" of the particular phenotypic property may occur at (single- or multiple) computational level/s (dih1... dihz) that may be different than the direct physical interaction between the particular phenotype and the (exhaustive set of ) Genetic Factors, due to the above mentioned 'materialistic-reductionistic' implicit assumption embedded within this (expanded) SROCS structure the determination of the "existence" or "non-existence" of that particular phenotypic property ' $\phi(o)$ ' is solely- and strictly- *caused* by the direct physical interaction between the (exhaustive set of) Genetic Factors (at dih1) and that phenotypic property ' $\phi(o)$ '; But, this implies that the determination of the "existence" or "non-existence" of the phenotypic property ' $\phi(o)$ ' takes place at the *same computational level/s* as the direct physical interaction level (dih1... dihz) between the Genetic Factors and the phenotypic property, which may be represented thus:

$$PR\{G\{1\dots n\},\phi(o)\} \rightarrow ['\phi(o)' \text{ or } '\neg\phi(o)']_{dih1\dots dihz}$$

which precisely replicates the above SROCS computational structure which has been shown to be constrained by the Duality Principle...

In other words, whether the interaction between the Genetic Factors and the phenotypic property takes place at the same computational level (e.g., at 'dih1') as the determination of the "existence" or "non-existence" of the phenotypic property, or takes place at a different (single or multiple) computational level/s (e.g., 'dih1... dihz') - due to the implicit materialistic-reductionistic assumption embedded within the (expanded) SROCS computational structure this inevitably leads to both 'logical inconsistency' which inevitably leads to both 'logical inconsistency' and 'computational indeterminacy' that were contradicted by empirical evidence and which therefore lead to the Duality Principle's assertion regarding the need for a conceptually higher-ordered 'D2' computational level which merely computes the "co-occurrences" of any hypothetically pairs of 'Genetic Factors - phenotypic property'.

In fact, the Duality Principle's conceptual computational proof for the principle inability to determine the "existence" or "non-existence" of any particular phenotypic property from within any direct or indirect (di1..diz) physical interaction between the Genetic Factors and the phenotypic property also includes any spatial-temporal span in which these direct or indirect physical interactions occur, or in which the determination of the "existence" or "non-existence" of the (particular) phenotypic property takes place; This can be seen if we formalize each of these direct or indirect physical interaction/s between the Genetic Factors and the particular phenotypic property- as well as to the determination of the "existence"/"non-existence" of the phenotypic property any (hypothetical) spatial-temporal value/s, thus:

$$PR\{G_{\{1...n\}}, \phi(o)\}_{st1..stj} \rightarrow [\phi(o) \text{ or } \neg\phi(o)]_{stn} / di1\dots dihz$$

Wherein the direct physical interaction between the (exhaustive set of) Genetic Factors and the particular phenotypic property takes place at either single- or multiple- time points (st1...stj) that may be different than the spatial-temporal point/s at which the determination of the "existence" or "non-existence" of the (particular) phenotypic property takes place (e.g., 'di1...dihz'). This is because even if we assume that the spatial temporal points at which the direct physical interaction between these Genetic Factors and the particular phenotypic property (PR{G{1...n},phi (o)}st1..stj ) , and the determination of the "existence" or "non-existence" of the particular phenotypic property [ $\phi(o)$  or  $\neg\phi(o)$ ]<sub>stn</sub> are different, then due to the (above generalized) SROCS' embedded 'materialistic-reductionsitic' causal assumption wherein the determination of the "existence" or "non-existence" of the particular phenotypic property is assumed to be determined strictly- and solely- based on the direct (or indirect) physical interaction between the Genetic Factors and that phenotypic property, then this (generalized) SROCS computational structure inevitably leads to both logical inconsistency and computational indeterminacy - which (in turn) point at the Duality Principle's (abovementioned) computational constraint...

We are thus forced to accept the Duality Principle's conceptual computational constraint imposed upon the 'Genetic Encoding - Phenotypic Property' (secondary) SROCS structure wherein the determination of the "existence" or "non-existence" of any particular phenotypic property (within any given organism) cannot (e.g., in principle) be determined from within any direct- or indirect- physical interaction between any exhaustive set of Genetic Factors and any hypothetical phenotypic property, or through any hypothetical single- or multiple- computational levels associated with these direct or indirect physical interaction/s or based on the same or different (single- or multiple-) spatial-temporal points (or intervals) at which these Genetic Factors may interact with any particular phenotypic property:

$$PR\{G_{\{1...n\}}, \phi(o)\}_{st1..stj} \not\rightarrow [\phi(o) \text{ or } \neg\phi(o)]_{stn} / di1\dots dihz.$$

As stated above, the conceptual computational proof for the Duality Principle's assertion arises from the inevitably 'logical inconsistency and 'computational indeterminacy' implications of the SRONCS computational structure wherein the particular phenotypic property seems to both "exist" and "not exist" at the same computational level (which not only constitutes an explicit 'logical inconsistency' but also produces an inevitable 'computational indeterminacy' that is contradicted by empirical findings indicating the capacity of genetic-biological computational systems to determine the "existence" or "non-existence" of any particular phenotypic property);



Instead, the Duality Principle asserts that there must exist a conceptually higher-ordered 'D2' computational framework which is capable of computing the "co-occurrences" of any hypothetical pair/s of Genetic Factor/s and any phenotypic property (e.g., existing at any spatial-temporal point/s):

$$D2: [\{G_{1...n}\}, \text{'phi (o)'} ]_{st1}; \{G_{1...n}\}, \text{'phj (o)'} ]_{sti}; \dots \{G_{1...n}\}, \text{'phn(o)'} ]_{stn}].$$

Therefore, the application of the computational Duality Principle to both Darwin's 'Natural Selection' (primary) SROCS computational paradigm, as well as to its (secondary) 'Genetic Encoding - Phenotypic Property' SROCS paradigm (e.g., which is assumed to serve as a contingency for the primary Natural Selection SROCS paradigm) has proven that it is not possible to determine the "existence" or "non-existence" of any 'organism'- or organism related 'phenotypic property' based on any direct- or indirect- physical interaction between any organism- and an exhaustive set of Environmental Factors or between any (organism's) phenotypic property and any exhaustive set of Genetic Factors e.g., including as carried out by single- or multiple- computational level/s, or taking place at any spatial-temporal point/s etc. Instead, the (novel) computational Duality Principle asserts that there exists a conceptually higher-ordered D2 computational level which computes the "co-occurrences" of any single or multiple hypothetical pairs of any exhaustive set of 'Environmental Factors' and any given 'organism' or of any exhaustive set of 'Genetic Factors' and any organism's 'phenotypic property', which may be represented in this manner:

$$D2: [\{E_{1...n}\}, o]_{st1}; \{E_{1...n}\}, o]_{st2} \dots [\{E_{1...n}\}, o]_{stn}].$$

$$D2: [\{G_{1...n}\}, \text{'phi (o)'} ]_{st1}; \{G_{1...n}\}, \text{'phj (o)'} ]_{sti}; \dots \{G_{1...n}\}, \text{'phn(o)'} ]_{stn}].$$

Finally, it is hypothesized that with the advent of modern genetics, RNA and mRNA scientific research one additional (hypothetical) SROCS computational paradigm has emerged which is the '*Genetic Encoding - Protein Synthesis*' (tertiary) SROCS paradigm; This is because the latest developments in genetics research (in general) and those related to the investigation of the relationships that exist between genetic encoding and protein synthesis (in particular) are based on the assumption wherein any biological synthesis of proteins comprising- and constructing- the biological organism are contingent upon a direct (or indirect) physical relationship between an exhaustive set of Genetic Factors and a certain protein synthesis agent, e.g., such as for instance a particular RNA or mRNA synthesis of a particular protein through their direct or indirect physical interaction with a given set of exhaustive Genetic Factors (Burgess, 1971; Geiduschek & Haselkorn, 1969; Khorana, 1965; Rich & Rajbhandary, 1976; Schweet, & Heintz, 1966).

Indeed, it is suggested that this hypothetical (direct or indirect) physical relationship between a certain exhaustive set of Genetic Factors and any (hypothetical) protein synthesis agent precisely reproduces the (above mentioned) tertiary 'Genetic Expression - Protein Synthesis' SROCS paradigm.

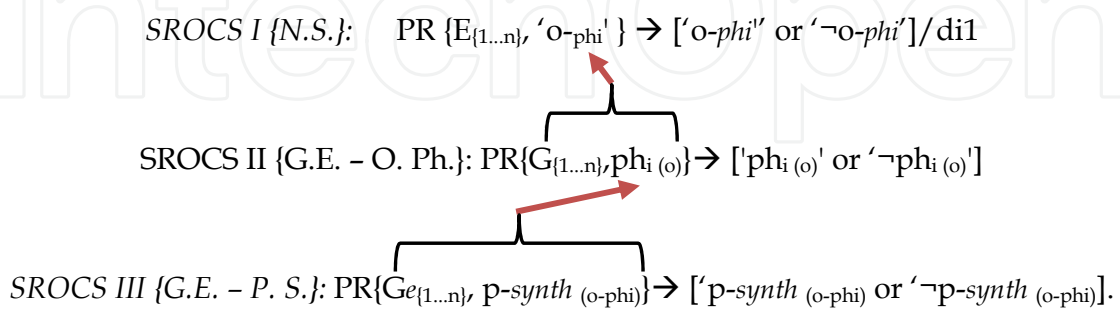
iii. **Protein Synthesis (phenotype) - Genetic Expression SROCS:** It is therefore hypothesized that both Darwin's (above mentioned 'primary') Natural Selection SROCS paradigm as well as the (secondary above mentioned) 'Genetic Encoding - Phenotypic Property' SROCS paradigms are anchored in- and contingent upon- a (tertiary) 'Phenotypic Expression - Protein Synthesis' SROCS computational paradigm, which assumes that the determination of the "existence" or "non-existence" of any particular



Protein (phenotype) is strictly- and entirely- dependent upon its direct (or indirect) physical interaction with an exhaustive set of Genetic Expression ;

**SROCS III {Genetic Expression - Protein Synthesis}: PR{G{1...n}, p-synth}  
→ ['p-synth or '¬p-synth].**

we therefore obtain the full hierarchical-dualistic computational structure underlying Darwin's evolutionary theory as comprising of:



This (new) hypothetical hierarchical-dualistic computational structure underlying Darwin's evolutionary modeling is nevertheless constrained (i.e., at each and every one of its three layered SROCS scientific paradigms) by the *Duality Principle* which therefore forces us to replace each of these (three) SROCS computational levels with a conceptually higher-ordered singular 'D2' computation of the "co-occurrences" of multi-layered pairs of 'Environmental Factors - organism', 'Genetic Factors - (organism) Phenotype' and 'Genetic Expression - (organism-phenotype) Protein Synthesis'...

Based on the (above detailed) analysis of the Duality Principle's constraint of any (generalized) SROCS computational paradigm it is not necessary to repeat the details of the Duality Principle's conceptual computational proof for the inability of the (tertiary) 'Genetic Encoding - Protein Synthesis' SROCS to determine the "existence" or "non-existence" of any particular 'protein synthesis' based on its direct physical interaction with an exhaustive set of 'Genetic Expression'; Suffice to state that according to the (above generalized) conceptual computational proof of the Duality Principle, in the specific case of a SRONCS - i.e., in which any direct (or indirect) physical interaction/s between such (an exhaustive set of) Genetic Expression and any particular Protein Synthesis leads to the "non-existence" (e.g., 'non-synthesis') of any such particular protein, this produces the (abovementioned) 'logical inconsistency' and ensuing 'computational indeterminacy' which are contradicted by well-known empirical evidence indicating the *capacity* of biological-evolutionary systems to determine whether any particular protein is synthesized... As shown above, this leads to the Duality Principle's inevitable assertion regarding the existence of the conceptually higher-ordered 'D2' computational framework which computes the "co-occurrences" of any (hypothetical) series of 'Genetic Expression - Protein Synthesis' pairs occurring at any given spatial-temporal point/s in any given organism:

D2: [{Ge{1...n}, pi-synth (o-phi)}st1; Ge{1...n}, pj-synth (o-phi)}sti... ;  
Ge{1...n}, pn-synth (o-phi)}stn]

Therefore, the Duality Principle's (abovementioned) constraint of the three ('Natural Selection', 'Genetic Encoding' and 'Protein Synthesis') SROCS computational paradigms (or

levels) has proven the conceptual computational inability of each of these scientific paradigms (or computational levels) to determine the "existence" or "non-existence" of the particular 'y' element (e.g., particular 'organism', particular 'phenotypic property', or particular 'protein synthesis') - from within any direct or indirect physical interaction between the (given) 'x' factor and an exhaustive set of the (abovementioned) 'x' factor/s; Instead, the Duality Principle evinced the existence of a conceptually higher-ordered 'D2' computational level which (alone) can compute the "co-occurrences" of any of these (three-leveled) 'x' and 'y' factors (e.g., at any given hypothetical spatial-temporal point/s or computational level/s etc.), thus:

$$D2: [\{E_{\{1...n\}}, o\}_{st1}; \{E_{\{1...n\}}, o\}_{st2} \dots [\{E_{\{1...n\}}, o\}_{stn}].$$

$$D2: [\{G_{\{1...n\}}, \text{'phi (o)'}\}_{st1}; \{G_{\{1...n\}}, \text{'phj (o)'}\}_{sti}; \dots \{G_{\{1...n\}}, \text{'phn(o)'}\}_{stn}].$$

$$D2: [\{Ge_{\{1...n\}}, \text{pi-synth (o-phi)}\}_{st1}; Ge_{\{1...n\}}, \text{pj-synth (o-phi)}\}_{sti} \dots ; \\ Ge_{\{1...n\}}, \text{pn-synth (o-phi)}\}_{stn}]$$

However, based on the previous (Bentwich, 2011c) conceptual proof for the *singularity* of the 'D2' computational framework forces us to accept the fact that there must be a (singular) simultaneous computation of all three-layered SROCS' "co-occurring" pairs (e.g., which according to the CUFT must comprise the same USCF frame/s):

$$D2: [\{E_{\{1...n\}}, o\}_{st1}; \{E_{\{1...n\}}, o\}_{st2} \dots [\{E_{\{1...n\}}, o\}_{stn}].$$

$$D2: [\{G_{\{1...n\}}, \text{'phi (o)'}\}_{st1}; \{G_{\{1...n\}}, \text{'phj (o)'}\}_{sti}; \dots \{G_{\{1...n\}}, \text{'phn(o)'}\}_{stn}].$$

$$D2: [\{Ge_{\{1...n\}}, \text{pi-synth (o-phi)}\}_{st1}; Ge_{\{1...n\}}, \text{pj-synth (o-phi)}\}_{sti} \dots ; \\ Ge_{\{1...n\}}, \text{pn-synth (o-phi)}\}_{stn}]$$

Along these lines it is suggested that based on the Duality Principle's proof for the existence of a conceptually higher-ordered 'D2' computational framework for each of the two (Darwin's 'Natural Selection' and 'Genetic Factors - Phenotypic Property') SROCS paradigms, and a previous (Bentwich, 2011c) conceptual proof for the singularity of such higher-ordered 'D2' computational framework we are led to conclude that :

- a. Darwin's evolutionary theory is based on a three-layered hierarchical-dualistic computational structure which consists of a primary 'Natural Selection' SROCS paradigm that is contingent upon a secondary 'Genetic Encoding - Phenotypic Property' SROCS paradigm that is (in turn) contingent upon a tertiary 'Genetic Expression - Protein Synthesis' SROCS computational paradigm...
- b. Each of these SROCS computational paradigms is constrained by a (generalized) 'Duality Principle' which asserts that it is not possible to determine the "existence" or "non-existence" of any (hypothetical) 'y' element based on any direct or indirect physical interaction of that 'y' element with any (exhaustive set of) 'x' factor/s; Instead, the Duality Principle postulates that it is only possible to determine the "co-occurrences" of any series of (hypothetical) 'x-y' pairs taking place at different spatial-

temporal point/s or interval/s as computed by a conceptually higher-ordered 'D2' computational framework that is (e.g., in principle) irreducible to any series of exhaustive hypothetical direct- or indirect- physical interaction/s, single- or multiple-computational level/s or any hypothetical series of spatial-temporal interactions or occurrences... and:

- c. That there can exist only *one singular* such higher-ordered 'D2' computational framework (e.g., as proven by the application of the Duality Principle to each and every one of these hypothetical SROCS paradigms); (Later on, it will be shown that this (hypothetical) singular conceptually higher-ordered 'D2' computational framework must be equivalent to the previously indicated (Bentwich, 2011c) Computational Unified Field Theory's (CUFT) rapid series of 'Universal Simultaneous Computational Frames' (USCF's) which may underlie all microscopic (quantum) and macroscopic (relativistic) aspects of the physical reality.)

Note (however) that the full theoretical implications of accepting these conceptual computational constraints imposed by the Duality Principle upon any scientific SROCS paradigm (in general) and particularly which are set upon Darwin's three-layered must necessarily replace all material-causal (direct- or indirect- single- or multiple-) interaction/s with an a-causal (conceptually higher-ordered) singular computational framework (e.g., termed: 'D2') which alone can compute an exhaustive series of 'x-y' pairs that occur at different spatial-temporal point/s or level/s; Specifically, in the case of Darwin's biological-evolutionary theory the application of the computational Duality Principle to the (above-mentioned) three-layered (primary 'Natural Selection', secondary 'Genetic Encoding - Phenotypic Property' and tertiary 'Genetic Expression - Protein Synthesis') SROCS paradigms, may have potentially far reaching theoretical implications:

Essentially, the acceptance of the Duality Principle's postulated singular conceptually higher-ordered 'D2' computation of the "co-occurrences" of an exhaustive series of 'x-y' pairs implies that all three ('Natural Selection', 'Genetic Encoding -Phenotypic Property', and 'Genetic Expression - Protein Synthesis') 'material-causal' scientific SROCS paradigms must be replaced by a singular (conceptually higher-ordered) 'D2' computation of the "co-occurrences" of each of these (triple-layered) 'Environmental Factors - organism', 'Genetic Factors - phenotypic property' and 'Genetic Expression - Phenotypic Property' computational pairs simultaneously!

It is to be noted that the (above) detailed analysis of the three-layered SROCS computational structure points at two important (specific and more generalized) theoretical implications:

First, in the specific case of Darwin's (three-layered hierarchical-dualistic) SROCS computational structure, it becomes evident that not only is each one of the three constituent SROCS paradigms constrained by the computational Duality Principle - which therefore points at the existence of a singular (conceptually higher-ordered) 'D2' computational framework that computes the "co-occurrences" of each of the (above-mentioned) 'Environmental Factors - organism', 'Genetic Factors - phenotype' and 'Genetic Expression - protein synthesis' pairs (at any given spatial-temporal point/s); but also, an examination of the computational inter-relationships that exist between these (three-layered) SROCS paradigms reveals that each such (subsequent) computational SROCS layer in effect further fragments one of the components of the physical interaction/s in the (previous) layered SROCS structure:





So, we can see that the initial ('generalized') SROCS computational structure:

$PR\{E\{1\dots n\}, 'o\text{-}phi'\} \rightarrow ['o\text{-}phi'$  or  $'\neg o\text{-}phi']/di1$  already contains within it any further (secondary) SROCS computational paradigms such as for instance the 'Genetic Encoding - phenotype property' SROCS paradigm; This is because the organism element within the primary SROCS paradigm (represented as:  $'o\text{-}phi'$ ) already contains any further segmentation or fragmentation - i.e., as consisting of the Genetic Encoding and phenotype property (direct or indirect) physical interaction/s. Indeed, if we wish to represent the basic (generalized) SROCS computational structure as:  $PR\{X\{1\dots n\}, Y\{1\dots n\}\} \rightarrow ['y'$  or  $'\neg y']$  then any potential (further) breakdown or fragmentation of the  $Y\{1\dots n\}$  element is bound to be contained within the (original) generalized SROCS computational structure and therefore bound to be constrained by the computational Duality Principle.

In the specific case of Darwin's evolutionary theory - the generalized (above mentioned) SROCS computational structure may be represented by the (primary) 'Natural Selection' SROCS structure, thus:

*SROCS I {N.S.}*:  $PR\{E\{1\dots n\}, 'o\text{-}phi'\} \rightarrow ['o\text{-}phi'$  or  $'\neg o\text{-}phi']/di1$  which precisely replicates the (above mentioned) generalized SROCS structure of:  $PR\{X\{1\dots n\}, Y\{1\dots n\}\} \rightarrow ['y'$  or  $'\neg y']$ ; indeed, the further fragmentation of this basic (generalized-primary) SROCS computational structure into the secondary 'Genetic Encoding - Phenotype Property' and tertiary 'Genetic Factors - Protein Synthesis' SROCS computational does not alter the basic (generalized) SROCS computational structure (which is obviously constrained by the computational Duality Principle); This is because any further breakdown of the organism ( $Y\{1\dots n\}$ ) factor (e.g., within the basic SROCS generalized structure) - i.e., into the 'Genetic Factors' and 'Phenotype Property' [e.g.,  $PR\{G\{1\dots n\}, phi(o)\}$ ] or into the 'Genetic Encoding' and 'Protein Synthesis' relationship [e.g.,  $PR\{Ge\{1\dots n\}, p\text{-}synth(o\text{-}phi)\}$ ] - obviously does not alter the basic (generalized) SROCS relationship between the organism (e.g., and all of its related phenotypic, genetic, protein... etc. factors) and its Environmental Factors!

More generally, we can see that any scientific SROCS paradigm which consists of the generalized format:  $PR\{X\{1\dots n\}, Y\{1\dots n\}\} \rightarrow [Y\{1\dots n\}$  or  $' Y\{1\dots n\}']/di1$  is not altered by any further breakdown (or fragmentation of the  $Y\{1\dots n\}$  element; Indeed, it is hypothesized that the BBH precisely constitutes such an explicit fragmentation of the basic SROCS computational structure (e.g.,  $PR\{X\{1\dots n\}, Y\{1\dots n\}\} \rightarrow [Y\{1\dots n\}'$  or  $' Y\{1\dots n\}']/di1$ ) into further and further computational relationships - which are nevertheless comprised within the  $PR\{X\{1\dots n\}, Y\{1\dots n\}\}$  basic SROCS computational structure which has already been shown to be constrained by the computational Duality Principle. Indeed, the abovementioned conceptual computational proof may point at the generalization of the Duality Principle which points at the fallacy of the 'Black Box Hypothesis' - i.e., wherein it becomes clear that the Duality Principle's basic computational constraint imposed upon any (generalized) SROCS paradigm remains unaltered regardless of how many further fragmentations, subdivisions or computational levels ( $di1\dots din$ ) the original 'y' element is comprised of- or divided into-...

Thus, it seems that the generalized form of the Duality Principle may point at the basic fallacy of the 'Black Box Hypothesis' (BBH) - i.e., proving that regardless of the number of factors- or computational levels- that any hypothetical SROCS is fragmented (or broken down into), any such (original) SROCS is necessarily (still) constrained by the Duality Principle; This means that the Duality Principle proves the conceptual computational inability of any such (single- or multiple- leveled) SROCS structure to determine the "existence" or "non-existence" of any hypothetical 'y' element from within its direct or

indirect physical relationship/s with any exhaustive 'X-series' (e.g., at any 'di1...din computational level contained within this original SROCS computational structure):

$$\text{SROCS: PR}\{X_{1\dots n}, y\} \rightarrow ['y' \text{ or 'not } y']$$

But, if indeed the generalized form of the Duality Principle can prove that any (single- or multiple- level) SROCS computational structure is constrained by the Duality Principle, then this means that for any such scientific SROCS paradigm (e.g., for which it is known that the given computational system *is capable* of determining whether a given 'y' element "exists" or "doesn't exist" – there must exist a conceptually higher-ordered 'D2' computational level at which there is an 'a-causal' computation yielding the identification of (single- or multiple-) pairs of 'x' and 'y' factors (e.g., occurring at different spatial-temporal point/s, interval/s etc.). This is because the (generalized) Duality Principle has already proven that assuming that the determination of the "existence" or "non-existence" of any given 'y' element from *within* its direct physical interaction with another X(1...n) factor/s inevitably leads to both 'logical inconsistency' and 'computational indeterminacy' – which are (once again) contradicted by robust empirical findings. Moreover, it was shown earlier that the computational characteristics of such D2 level involves an 'a-causal' computation, which computes the "co-occurrences" of any (exhaustive hypothetical) series of 'x-y' pairs (occurring at any hypothetical spatial-temporal point/s or intervals etc.).

Indeed, in the above mentioned case of Darwin's tertiary SROCS computational structure e.g., (comprised of the primary 'Natural Selection Principle, which was further fragmented into the secondary 'Genetic Factors – Phenotypic Property' SROCS paradigm and finally further broken down into the third level 'Genetic Encoding – Protein Synthesis' SROCS paradigm) – the generalized Duality Principle proof pointed at the fallacy of the (tertiary leveled) 'BBH'; Instead, the (generalized) Duality Principle points at the existence of a conceptually higher-ordered 'D2' computational level which carries out computation yielding the (simultaneous) "co-occurrences" of all of the above mentioned three leveled 'x-y' pairs series: Specifically, it is suggested that in the case of Darwin's evolutionary theory an adoption of the Duality Principle's singular D2 computational level indicates that all (abovementioned) apparent tertiary SROCS computational paradigms need to be replaced by three (corresponding) series of 'x-y' pairs (e.g., Environmental Factors – organism; Genetic Factors – Phenotype Properties; Genetic Encoding – Protein Synthesis)...

This means that in the specific instance of Darwin's evolutionary theory instead of there existing multiple 'material-causal' interactions, i.e., between an exhaustive set of Environmental Factors and a single organism (e.g., which is assumed to determine whether that organism "survives" or "doesn't survive"); or between the organism's (deeper) 'Genetic Factors' and its 'Phenotypic Property' (e.g., which is supposed to determine whether particular phenotypic properties of that organism "exist" or "don't exist" – hence indirectly determining that organism likelihood of "surviving" or "not surviving"); or between the (still deeper) organism's 'Genetic Encoding' process and its expression of certain Protein Synthesis (e.g., which is once again assumed to determine the specific Phenotypic Property which determines the organism's "adaptability" or "compatibility" to the Environmental Factors, and hence determines whether that organism shall "survive" or be "extinct" etc.) – according to the computational Duality Principle there seems to exist only one singular conceptually higher-ordered computational level, 'D2' which is responsible for an "a-causal" computation of the existence of "co-occurring" pairs of 'organism-environment', genetic factors-phenotypic property, and genetic encoding process-protein synthesis etc...

Obviously, such conceptually higher-ordered "a-causal" D2 computation is quite "alien" to the basic Cartesian-causal conception wherein it is assumed that any naturally occurring phenomenon is necessarily caused by another material element/s (e.g., which are implicitly assumed to be caused by a series of ever more fine material-causal processes)... However, it is suggested that precisely through the above mentioned application of the Duality Principle analysis of any (single- or multiple- level) SROCS scientific paradigm it can be shown that such Cartesian-causal 'Black Box Hypothesis' is falsified and must necessarily point at the existence of a singular conceptually higher-ordered 'D2' computational framework which merely computes the "co-occurrences" of (single or multiple) computational 'x-y' pairs... Thus, in the case of Darwin's evolutionary tertiary SROCS structured computational paradigm it becomes clear that the material-causal (Cartesian) relationships must give way to a singular higher-ordered a-causal D2 computational framework which computes the "co-occurrences" of the above mentioned three pairs series, i.e., which "co-exist" rather than cause each other...

Indeed, it is suggested that precisely due to Cartesian science's (ingrained) material-causal working hypothesis, that the computational Duality Principle's conceptual proof for the principle inability to compute the "existence" or "non-existence" of any hypothetical 'di...din' specific 'y' element - from *within* its direct or indirect physical relationship/s with any other (exhaustive) 'x-series' inevitably leads to both 'logical inconsistency' and (ensuing) 'computational indeterminacy' that are contradicted by robust empirical findings (e.g., in the case of each of the earlier mentioned SROCS scientific computational paradigms); Hence, the (generalized) Duality Principle has proven the conceptual computational fallacy of any such single- or multiple- 'Black Box Hypothesis' (BBH) based on an exhaustive analysis of any single or multiple SROCS computational level/s or factor/s - instead pointing at a singular conceptually higher-ordered D2 computational framework which can merely compute the "co-occurrences" of a series of 'x-y' pairs... Indeed, it is due to the generalized Duality Principle's conceptual proof for the principle inability of the multi-layered and (infinitely) complex BBH to determine any of its (single or multiple) SROCS  $x \rightarrow y$  material-causal relationships that it is able to point at the conceptually higher-ordered singular D2 computational framework as the only viable means for determining the "co-occurrences" of any exhaustive series of 'x-y' pairs as underlying any such scientific SROCS paradigms! Finally, based on the earlier (Bentwich, 2011c) proof for the existence of only a singular such conceptually higher-ordered 'D2' Universal Computational Principle' which is responsible for computing a series of 'Universal Simultaneous Computational Frames' (USCF's) which give rise to all ('secondary') computational properties of 'space', 'time', 'energy', 'mass' (and 'causality'), it becomes clear that any such specific SROCS scientific paradigm can only be computed strictly based on this singular (higher-ordered) D2 USCF's series...

Hence, the next step is to prove in the case of each of the other scientific (key) scientific SROCS paradigms that their particular (single- or multiple-) computational (BBH) structure must necessarily be replaced by the singular D2 computational framework; Indeed, it is suggested that besides Darwin's (tertiary-leveled) SROCS evolutionary theory - there are two other (key) scientific paradigms that share the same (problematic) SROCS computational structure, and which therefore necessitate their reformalization based on the same singular conceptually higher-ordered D2 computational framework; These include: Genetics' fundamental 'genetic encoding' hypothesis and Neuroscience's basic 'psycho-physical' problem (e.g., and underlying 'materialistic-reductionistic' working hypothesis); We've already seen that perhaps two out of three of Darwin's evolutionary theory SROCS paradigms, e.g., 'Genetic Factors - Phenotype Property' and 'Genetic Encoding - Protein

Synthesis' SROCS may be constrained by the computational 'Duality Principle' (and therefore call for their replacement by a corresponding higher-ordered singular 'D2 a-causal' computational framework); Indeed, when presented in the context of Darwin's evolutionary (tertiary) SROCS structure, it was shown that these specific 'Genetic Factors - Phenotype Property' and 'Genetic Encoding - Protein Synthesis' SROCS paradigms do not alter the basic constraint imposed by the (generalized) computational Duality Principle upon all SROCS scientific paradigms (as well as does not alter the need to replace all three-leveled Darwin's evolutionary theory SROCS with the singular higher-ordered D2 a-causal computational framework)... As such, the identification of these two genetics related computational SROCS paradigms (e.g., alongside Darwin's third evolutionary SROCS paradigm of 'Natural Selection') may indeed point at the (abovementioned) need to replace Darwin's tertiary SROCS computational structure by a singular conceptually higher-ordered 'D2 a-causal' computational framework...

But, given the fact that apart from the involvement of these two 'Genetic Factors - Phenotype Property' and 'Genetic Encoding - Protein Synthesis' SROCS paradigms within Darwin's (tertiary) evolutionary theory, these two SROCS computational paradigms also stand at the basis of the central scientific field of Genetics (e.g., in particular and Biology more generally), it is important to scrutinize these two basic genetics SROCS computational paradigms in terms of their fundamental definition of Genetics (and Biology)...

Indeed, it is suggested that the entire field of Genetics (and Biology more generally) may be founded upon these two basic 'Genetic Factors - Phenotype Property' and 'Genetic Encoding - Protein Synthesis' scientific SROCS paradigms; As such, their (above sown) constraint by the computational Duality Principle may call for a rather basic transformation of the scientific fields of Genetics (and Biology) based on the Duality Principle's proof for the need to base these SROCS computational paradigms upon the singular higher-ordered D2 a-causal computational framework;

In a nutshell, it is suggested that the entire field of Genetics is anchored in- and (completely) based upon- these two basic 'Genetic Factors - Phenotype Property' and 'Genetic Encoding - Protein Synthesis' SROCS paradigms... This is because the basic tenet of modern Genetics research (and understanding) is that any genetic process or phenomenon is anchored in and entirely based upon the (direct or indirect) physical relationship/s between certain Genetic Factors and particular Phenotypic Properties which are further mediated (or fragmented into) a secondary (direct or indirect) physical relationship between specific Genetic Encoding processes and particular 'Genetic Encoding' and 'Protein Synthesis' factors... Even more generally, it is suggested that the whole domain of modern Biological research (and scientific body of knowledge) is based upon the basic working assumption that the fundamental 'building-blocks' of all biological organisms is guided by- and based upon- these dual processes of 'Genetic Factors - Phenotype Property' and 'Genetic Encoding - Protein Synthesis' SROCS paradigms; Indeed, one may say that in much the same manner that Physics serves as the most basic building block for all other scientific domains (e.g., because it tells us what are the basic 'building blocks' of nature), these two genetics SROCS paradigms inform all the rest of Genetics and Biology in terms of the fundamental processes by which all biological phenomena, processes or organism/s are produced (and operate through etc.)

Thus, it is suggested that the whole domain of Genetics is based upon the basic working hypothesis wherein any characteristic/s- function/s- organ- tissue/s- or cellular structure/s etc. of any biological organism etc. is entirely dependent upon a series of (direct or indirect)



physical interactions between an exhaustive set of Genetic Encoding factors and the production of specific Protein Synthesis, which in return are (solely) responsible for the production of an organism's particular Phenotypic Property; Hence, the production of any (possible) protein found within an organism is assumed to be solely determined through its (direct or indirect) physical interaction/s with an exhaustive set of Genetic Encoding processes, which are governed (solely and strictly) by an exhaustive set of Genetic Factors (e.g., responsible for the production of the specific Protein Synthesis processes). Therefore, we also obtain a (slightly similar) dual leveled SROCS computational structure of this form:

$$\text{PR}\{G(1\dots n), P\text{-synth}\} \rightarrow [\text{'P-synth' or 'not P-synth'}] \quad (7)$$

$$\text{PR}\{P\text{-synth}(1\dots n), \text{Phenotype}_i\} \rightarrow [\text{'Phenotype}_i \text{ or 'not Phenotype}_i\text{'}] \quad (8)$$

Indeed, it is suggested that all genetic-originated biological processes and functions arise (e.g., in one form or another) from this dual-leveled SROCS paradigm: Thus, whether it is the genetic encoding of certain RNA proteins, mRNA activation of specific protein synthesis, the translation of any genetic (single or multiple) factor/s into three-dimensional protein structure/s or their translation into any (simple or complex) organism phenotype, trait or characteristics - all of these genetic encoding, transcription, synthesis and production/interface with any organism's phenotypic property must necessarily rely on the basic assumed (above mentioned) dual-leveled SROCS computational structure.

However, as shown (earlier) the composition of this dual-level Genetics SROCS computational structure is necessarily constrained by the (generalized) Duality Principle; This is due to the fact that each of the constituent SROCS paradigms is necessarily constrained by the Duality Principle (e.g., pointing at the existence of a conceptually higher-ordered D2 a-causal computational framework); Even beyond that the (abovementioned) fallacy of the BBH indicates that regardless of the number of intervening- or mediating- or complex- fragmentation (or makeup) of the basic Genetics SROCS computational structure of the form:

$$\text{PR}\{G(1\dots n), P\text{-phenotype}(1\dots n)\} \rightarrow [\text{'P-phenotype}(1\dots n) \text{ or 'not P-phenotype}(1\dots n)\text{'}] / di1\dots din$$

the Duality Principle necessarily constrains any such (single or multiple) computational levels ( $di1\dots din$ ) or any (single or multiple) mediating factor/s  $P\text{-phenotype}(1\dots n)$ , and points at the existence of a conceptually higher-ordered D2 a-causal computational framework;

Indeed, in much the same manner in which the (generalized) Duality Principle has shown that all of Darwin's evolutionary (tertiary) SROCS computational levels must give way to (three) levels of simultaneously "co-occurring" ('x-y') pairs, so in the case of the (above mentioned) Genetics dual-level SROCS structure it is suggested that an application of the (generalized) Duality Principle points at the existence of the (same) conceptually higher-ordered singular 'D2 a-causal' computational framework which computes (simultaneously) the "co-occurrences" of dual levels of 'Genetic Factors - Protein Synthesis' and 'Protein Synthesis - Phenotype Property' computational pairs.

In other words, it is shown that an (embedded) part of the (above mentioned) tertiary computational structure of Darwin's evolutionary theory is the generalized (dual) 'Genetic Computation' SROCS structure; Therefore, since Darwin's (broader) evolutionary theory (tertiary) SROCS was shown to be based on a (triple strict) '*material-causal*' physical relationships between an organism's 'Genetic Factors  $\rightarrow$  Protein Synthesis'; which is assumed to also cause any specific (e.g., single- or multiple- relevant) Phenotypic Property,

thus: 'Protein Synthesis → Phenotypic Property'; which (in return) also caused the survival ("existence") or extinction ("non-existence") of any given organism: 'Phenotypic Property → Organism' ; hence, it is also shown that modern 'Genetic Computation' (dual) SROCS structure may be based on that organism's (direct or indirect) physical interaction/s between its 'Genetic Factors → Protein Synthesis ' ; and 'Protein Synthesis → Phenotypic Property'.

But, we've already seen that the discovery of the Duality Principle forced relinquishing any such strict -'materialistic-reductionistic' (generalized) SROCS computational structure, in favor of a conceptually higher-ordered 'D2 a-causal' computational framework which negates the existence of any such material-causal (tertiary) physical relationship. Instead, the (generalized) Duality Principle (format) has proven that *regardless of the number of computational levels or factors* that may be associated with the production of any given organism's phenotype or of the number of (direct or indirect) physical interactions between the organism and its environment, the only viable computation that determines any relationships between a given organism and its environment or any between constituent (genetic, protein synthesis or other) elements within the organism and its phenotypic property or properties is *a singular conceptually higher-ordered D2 computational framework which can only determine the simultaneous "co-occurrences"* of any such (single, multiple or exhaustive) pairs of 'Environmental Factors - Organism' ; 'Genetic Factors - Phenotypic Property'; or 'Genetic Encoding Factors - Protein Synthesis' pairs series...

Therefore, it necessarily follows that the whole of Genetic Science (e.g., including all single-multiple- or exhaustive- factors, computational level/s, phenomena, processes etc. describing an organism's genetic, protein, biological etc. makeup, functioning, development or characteristics etc.) must be anchored in- and based upon- such singular (conceptually higher-ordered) D2 a-causal computational framework which can only compute the "co-occurrences" of any 'Genetic-Factors - Protein Synthesis'; and 'Protein Synthesis - Phenotypic Property' pairings (e.g., occurring simultaneously at any given spatial-temporal point/s)...

Hence, instead of the current 'materialistic-reductionistic' (dual) SROCS structure underlying all Genetic Science (research and theoretical body of knowledge), the (generalized) Duality Principle points at the existence of a singular (conceptually higher-ordered) 'D2 a-causal' computational framework which merely computes the "co-occurrences" of any given pairs of 'Genetic Factors - Protein Synthesis' and 'Protein Synthesis - Phenotype Property'. This means that instead of any exhaustive pool of Genetic Factors "causing" a given organism's resulting Phenotypic Property (or properties), the application of the (generalized) Duality Principle points at the existence higher ordered (singular) D2 computation which simultaneously computes the "co-occurrences" of all of the various aspects of an organism's genetic, protein synthesis, development, traits etc. (e.g., and in the broader scope of Darwin's tertiary evolutionary theory - also of all exhaustive series of any simultaneous 'Environmental Factors') taking place at any given spatial-temporal point/s or interval.

Indeed, it is suggested that such basic shift from the materialistic-reductionistic working assumption underlying current Genetic Science formulation towards a conceptually higher-ordered D2 a-causal computation may bear a few potentially significant theoretical ramifications: First, such conceptually higher-ordered 'D2 a-causal' computational framework necessarily replaces the currently assumed material-causal relationships between any exhaustive set of Genetic Factors which are assumed to cause particular

Protein Synthesis which (in turn) cause particular Phenotypic Properties to appear in a given organism (which may be further extended to include Darwin's Natural Selection SROCS' assumed causal relationship between the above 'Phenotypic Properties' which are assumed to directly interact with an exhaustive set of 'Environmental Factors', wherein it is assumed that the direct or indirect physical relationship of these Environmental Factors with the organism's Phenotypic Properties causes the determination of the "existence" or "non-existence" of any such given organism):

Instead, based on the (above mentioned) generalized Duality Principle's proof for the conceptual computational inability of any (single or multiple) SROCS structure to determine the "existence" or "non-existence" of any (SROCS') particular 'y' from within its direct (or indirect) physical interaction with any other exhaustive X series, the Duality Principle asserts the existence of a (singular) conceptually higher-ordered 'D2 a-causal' computational framework that computes (simultaneously) the "co-occurrences" of any (single or multiple levels) SROCS' 'x' and 'y' pairs series; Thus, the generalized Duality Principle points at the operation of a singular conceptually higher-ordered 'D2 a-causal' computational framework which computes (simultaneously) the "co-occurrences" of all of the abovementioned (dual or tertiary SROCS) computational pairs, thus:

*D2 A-Causal Computation:*

$$D2: [\{E_{\{1\dots n\}}, o\}st_1; \{E_{\{1\dots n\}}, o\}st_2 \dots \{E_{\{1\dots n\}}, o\}st_n].$$

$$D2: [\{G_{\{1\dots n\}}, 'phi(o)'\}st_1; \{G_{\{1\dots n\}}, 'phj(o)'\}st_i; \dots \{G_{\{1\dots n\}}, 'phn(o)'\}st_n].$$

$$D2: [\{Ge_{\{1\dots n\}}, pi-synth(o-phi)\}st_1; Ge_{\{1\dots n\}}, pj-synth(o-phi)\}st_i \dots ; \\ Ge_{\{1\dots n\}}, pn-synth(o-phi)\}st_n]$$

Hence, the first (potentially significant) theoretical implication of the generalized Duality Principle (e.g., in the case of the currently existing Genetic Science dual SROCS computational paradigm) is that there cannot exist any real 'material-causal' relationships between any of the dual Genetic SROCS (or tertiary Darwin's evolutionary theory SROCS) particular 'x' and 'y' factors; In other words, based on the generalized Duality Principle conceptual computational proof it is asserted that neither the Genetic Factors can "cause" any real 'Protein Synthesis', not can such (particular) Protein Synthesis "cause" any real 'Phenotypic Property' in an organism; nor can any such 'Phenotypic Property' have any real physical interaction with an exhaustive set of 'Environmental Factors' - thereby "causing" the "existence" (survival) or "non-existence" (extinction) of any given (single or multiple) organism/s... Instead, the generalized Duality Principle asserts that there exist a singular conceptually higher-ordered D2 a-causal computational framework which computes *simultaneously* the "co-occurrences" of all of these 'Genetic Factors $st(i)$ ', 'Protein Synthesis  $st(i)$ ', 'Phenotypic Property  $st(i)$ ', or 'Environmental Factors  $st(i)$ '!

This means that as in the previous application of the computational Duality Principle in the case of the quantum and relativistic SROCS paradigms (Bentwich, 2011c) where it was shown that all of the physical properties of 'space', 'time', 'energy' and 'mass' cannot be computed based on any (quantum or relativistic) SROCS paradigms - but may only arise as secondary emerging (integrated) computational products of the singular conceptually higher-ordered 'D2 a-causal' series of 'Universal Simultaneous Computational Frames' (USCF's) computation; So also in the case of the Genetic model's dual level SROCS (or tertiary Darwin's evolutionary

theory SROCS paradigm) we reach the inevitable conclusion that all of the above mentioned constituent biological elements of 'Genetic Factors  $st(i)$ ', 'Protein Synthesis  $st(i)$ ', 'Phenotypic Property  $st(i)$ ', or 'Environmental Factors  $st(i)$ ' can only exist as secondary emerging computational properties of a singular conceptually higher-ordered 'D2 a-causal' computational framework (e.g., which are therefore computed simultaneously as "co-occurring" at the D2 singular computational level). But, since it was earlier shown above (and also in Bentwich, 2011c) that there can only exist *one* such *singular* conceptually higher-ordered D2 computational framework – which has already been shown to consist of the CUFT's USCF's series that are computed by a Universal Computational Principle, thus:

$$\frac{c^2 x'}{h} = \frac{s \times e}{t \times m}$$

then it follows that the 'D2 a-causal' computation of the abovementioned multiple pairs series of 'Genetic Factors  $st(i)$ ' - 'Protein Synthesis  $st(i)$ '; 'Protein Synthesis  $st(i)$ ' - 'Phenotypic Property  $st(i)$ '; 'Phenotypic Property  $st(i)$ ' - 'Environmental Factors  $st(i)$ ' may only be carried out through the singular D2 a-causal computation of the series of USCF's! What's essential to understand is that given the Duality Principle's above mentioned conceptual computational proof for the principle inability of either of the Genetic (dual) SROCS paradigms (or Darwin's Natural Selection paradigm) to determine any 'material-causal' relationship/s between any of the (abovementioned) 'Genetic Factors  $st(i)$ '  $\rightarrow$  'Protein Synthesis  $st(i)$ '; 'Protein Synthesis  $st(i)$ '  $\rightarrow$  'Phenotypic Property  $st(i)$ '; 'Phenotypic Property  $st(i)$ '  $\rightarrow$  'Environmental Factors  $st(i)$  ; but instead, the recognition that all of these 'x-y' pairs (series) are computed simultaneously as part of the same USCF's (e.g., at the conceptually higher-ordered singular D2 computational level)... Moreover, if (indeed) there cannot exist any real 'material-causal' physical relationship between any of these  $x \rightarrow y$  (hypothesized particular SROCS) pairs, but only a conceptually higher-ordered (singular) D2 'a-causal' "co-occurrences" of all of these x-y pairs (series) as being computed simultaneously as part of the same (particular) USCF (frames), then it follows that the only computation responsible for such conceptually higher-ordered (singular) USCF's series (e.g., including all of its embedded particular 'x-y' pairs series) is the Universal Computational Principle which was hypothesized to be responsible for all USCF's series computation (i.e., including all of the "secondary computational integrated" physical properties of 'space', 'time', 'energy' and 'mass' etc.)

Note that despite the apparent "radical" theoretical conclusion that seems to stem from an application of the (generalized) Duality Principle in the case of the above (dual) Genetic Science SROCS computational structure (and its extended Darwin's Natural Selection assumed SROCS computational paradigm)- i.e., that there cannot exist any (real) "causal-material" physical relationship between any (exhaustive hypothetical) series of 'Genetic Factors  $st(i)$ '  $\rightarrow$  'Protein Synthesis  $st(i)$ '; 'Protein Synthesis  $st(i)$ '  $\rightarrow$  'Phenotypic Property  $st(i)$ '; 'Phenotypic Property  $st(i)$ '  $\rightarrow$  'Environmental Factors  $st(i)$ , but rather that there exists only one (singular) conceptually higher-ordered 'D2' a-causal' computational framework that computes simultaneously the series of USCF's (various) 'x-y' pairs, such conceptually higher-ordered D2/USCF's computational level is proven based precisely upon such a rigorous computational and empirical analysis (e.g., pertaining to any SROCS computational structure which inevitably proves the computational constraint imposed by the 'Duality Principle'). Furthermore, the adoption of such a conceptually higher-ordered



'D2 a-causal' computational mechanism - e.g., anchored in the USCF's series (computed by the singular 'Universal Computational Principle'), instead of the currently assumed 'materialistic-reductionistic' SROCS computational structure does not negate any of the (already known) empirical facts or body of knowledge pertaining to any biological intra-organism (genetic, protein synthesis, phenotypic etc.) or inter-organism (environmental or other evolutionary) empirical findings; Rather, the theoretical explanation (or construct) upon which these empirically well-validated facts are based is shifted (or even expanded) from the narrow constraints of any (hypothetical exhaustive) 'material-causal' (direct or indirect) physical relationship/s between any particular 'x→y' pair/s to a 'D2 a-causal' relationship/s between all potential 'x and 'y pairs (series) that are embedded within the exhaustive Universal Simultaneous Computational Frames (USCF's) series that are being computed by a singular Universal Computational Principle...

Finally, it should be noted that as shown previously (Bentwich, 2011b), the Computational Unified Field Theory's (CUFT) analysis of the production of the series of Universal Simultaneous Computational Frames (USCF's) is carried out by a *Universal Computational Principle* - which is the only computational (e.g., rather than "material" or "physical") element that exists "in-between" any two USCF's frames; This stemmed from the fact that it was shown that there can only exist one (singular) conceptually higher-ordered D2 computational level - which is (in principle) irreducible to any exhaustive-hypothetical 'x→y' (direct or indirect) physical relationship/s; Based on this conceptual computational constraint imposed by the 'Duality Principle' (e.g., negating the existence of any real 'x→y' physical relationship, but rather its replacement by a conceptually higher-ordered D2 computation of the "co-occurrences" of simultaneously occurring 'x-y' pairs embedded within the same USCF's) and empirical-computational postulate of the existence of these disparate USCF's (e.g., which coalesces well-validated quantum and relativistic empirical phenomena such as Planck's minimal inter-USCF's 'h' constant as well as the hypothetical extremely rapid rate of USCF's computation given by  $c^2/h$ ) it was hypothesized that there cannot exist any material element "in-between" two such postulated USCF's - except for the 'Universal Computational Principle' which computes each of these series of USCF's... Indeed, the hypothesized Universal Computational Formula:

$$\frac{c^2 x'}{h} = \frac{s \times e}{t \times m}$$

precisely outlines the fact that all computational features of 'space', 'time', 'energy', 'mass' (and 'causality') arise as secondary (integrated) physical properties of the conceptually higher-ordered D2 Universal Computational Principle's production of these series of USCF's frames). Therefore, when viewed from the conceptually higher-ordered perspective of the 'D2 a-causal' computational framework, all hypothetical (exhaustive) series of 'x-y' pairs may only be computed by the (singular) Universal Computational Principle as embedded within the series of USCF's (e.g., thereby replacing any of the currently assumed 'materialistic-reductionistic' direct or indirect "causal" relationship/s between any hypothetical exhaustive 'x→y' pair/s).

Indeed, perhaps a good mode of explaining the potential transformation from the contemporary purely 'materialistic-reductionistic' SROCS computational structure (e.g., underlying key scientific SROCS paradigms described in this article) to the conceptually higher-ordered 'D2 a-causal' computational framework - is to analyze the (metaphorically

'equivalent') case of the cinematic film sequence underlying any apparently "material-causal" relationships that may exist between any two 'x' and 'y' elements (e.g., within a given cinematic film); As hinted in a previous article (Bentwich, 2011c) it is suggested that underlying any such apparent " $x \rightarrow y$ " physical relationship (within any given cinematic film sequence), there cannot be any "real" 'material-causal' relationship within the film sequence; This is because it is shown based on the cinematic film metaphor that in order for any 'physical relationship' to exist through any (hypothetical) sequence of cinematic film frames, there must exist a certain pattern of "co-occurrences" of the given 'x' and 'y' elements - i.e., such as for instance that the 'x' factor appears to be located "spatial-temporally" closer and closer to the 'y' element (across a certain number of cinematic frames) which then leads to an alteration in the 'y' factor's (particular) condition (or spatial-temporal configuration etc.); In other words, for the appearance of any (hypothetical) "physical causality" to exist between the 'x' and 'y' factors within any film sequence there must be a (certain) series of film frames across which the "spatial-temporal" relationship between the 'x' and 'y' factors is transformed... To put it succinctly, it is suggested that it is not possible (e.g., in principle) to have any "causal-material" relationship between any two (hypothetical) 'x' and 'y' elements - that is not based on an alteration in the spatial-temporal (proximity and configuration) of any two such 'x' and 'y' elements across a number of cinematic film frames. But, once we realize that it is not possible to obtain any "material-causal" relationship between any two (hypothetical) 'x' and 'y' elements - which is not based on a change in their "co-occurring" pattern *across a few cinematic film frames* the door is open to evince that there cannot in fact exist any "real material" element that can "pass" in-between any two such (hypothetical) cinematic film frames? But since we know that there does not exist any "material" element that exists "in-between" any two such hypothetical cinematic film frames (e.g., ' $f-i$ ' and ' $f-i+n$ '), then we must conclude that the only viable means for producing any such apparent "material-causal" relationship/s is based on the alteration in the spatial-temporal configuration of the 'x' and 'y' elements (across a series of cinematic frames)... In other words, since there is not "material" element that can pass "in-between" two such hypothetical cinematic film frames (e.g., ' $f-i$ ' and ' $f-i+n$ ') and since the existence of any hypothetical material-causal" physical relationship between any two hypothetical 'x' and 'y' elements is contingent upon a certain pattern of change in the 'x-y' spatial-temporal configuration across such (hypothetical) cinematic film sequence then it follows that the only means for producing any "causal" relationship between the 'x' and 'y' elements is only based on their "co-occurring" spatial-temporal across a certain number of cinematic frames... Finally, precisely based on this keen (computational) analysis wherein it is shown that any hypothetical "causal-material"  $x \rightarrow y$  relationship can only evolve based on their particular spatial-temporal configuration (across a series of cinematic film frames), and since there cannot be any "material" element that can pass "in between" any two subsequent cinematic film frames, then we are also led to conclude that the only means for arranging the particular "co-occurrence" of any apparently spatial-temporal "causal" pattern of change in the 'x' and 'y' configuration across a series of cinematic frames is based on a conceptually higher-ordered computation (or arrangement) of the 'x' and 'y' "spatial-temporal" sequencing across these series of frames... Ultimately, since there is no "material" element that can pass "in-between" any two subsequent (hypothetical) film frames and since the perception of any apparent "causal-material" physical relationship between the 'x' and 'y' elements is contingent upon a particular pattern of change in the "spatial-temporal" configuration of the 'x' and 'y' elements across a series of cinematic film frames - then this

points at the existence of a conceptually higher-ordered "non-material" computational element that is responsible for this particular spatial-temporal pattern of change across the film frames...

Indeed, it is hypothesized that the above metaphor of the cinematic film sequence may be entirely analogous to the Computational Unified Field Theory's (CUFT) (Bentwich, 2011c) account - not only in terms of the secondary (integrated) emerging physical features of "space", "time", "energy", "mass", but may also pertain to the basic (implicit) concept of "causality"; Previously, the cinematic film metaphor has been used as a 'pointer' to some of the hypothetical features of the CUFT including its delineation of the emerging (secondary) computational properties of 'space', 'time', 'energy' and 'mass' (e.g., wherein it was shown that the apparently physical properties of 'space' and 'energy', 'mass' and 'time' may arise as secondary computational combinations of a 'consistent' vs. 'inconsistent' computations of whole 'frame' presentations of the same object or event or of only partial segments of the whole frame entitled: 'object' - 'consistent' or 'inconsistent' presentations). The abovementioned postulated Computational Unified Field Theory's account of the four basic physical features (of 'space', 'time', 'energy' and 'mass') was also based on the existence of a hypothetical conceptually higher-ordered (D2) 'Universal Computational Principle' ("") which may carry out extremely rapid ( $c^2/h$ ) computational process giving rise to a series of 'Universal Simultaneous Computational Frames' (USCF's). The essential point to be noted is that based on the earlier outlined Duality Principle which proved that there can only exist one singular conceptually higher-ordered 'D2' computational framework that can (solely) determine all exhaustive hypothetical (quantum, relativistic or any other) 'x-y' "co-occurrences" across the series of (hypothesized) USCF's the CUFT was capable of replicating all known quantum and relativistic phenomena (as well as potentially harmonize all existing apparent contradictions between these two major pillars of modern Physics). But, if indeed the entire corpus of (all possible hypothetical) quantum and relativistic features, phenomena, laws and theoretical explanations can only be derived from such a Duality Principle based conceptually higher-ordered D2 (e.g., 'Universal Computational Principle' ' ' ) computation of a series of (extremely rapid) USCF's (Bentwich, 2011c), then it also necessarily follows that the CUFT's account of any (apparently) "material-causality" must also be transformed; Indeed, somewhat alike the cinematic film metaphor's demonstration that there cannot exist any real "material-causal" relationship between any hypothetical 'x' and 'y' factors - but only a conceptually higher-ordered ('D2') arrangement of the "co-occurrences" of a specific spatial-temporal configuration of the 'x' and 'y' factors (as discussed above), it is suggested that the CUFT's portrayal of a series of extremely rapid USCF's does not allow for any "material" element/s to pass "in-between" any two (hypothetical) USCF's except for the conceptually higher-ordered (immaterial) 'Universal Computational Principle' ("") which alone can compute the particular "co-occurrences" of a series of 'x-y' pairs that can give rise to the apparent existence of a "causal" relationship between the 'x' and 'y' elements...

Hence, we arrive at the inevitable conclusion wherein any apparent "material-causal" relationship/s between any hypothetical 'x' and 'y' factors (e.g., embedded within one of the key SROCS scientific paradigms) - must necessarily arise as secondary emerging computational property associated with a particular 'spatial-temporal' "co-occurrences" of the particular 'x' and 'y' factors' configuration across a series of USCF's... To follow the cinematic film metaphor, there does not exist any "real material-causality" between any two hypothetical 'x' and 'y' elements, but only the "co-occurrence" of the particular 'x' and 'y'

factors across a series of USCF's (e.g., as computed by a conceptually higher ordered D2 computational principle - which in the case of the CUFT is the 'Universal Computational Principle'). Therefore, it may be said that perhaps underlying all scientific SROCS paradigms there cannot exist any (real) "material-causal" relationship/s between any two hypothetical 'x' and 'y' elements, but only the computation of their "co-occurrences" (e.g., in a particular spatial-temporal sequence as explained above) across a series of USCF's (as computed by the conceptually higher-ordered D2 'Universal Computational Principle' ("))....

This means that in the two (abovementioned) cases of Darwin's (tertiary) evolutionary theory SROCS computational structure as well as in the case of the (dual) Genetic Science SROCS computational structure an application of the (generalized) Duality Principle and its broader development within the CUFT has pointed at the existence of a series of USCF's that are computed by the conceptually higher-ordered ('D2') 'Universal Computational Principle' ("") and which give rise to any SROCS apparent "material-causal" ('x→y') relationships that are underlie by a particular series of "co-occurring" x-y pairs in which the 'spatial-temporal' relationships (e.g., as embedded within a series of corresponding USCF's, as explained above).

This means that both in the case of Darwin's (tertiary) SROCS computational structure as well as in the case of Genetic Science (dual) SROCS computational structure we must replace the currently assumed direct (or indirect) 'material-causal' relationship between any two particular 'x' and 'y' elements by the conceptually higher-ordered D2 computation of the "co-occurrences" of the corresponding (triple or dual) SROCS series of 'x-y' pairs that give rise to the appearance of any "material-causal" relationship; As discussed above, in both cases there exists a (hypothetical) conceptually higher-ordered D2 computational level which carries out the simultaneous computation of the "co-occurrences" of Darwin's SROCS paradigm's alternate 'Environmental Factors  $st(i)$ ' and 'Phenotypic Property  $st(i)$ ' pairs series, as well the two other (Genetic SROCS dual pairs of) 'Genetic Factors  $st(i)$ ' and 'Protein Synthesis  $st(i)$ ', and the 'Protein Synthesis  $st(i)$ ' and 'Phenotypic Property  $st(i)$ ' series. Indeed, according to the CUFT's (broadened application of the Duality Principle) such conceptually higher-ordered D2 simultaneous computation of each of these evolutionary and genetic encoding computational pairs constitutes the (extremely rapid hypothetical) series of USCF's that are carried out by the singular 'Universal Computational Principle' (""). Thus, instead of the existence of any 'real' "material-causal" relationship/s between any of these (evolutionary or genetic) SROCS' particular 'x' and 'y' factors - all that truly exists is the conceptually higher-ordered (singular) Universal Computational Principle's ("") simultaneous computation of a series of (extremely rapid) USCF's in which there is an embedded series of 'Environmental Factors  $st(i)$ ' and 'Phenotypic Property  $st(i)$ '; 'Genetic Factors  $st(i)$ ' and 'Protein Synthesis  $st(i)$ '; and the 'Protein Synthesis  $st(i)$ ' and 'Phenotypic Property  $st(i)$ ' pairs series (which give rise to the appearance of 'real' interactions within seemingly "material-causal" SROCS 'x→y' relationships)...

Finally, it is suggested that the application of the Duality Principle's asserted conceptually higher-ordered 'D2' (Universal Computational Principle's) computation of the series of USCF's which also embed all (exhaustive-hypothetical) 'x-y' pairs e.g., as replacing all scientific SROCS paradigms' apparent ('x→y') "material-causal" relationships should be implemented; Hence, the next step in the application of the computational Duality Principle to various other scientific SROCS paradigms consists of a (triple) demonstration that each of these (remainder) scientific SROCS paradigms is constrained by the (generalized) Duality Principle, may contain



the (abovementioned) 'Black-Box-Hypothesis' (BBH) (e.g., which we've already seen cannot alter the basic computational constraint imposed by the generalized Duality Principle format), and therefore inevitably calls for the CUFT's assertion regarding the need to replace the currently assumed SROCS (particular) "material-causal" (' $x \rightarrow y$ ') relationship with a conceptually higher ordered (Universal Computational Principle's ') computed series of "co-occurring" 'x-y' pairs (as embedded within a rapid series of USCF's being computed by this hypothetical Universal Computational Principle).

### 3.2 The Duality Principle: Constraint of the 'Psycho-Physical Problem' (PPP) SROCS

It is hypothesized that another key scientific SROCS paradigm consists of Neuroscience's Psycho-Physical Problem (PPP); This is because the PPP which is defined as the question regarding how it may be possible for any given physical stimulus (or stimuli) to be translated into a neurochemical signal within the Central Nervous System (in humans) – is currently assumed to be resolved through Neuroscience's basic 'materialistic-reductionistic' (generalized) 'Psycho-Physical SROCS' computational structure: Essentially, Neuroscience's basic (generalized) 'Psycho-Physical SROCS' assumes that the determination of the "existence" or "non-existence" of any hypothetical (exhaustive) Psycho-Physical Stimulus or stimuli (e.g., 'PP<sub>s-i</sub>' - including all physical stimulation or any of its derived or associated physical features, properties, representations etc.) is determined solely based on its direct or indirect physical interactions with an exhaustive set of 'Neural Activation/s' (e.g., 'N<sub>a(1...n)</sub>' – an exhaustive hypothetical series of neurons, neural connections, neural activation/s neurophysiological activity or pattern/s etc. which may take place at different single or multiple spatial-temporal points in the human Nervous System);

$$\text{SROCS: PR}\{ \text{PP}_{s-i}, \text{N}_{a(1...n)} \} \rightarrow [ \text{'PP}_{s-i} \text{' or 'not PP}_{s-i} \text{' } ] / \text{di}1 \dots \text{din}$$

Thus, for instance, it is currently assumed that the computation of the "existence" or "non-existence" of any such Psychophysical Psycho-Physical Stimulus, e.g., human consciousness or awareness to the existence of any given physical stimulus intensity (termed: termed: PP<sub>s-pp</sub>) – is strictly caused by the direct (or indirect) physical interaction of such 'Consciousness Psychophysical Stimulus' (C<sub>s-pp</sub>) with an exhaustive hypothetical series of 'Neural Activation/s' (e.g., including any exhaustive hypothetical activity or activation of any neuron/s, neural activation, neuronal pattern/s etc. in the human brain):

$$\text{SROCS: PR}\{ \text{N}_{(1...n)}, \text{C}_{s-pp} \} \rightarrow [ \text{'C}_{s-pp} \text{' or 'not C}_{s-pp} \text{' } ] / \text{di}1 \dots \text{din}$$

But, such SROCS computational structure was previously shown (Bentwich, 2006a) to produce an inevitable SRONCS (e.g., 'Self-Referential Ontological Negative Computational System', as described earlier) in the case of *sub-threshold psychophysical stimulation*: SROCS: PR{ N<sub>(1...n)</sub>, C<sub>s-i</sub>} → 'not C<sub>s-i</sub>' / di1...din

Indeed, such SRONCS was shown to produce both 'logical inconsistency' and ensuing 'computational indeterminacy' that are contradicted by robust empirical findings indicating the *capacity* of such psychophysical computational systems to determine the "existence" or "non-existence" of any given psychophysical stimulation (e.g., including in the case of sub-threshold psychophysical stimulus); therefore, the Duality Principle pointed at the existence of a conceptually higher-ordered 'D2 a-causal' computational framework which is capable of computing the existence of any series of pairs of any given Consciousness-Stimuli and an exhaustive hypothetical series of all possible 'Neural Activation' hypothetical), thus:

$$D2: \{ \{ N_{(1\dots n) \text{ st-ir}} C_{s\text{-pp st-i}} \}; \dots \{ N_{(1\dots n) \text{ st-i+nr}} C_{s\text{-pp st-i+n}} \} \}$$

As proven previously (and represented in the generalized SROCS computational structure encompassing any single or multiple computational elements, factors etc., di1...din), the computational constraint imposed on the above Psychophysical SROCS structure is *conceptual* in nature - i.e., it holds true regardless of the number of neurons, neuronal interactions or spatial temporal point/s at which any direct or indirect physical interaction may take place between the given Consciousness Psychophysical Stimulus and any exhaustive hypothetical series of Neural Activations; This is because the formalization of this (primary) Psychophysical-Consciousness Stimulation SROCS already encompasses all direct or indirect physical interactions between any given Psychophysical Stimulation and an exhaustive set of all possible Neural Activations (occurring at any potential spatial-temporal point/s or interval/s etc.), and indicates that as such it inevitably leads to both 'logical inconsistency' and subsequent 'computational indeterminacy' (e.g., in the case of sub-threshold Psychophysical Stimulation SROCS system) that are contradicted by well validated empirical findings...

Next, it is hereby hypothesized that the abovementioned Psychophysical Consciousness Stimulation SROCS may serve as a primary SROCS level within a multi-layered PPP SROCS computational structure, which may be generally divided into (at least) four separate SROCS computational levels including:

1. **Psycho-Physical Consciousness SROCS:**  $PR\{C_{s\text{-pp}} , Na(s\text{-pp})\} \rightarrow [ 'C_{s\text{-pp}} ' \text{ or } ' \text{not } C_{s\text{-pp}} ' ] / di1\dots din$
2. **Functional Consciousness SROCS:**  $PR\{C_{s(pp)\text{-fi}} , Na(spp\text{-fi})\} \rightarrow [ ' C_{s(pp)\text{-fi}} ' \text{ or } ' \text{not } C_{s(pp)\text{-fi}} ' ]$ .
3. **Phenomenological Consciousness SROCS:**  $PR\{C_{s(pp\text{-fi})\text{-Ph}} , Na(spp\text{-fi})\text{-Ph} \} \rightarrow [ ' C_{s(pp\text{-fi})\text{-Ph}} ' \text{ or } ' \text{not } C_{s(pp\text{-fi})\text{-Ph}} ' ] / di1\dots din$
4. **Self-Consciousness SROCS:**  $PR\{ C_{s(pp\text{-fi})\text{-Ph}\text{-S}} , Na(pp\text{-fi})\text{-Ph}\text{-S} \} \rightarrow [ ' C_{s(pp\text{-fi})\text{-Ph}\text{-S}} ' \text{ or } ' \text{not } C_{s(pp\text{-fi})\text{-Ph}\text{-S}} ' ]$ .

Below is a delineation of the various hierarchical-dualistic computational levels currently assumed by Neuroscience's materialistic-reductionistic working hypothesis;

1. **Psycho-Physical Consciousness SROCS:**  $PR\{C_{s(pp)\text{-fi}} , Na(spp\text{-fi})\} \rightarrow [ ' C_{s(pp)\text{-fi}} ' \text{ or } ' \text{not } C_{s(pp)\text{-fi}} ' ]$ : wherein it is currently assumed that the (primary) Psychophysical Stimulation Consciousness SROCS' resulting output (e.g., [ 'C<sub>s-pp</sub> ' or 'not C<sub>s-pp</sub> ' ] / di1...din) undergoes a secondary SROCS computational structure in which the "existence" or "non-existence" of the (primary SROCS) 'Psychophysical Stimulation Consciousness' is analyzed in terms of the "existence" or "non-existence" of any particular 'Psychophysical Stimulation Functional Consciousness' (i.e., such as any given physical property, attribute, phenomenon etc., represented by: 'C<sub>s(pp)-fi</sub> '); It is hypothesized that this secondary 'Functional Consciousness' SROCS computational structure is comprised of: any direct or indirect physical interaction between a (given) Psychophysical Stimulation Functional Consciousness input (e.g., 'C<sub>s(pp)-fi</sub> ' or 'not C<sub>s(pp)-fi</sub> ' which is equivalent to the above primary SROCS's: 'C<sub>s-pp</sub> ' or 'not C<sub>s-pp</sub> ' output), and another exhaustive set of Neural Activation/s responsible for computing "existence" or "non-existence" of that particular given Psychophysical Stimulation Consciousness Function; However, as shown earlier, this secondary SROCS paradigm also shares the same SROCS computational structure and as such is constrained by the same (generalized) Duality Principle;

2. **Functional Consciousness SROCS:**  $PR\{Cs(pp)-fi, Na(spp-fi)\} \rightarrow ['Cs(pp)-fi']$  or 'not  $Cs(pp)-fi$ ']/di1...din.

This is because this (secondary) Functional Consciousness SROCS computational structure also inevitably leads to both 'logical inconsistency' and ensuing 'computational indeterminacy' in the case of a SRONCS:

$PR\{Cs(pp)-fi, Na(spp-fi)\} \rightarrow$  'not  $Cs(pp)-fi$ ']/di1...din. Once again, the generalized Duality Principle asserts that this last 'computational indeterminacy' is contradicted by validated empirical findings indicating the capacity of the human Central Nervous System (CNS) to determine any given particular functional properties of any given Psychophysical Stimulation. Therefore, the generalized Duality Principle points at the necessary existence of a conceptually higher-ordered 'D2' computational framework which computes simultaneously any series of "co-occurring" pairs of Functional Consciousness (attributes of a given psychophysical stimulus) alongside its Neural Activation correlate (e.g., at any given spatial-temporal point).

$$D2: [\{Cs(pp)fi, Na(spp)fi\}_{st-i}; \dots \{Cs(pp)f(i+n), Na(spp)f(i+n)\}_{st(i+n)}] / di1...din$$

Likewise, it is suggested that a further (subsequent third) potential SROCS computational paradigm level is that of 'Phenomenological Consciousness SROCS':

3. **Phenomenological Consciousness SROCS:**  $PR\{Cs(pp-fi)-Ph, Na(spp-fi)-Ph\} \rightarrow ['Cs(pp-fi)-Ph']$  or 'not  $Cs(pp-fi)-Ph$ ']/di1...din wherein the previous (secondary Functional Consciousness) SROCS output of ' $Cs(pp)-fi$ ' or 'not  $Cs(pp)-fi$ ' serves as the basis for the input to the third level Phenomenological Consciousness SROCS in the form of the phenomenological experience of any such particular Consciousness Function (i.e.,  $Cs(pp-fi)-Ph$ ) which directly interacts with an exhaustive set of Neural Activations which are assumed to be responsible for carrying out this processing; Hence, this third Phenomenological Consciousness SROCS assumes that the determination of the "existence" or "non-existence" of any particular 'phenomenological experience of any particular psychophysical stimulation function' ( $Cs(pp-fi)-Ph$ ) is solely based on direct or indirect physical interactions between such given 'phenomenological experience of any particular psychophysical stimulation function' ( $Cs(pp-fi)-Ph$ ) and an exhaustive set of Neural Activation/s (e.g.,  $Na(spp-fi)-Ph$ ) that are assumed to be responsible for carrying out such processing...

However, as in the two preceding SROCS computational structures it is clear that such (third-level Phenomenological Consciousness) SROCS must also be constrained by the generalized Duality Principle and therefore also inevitably leads to both 'logical inconsistency' and 'computational indeterminacy' in the case of the SRONCS:

$$PR\{Cs(pp-fi)-Ph, Na(spp-fi)-Ph\} \rightarrow$$
 'not  $Cs(pp-fi)-Ph$ ']/di1...din

wherein the specific phenomenological experience is asserted to both "exist" and "not exist" at the same (single or multiple) computational level/s (di1...din); But, since there exists ample empirical evidence indicating the capacity of human beings to determine (for each stimulus or stimuli) whether or not a certain phenomenological feature of function "exists" or "doesn't exist", then we must accept the (generalized) Duality Principle's assertion regarding the existence of a conceptually higher-ordered 'D2' computational level; Such conceptually higher-ordered 'D2' computational framework can compute the "co-occurrences" of any hypothetical series of such particular

'phenomenological experience of any particular psychophysical stimulation function' ( $Cs(pp-fi)-Ph$ ) and a corresponding exhaustive set of Neural Activations ( $Na(spp-fi)-Ph$ ):

$$D2: \{[Cs(pp-fi)-Ph_i, Na(spp-fi)-Ph_i]_{st-i}; \dots [Cs(pp-fi)-Ph_{(i+n)}, Na(spp-fi)-Ph]_{st-(i+n)}\}$$

4. **Self-Consciousness SROCS:**  $PR\{Cs(pp-fi)Ph-S, Na(pp-fi)Ph-S\} \rightarrow ['Cs(pp-fi)Ph-S' \text{ or 'not } Cs(pp-fi)Ph-S'] / di1 \dots din.$

It is finally hypothesized that there exists one further (fourth and final) SROCS computational level of 'Self-Consciousness' which combines between all (third-level) Phenomenological Consciousness SROCS outputs of the "existence" or "non-existence" of any given phenomenological experience (e.g., of a particular psychophysical stimulus function) as the basis for its integrated input stimulus of a 'Phenomenological Self Stimuli' - which is assumed to directly (or indirectly) physically interact with an exhaustive hypothetical set of Neural Activation/s (e.g., comprised of all potential neuron/s, neural connection, neural activation/s etc. responsible to determine whether there "exists" or "doesn't exist" any such 'Phenomenal Self Stimuli' at any given computational level, 'di1...din').

However, as in all previous computational level SROCS since this (final) 'Self-Consciousness SROCS' is necessarily constrained by the (generalized) Duality Principle, then it also must be replaced by the conceptually higher-ordered 'D2' computational framework which computes the "co-occurrences" of any series of pairs of 'Phenomenal Self Stimuli' (e.g., comprised of the sum total of all phenomenal functional psychophysical stimuli - at any given spatial-temporal point/s) and any simultaneously occurring (exhaustive hypothetical) Neural Activation/s, thus:

$$D2: \{[Cs(pp-fi)Ph-S_i, Na(pp-fi)Ph-S_i]_{st-i}; \dots [Cs(pp-fi)Ph-S_{(i+n)}, Na(pp-fi)Ph-S_{(i+n)}]_{st-(i+n)}\}$$

Therefore, it seems that the Psychophysical Problem of human Consciousness (PPP) is currently formalized as a (four-layered) computational SROCS structure which can be represented in the general format:

$$SROCS: PR\{Cs-i, Na_{(1..n)}, \} \rightarrow ['Cs-i' \text{ or 'not } Cs-i'] / di1 \dots din$$

wherein it is assumed that an hypothetical series of direct or indirect physical interactions between any possible ("external") psychophysical or ("internal") 'functional', 'phenomenological' or 'self' stimuli and an exhaustive set of Neural Activations (e.g., as described above comprised of any single or multiple spatial-temporal neural activations, patterns, interactions, neurons or neural connections or neural networks etc.) is solely responsible for determining whether any such Psychophysical, Functional, Phenomenological or Self stimulus "exists" or "doesn't exist". But, it was shown (above and previously) that the generalized 'Duality Principle' constrains any such SROCS computational structure - by proving that any SROCS structure inevitably leads to both 'logical inconsistency' and 'computational indeterminacy' which are contradicted by known empirical findings indicating the capacity of the human Nervous System to determine whether or not any given 'psychophysical', 'functional', 'phenomenological' or 'self' stimuli "exists" or "doesn't exist"; Therefore, the generalized Duality Principle proves that there must exist a conceptually higher-ordered 'D2' computational framework which can compute the "co-occurrences" of any hypothetical series of corresponding pairs of:



D2:

1. Psychophysical:  $[\{N(1\dots n)_{st-i}, Cs\text{-pp}_{st-i}\}; \dots \{N(1\dots n)_{st-i+n}, Cs\text{-pp}_{st-i+n}\}]$
2. Functional:  $[\{Cs(pp)_{fi}, Na(spp)_{fi}\}_{st-i}; \dots \{Cs(pp)_{f(i+n)}, Na(spp)_{f(i+n)}\}_{st(i+n)}]$
3. Phen.:  $[\{Cs(pp\text{-}fi)\text{-}Ph_i, Na(spp\text{-}fi)\text{-}Ph_i\}_{st-i}; \dots \{Cs(pp\text{-}fi)\text{-}Ph_{(i+n)}, Na(spp\text{-}fi)\text{-}Ph_{(i+n)}\}_{st-(i+n)}]$
4. Self:  $[\{Cs(pp\text{-}fi)Ph\text{-}Si, Na(pp\text{-}fi)Ph\text{-}S_i\}_{st-i}; \dots \{Cs(pp\text{-}fi)Ph\text{-}S_{(i+n)}, Na(pp\text{-}fi)Ph\text{-}S_{(i+n)}\}_{st-(i+n)}]$

This means that instead of the currently assumed 'materialistic-reductionistic' SROCS paradigms – e.g., at the psychophysical- functional- phenomenological- and self- stimulus levels, the Duality Principle proves that there can only exist one (singular) conceptually higher-ordered 'D2' computational framework which computes the "co-occurrences" of each of the above (particular four level)  $PR\{Cs\text{-}i, Na_{(1\dots n)}\}$  pairs... Moreover, instead of the currently assumed 'material-causal' physical relationships between the specific  $\{Cs\text{-}i, Na_{(1\dots n)}\}$  pairs, and moreover between each of these four SROCS computational levels:

5. *Psychophysical*:  $[\{N(1\dots n)_{st-i}, Cs\text{-pp}_{st-i}\}; \dots \{N(1\dots n)_{st-i+n}, Cs\text{-pp}_{st-i+n}\}]$
6. Functional:  $[\{Cs(pp)_{fi}, Na(spp)_{fi}\}_{st-i}; \dots \{Cs(pp)_{f(i+n)}, Na(spp)_{f(i+n)}\}_{st(i+n)}]$
7. Phen.:  $[\{Cs(pp\text{-}fi)\text{-}Ph_i, Na(spp\text{-}fi)\text{-}Ph_i\}_{st-i}; \dots \{Cs(pp\text{-}fi)\text{-}Ph_{(i+n)}, Na(spp\text{-}fi)\text{-}Ph_{(i+n)}\}_{st-(i+n)}]$
8. Self:  $[\{Cs(pp\text{-}fi)Ph\text{-}Si, Na(pp\text{-}fi)Ph\text{-}S_i\}_{st-i}; \dots \{Cs(pp\text{-}fi)Ph\text{-}S_{(i+n)}, Na(pp\text{-}fi)Ph\text{-}S_{(i+n)}\}_{st-(i+n)}]$

The Duality Principle conceptually proves that there cannot (e.g., in principle) exist any such direct or indirect material-causal relationship/s between any of these (assumed) four leveled scientific SROCS paradigms' particular  $N(1\dots n)_{st-i} \rightarrow Cs\text{-}_{st-i}$  factors, or between any of these SROCS paradigms (themselves – as stipulated above);

Instead, the Duality Principle proves that at none of these (currently assumed) SROCS paradigms, or indeed at any other (exhaustive hypothetical) SROCS computational level/s – can there exist any real "material-causal" relationship between any Conscious stimulus (or stimuli – e.g., at any of the four above mentioned generalized computational levels or at any other exhaustive-hypothetical computational level/s) and any exhaustive hypothetical Neural Activation/s locus or loci etc. (e.g., at any hypothetical computational level 'di1...din'); Instead, the Duality Principle asserts that there can only exist the singular (conceptually higher-ordered) 'D2' computational framework which can compute simultaneously the "co-occurrences" of any of the four abovementioned psychophysical-functional- phenomenological- or self- pairs...

This means that instead of the currently assumed Neuroscientific 'materialistic-reductionistic' working hypothesis whereby all Conscious stimulus processing (e.g., whether involving an "external-psychophysical" or "internal- functional, phenomenological or self" stimulus types) – being reduced to a particular neurophysiological material (causal) interaction between the specific Conscious stimulus and the corresponding brain locus (or loci) regions responsible for processing that particular type of information; the Duality Principle conceptually proves that it is not possible (e.g., again in principle) to reduce any such Psycho-Physical Stimulus to any direct or indirect physical interaction/s between any such Psycho-Physical Stimulus and any exhaustive hypothetical Neural Activation/s. Instead, the Duality Principle asserts that the only viable means for determining which pairs of the psychophysical, functional, phenomenological or 'self' 'Consciousness' and corresponding 'Neural Activation/s "co-occur" – is given by the abovementioned singular higher-ordered 'D2' computational framework. But, since it was shown (earlier) that there can only exist *one singular* such conceptually higher-ordered (a-causal) D2 computational framework – which was also shown previously (Bentwich, 2011b) to be equivalent to the

(hypothetical) Computational Unified Field Theory's (CUFT) rapid series of Universal Simultaneous Computational Frames (USCF's), then we must conclude that any (apparently) "external" (psychophysical) or "internal" (function- phenomenal- or self-) Psycho-Physical Stimulus (or stimuli) is necessarily computed simultaneously together with a corresponding Neural Activation/s locus as a series of pairs which are embedded- and computed- within the rapid series of USCF's... In other words, the current materialistic-reductionistic working hypothesis (underlying the key pillars of Neuroscience, Psychiatry Psychology and more fundamentally the Cartesian conception of all scientific inquiry) wherein the human brain is merely activated by- and can perceive- or interpret- "real-objective" psycho-physical stimulation and translate it (or reduce it) to specific Neural Activation/s patterns within specific loci in the brain - has to be abandoned in favor of the Duality Principle's proof for the non-existence of any such material-causal relationship between any (exhaustive hypothetical) computational level/s' (di1...din) SROCS Psycho-Physical Stimulus → Neural Activation/s; Instead, the existence of a singular conceptually higher-ordered D2 'Universal Computational Principle' must be recognized which can compute the rapid series of USCF's within which are embedded all hypothetical (exhaustive) 'a-causal' pairs (series) of all possible ("external" or "internal" 'psychophysical', 'functional', 'phenomenal', or 'self') Psycho-Physical Stimulus and corresponding Neural Activation/s!

Thus, instead of the currently assumed basic Cartesian 'split' that seems to exist between the "objective-material" 'psycho-physical' stimulus - which is assumed to materially "cause" an activation of a particular set of Neural Activations, e.g., which are assumed (in turn) to "cause" a series of 'Black Box Hypothesis' (BBH) material interactions within the CNS that give rise to all "subjective" phenomenological perceptions of the ("objective") physical Reality - the Duality Principle proves that all that truly exists is a series of ("external" psychophysical or "internal" functional, phenomenological or self) Conscious Stimulus - that are computed to "co-occur" simultaneously together with any exhaustive hypothetical Neural Activations within the CNS... Moreover, both the Psycho-Physical Stimulus and "co-occurring" Neural Activations pairs are computed simultaneously as embedded within a Universal Computational Principle's computed Universal Simultaneous Computational Frames (USCF's) rapid series...

But, since it was already shown (above and previously - Bentwich, 2011c) that it is the same USCF's series that give rise to all of the basic physical features of 'space', 'time', 'energy' or 'mass' (or 'causality'), then the recognition of the Duality Principle's asserted conceptually higher-ordered D2 Universal Computational Principle's computation of the series of USCF's in fact transforms Cartesian Science's fundamental conception of an "objective-physical" world that exists "externally" to our CNS' "internal-phenomenological" perception (and interpretation) of it! Instead, the discovery of the Duality Principle and the CUFT paves the way for a new (broader) understanding of both the "physical" universe alongside our "phenomenological" (CNS) conception of it - as mere integral pairs within the singular conceptually higher-ordered Universal Computational Principle computation of the rapid series of USCF's that embed all exhaustive hypothetical pairs of Psycho-Physical Stimulus and corresponding Neural Activations (within the CNS)...

#### **4. Summary & potential theoretical implications**

A previous publication (Bentwich, 2011c) hypothesized the existence of a novel 'Computational Unified Field Theory' (CUFT) which was shown to be capable of replicating

the primary empirical findings and laws of both Quantum Mechanics and Relativity Theory based on a conceptually higher-ordered 'D2' rapid (e.g.,  $c^2/h$ ) series of 'Universal Simultaneous Computational Frames' (USCF's) which are computed by a singular 'Universal Computational Principle' (termed: 'U'). Essentially, the CUFT is based on three fundamental theoretical postulates which consist of the computational 'Duality Principle', the existence of the rapid series of USCF's and the existence of three 'Computational Dimensions' associated with the dynamics of this rapid USCF's computation (e.g., by the singular Universal Computational Principle, 'U'). Moreover, the CUFT was able to resolve the key theoretical inconsistencies (and contradictions) that seem to exist between quantum and relativistic models of physical reality.

The primary aim of the current chapter is to validate the Computational Unified Field Theory based on a dual approach which consists of contrasting the CUFT's identification of three particular empirical instances (or conditions) for which the critical predictions of the CUFT's may differ (significantly) from those offered by relativistic or quantum theories; and a broader application of one of the CUFT's three theoretical postulates, namely: the 'Duality Principle' towards key scientific 'Self-Referential Ontological Computational Systems' ('SROCS') (e.g., akin to the previously identified Quantum and Relativistic SROCS computational paradigms) in order to point at the need to reformulate these key scientific paradigms based on the Duality Principle's conceptually higher-ordered 'D2 a-causal computational framework' - which is no other than the CUFT's (singular) rapid series of 'Universal Simultaneous Computational Frames' (USCF's) (Bentwich, 2011c).

The CUFT's three critical predictions include: the 'CUFT's Universal Computational Formula's Relativistic & Quantum Derivatives', 'Differential USCF's Presentations of "Massive" vs. "Light" Objects', and the 'Reversibility of USCF's Spatial-Temporal Sequence'. Succinctly stated, the CUFT significantly differs from both relativistic and quantum theories in its complete integration of all four basic physical features (e.g., of 'space', 'time', 'energy' and 'mass') within a singular Universal Computational Formula. In contrast, Relativity Theory only unifies between 'space and time' (e.g., as a four-dimensional integrated continuum) and 'energy' and 'mass' ( $E = mc^2$ ) and describes the curvature of 'space-time' by massive objects etc., whereas Quantum Mechanics only constrains 'energy and space' or 'time and mass' as complimentary pairs whose simultaneous measurement accuracy cannot exceed Planck's constant ('h'). Therefore, by utilizing two specific (relativistic and quantum) derivatives of this Universal Computational Formula it is possible to critically contrast between the CUFT and existing relativistic and quantum predictions (e.g., regarding the relativistic 'energy-mass equivalence' or regarding the complete integration of the two quantum complimentary pairs - as embedded within the broader Universal Computational Formula).

The second empirical instance for which it seems that the critical predictions of the CUFT may differ (significantly) from those of quantum and relativistic theories is regarding the differential USCF's presentations of "massive" vs. "light" objects: Based on the CUFT's computational definition of "mass" as the number of 'object-consistent' presentations (across a given number of USCF's) (Bentwich, 2011c) it follows that when we measure the number of such 'object-consistent' presentations of a more "massive" compound (or atom/s) relative to a "lighter" compound (or atom/s, e.g., from the 'local framework' perspective - we should obtain that the "lighter" compound should appear on less USCF's, relative to the more "massive" compound)... In contrast, according to both quantum and relativistic theories the differences in masses (between relatively 'lighter' or 'more massive' compounds or atoms) is

due to differences in the weight of their nucleuses but should not entail any differences in their number of consistent presentations across a series of USCF's.

The third critical prediction of the CUFT involves its capacity to reverse a given 'spatial-temporal' sequence of events (e.g., thereby de facto "reversing the flow of time" according to the CUFT); According to both relativistic and quantum theories the "flow of time" is assumed to be "uni-directional" and "un-altered" - due to the light speed limit set by Relativity theory on our capacity to reach any past relativistic event (object or phenomenon), or due to the probabilistic interpretation of quantum mechanics which assumes a strict 'SROCS' computational structure (Bentwich, 2011c) that is dependent on the "collapse" of the target's 'probability wave function' as a contingency for our capacity to determine (or even measure) any subatomic phenomenon, thereby negating the possibility of "un-collapsing" the target's probability wave function (e.g., which would be necessary if we wished to reverse the sequence of subatomic events such that the target's "collapsed" probability wave function would become "un-collapsed" as prior to its direct physical interaction with the 'probe' element). In contrast, the CUFT predicts that it may be possible to reverse a given object's spatial-temporal sequence by applying a certain electromagnetic field to the relevant series of that object's particular series of USCF's 'spatial-electromagnetic pixel/s value/s' - in such a manner which may allow to reverse its recorded series of USCF's 'spatial-electromagnetic pixel/s value/s'. It is suggested that in this manner it may be possible to "reverse the flow of time" of a given object/s, event/s or phenomenon (with other potentially associated phenomena that may allow for a "materialization" or "de-materialization" of objects or their modulation and their potential transference to other regions in space...)

The second segment of this chapter focused on attempting to apply one of the three theoretical postulates of the CUFT, namely: the computational 'Duality Principle' to key scientific 'Self-Referential Ontological Computational Systems' (SROCS) computational paradigms including: Darwin's Natural Selection Principle and associated Genetic Encoding hypothesis and Neuroscience's Psycho-Physical-Problem; The aim of applying the computational Duality Principle to such key ('materialistic-reductionistic') SROCS scientific paradigms was to demonstrate the broader potential applicability and construct validity of the Computational Unified Field Theory as a significant candidate for a 'Theory of Everything' (TOE) which therefore may possess a broader validity bearing on other (primary) scientific disciplines. Succinctly stated, this application of the computational Duality Principle to the abovementioned key scientific (SROCS) paradigms successfully demonstrated that each of these scientific paradigms does in fact constitute a SROCS computational structure and is therefore constrained by the Duality Principle; Specifically, the conceptual computational constraint imposed on each of these scientific SROCS paradigms by the Duality Principle pointed at the need to replace their current 'material-causal' working hypothesis by a conceptually higher-ordered 'D2 a-causal' computational framework which simultaneously computes the "co-occurrences" of an exhaustive series of (particular) spatial-temporal 'x-y' pairs, which are (in turn) embedded in the Computational Unified Field Theory's rapid series of USCF's (Bentwich, 2011c).

In terms of some of the potential theoretical implications of these (three) critical predictions differentiating the CUFT from the currently existing quantum and relativistic models of physical reality it is (first) suggested that a potential empirical validation of the CUFT (e.g., in contrast to the predictions of the existing quantum or relativistic theories) may indeed suggest that the CUFT may broaden the theoretical scope of our understanding of quantum



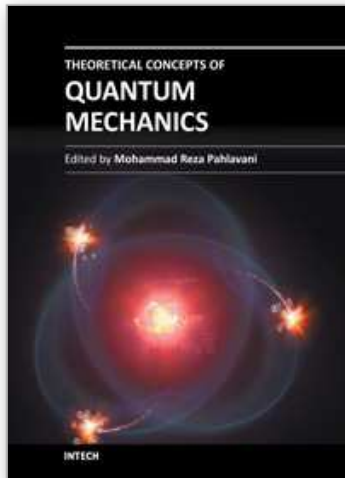
and relativistic phenomena – as embedded within the more comprehensive (higher-ordered) rapid series of USCF's which are computed by the stipulated 'Universal Computational Principle' (''), and which are delineated by the 'Universal Computational Formula'. Indeed, when taken together – the previous outline (Bentwich, 2011c) of the CUFT as being capable of both replicating all major quantum and relativistic phenomena (and laws) as well as bridging the apparent gap (and theoretical inconsistencies) between quantum and relativistic models of physical reality, together with the current chapter's identification of three critical predictions that may potentially validate the CUFT *visa vis* the currently acceptable quantum and relativistic theories may point at the feasibility of the CUFT as a broader theoretical framework which may unify and embed the limiting cases of quantum and relativistic modeling within the higher-ordered ('D2') conceptualization of the rapid series of (a-causal) USCF's, which give rise to all known physical properties of 'space', 'time', 'energy', 'mass' (and 'causality') as secondary computational properties of the singular USCF's sequential process... Second, to the extent that the CUFT's critical predictions are validated empirically (and based on an acceptance of the CUFT's hypothetical computational structure, replication of quantum and relativistic findings and tentative resolution of any quantum-relativistic inconsistencies), a logical next step may also involve a closer analysis of the very "essence" of the 'Universal Computational Principle' ('') and its production of the rapid series of USCF's.

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Quantum theory as a scientific revolution profoundly influenced human thought about the universe and governed forces of nature. Perhaps the historical development of quantum mechanics mimics the history of human scientific struggles from their beginning. This book, which brought together an international community of invited authors, represents a rich account of foundation, scientific history of quantum mechanics, relativistic quantum mechanics and field theory, and different methods to solve the Schrodinger equation. We wish for this collected volume to become an important reference for students and researchers.

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