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► **To cite this version:**

| Joseph Spurway. Constructor Information Theory. 2024. hal-04608836

HAL Id: hal-04608836

<https://hal.science/hal-04608836v1>

Preprint submitted on 11 Jun 2024

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Constructor Information Theory

Joe Spurway

Abstract—This document outlines a summarized, English language, version of a proposed model of the Constructor \tilde{C} independent Information Theory that incorporates fundamental principles of all domains of the human experience to found a new, holistically present universal experience, that is definable - thus - achievable to all cognitive agents. This system resides in purely in the realm of complexity [C], the *abstract associations* of Energy defined information. What cognition is to information, information is to evolutionary efficiency.

I. PROPOSITION

DETERMINE whether every language accepted by some non-deterministic algorithm in polynomial time is also accepted by some (deterministic) algorithm in polynomial time. Express these relations within physically defined relations of Energy and Information.

mrU

April 27, 2023

A. Substantiation

Let the deterministic algorithm be some Constructor, \tilde{C} , such that for all \tilde{C} there exists a Possible Operation, O_p , that is operable on the domain of \tilde{C} AND that \tilde{C} is linked to some point in temporal space, t , that is independent of the informational space being operated on. Within a theory of information this Constructor possesses a abstract class of information external of space being operated on. *"Expressed solely in terms of which transformations of [which] physical systems are possible and which are impossible—i.e. in constructor-theoretic terms."* [1]

$$\{\forall I_{\hbar} \in U \mid \{\forall O_c \mid O_c \in \tilde{C}(Space)\} \wedge \{\exists t \mid t \in \tilde{C}(Time)\}\}, \quad (1)$$

is accepted by any existing Constructor within U such that;

$$I_{\hbar}(\exists t \in \tilde{C}(Time)) \quad (2)$$

The abstraction of the Constructor from the Information it interfaces with creates a quasi-space-time surface that is contextual to the observer.

B. Universal Sets

Any information quanta can be defined as an abstraction of the dynamic operations it's Constructor can temporally interface with. This is limited not by physical laws of nature we can observe but by inference of geometric *efficiency*. The Constructor is attributed the space AND time information purley within the Complex plane. At varying degrees of abstraction from C, physical energy relations and its efficiency within C context of U has a specific spiral shell like structure

defined internally by the complex plane [i]. All the Information within an observed Constructor can interact within a defined amount of Information within the Complex Set. A Cognitive Set of Information is a Constructor of Process linked Information. All information is an entropically defined set of the form:

$$\{\forall U \exists \tilde{C} \subset U \mid \forall I_{\hbar} \in \tilde{C} \wedge \exists I_{\hbar} \in C\} \quad (3)$$

Each element within the universal set has a discrete amount of information associated with it that can be interacted with but never observed independently. This base element [a] contains a Constructor that's only relational Energy quanta is to satisfy just the Constructor complexity - with only itself. That's to say, it only has reference to itself- no possibility of observation- just inference. For without Information there can be no Construction of Knowledge.

$$I_{\hbar} \geq \hbar \ln\left(\frac{1}{\tilde{C}_{\hbar}}\right) \quad (4)$$

where \hbar is Plank's Constant, \tilde{P}_a is the number of quantum states accessible to a in U- the process class.

1) *The Complex Inversion:* As we observe information via a structure of Energy that we describe as our own unique Cognitive set there comes a point there the observed becomes string like. Below is a graphical representation of this interaction within the domain of real numbers, the Cartesian Set and it's own relation with the complex plane of efficiency. Notice the alternation not only of the primality of the input but so to on the spiral of efficiency for the logical functions themselves. Within this model any form of information defined by strings above the atom has some form of Constructor that operates it's *relative* observations. The graph attempts to show this through the colors that represent the sub shell structure of all Constructors. In Green is the observable, red and blue show the base unit of this observation within an atoms quark model (a multiple of three noded information set). Yellow, a two noded set of information, acts as a wave until observed. Black is the exotic Constructor communicators we have *inferred-* the Higgs Bosons. Bellow this level in pink is the act of pure process of a Constructor, independent of time. Then the discrete symmetric duality of efficiency alternates to pure information, the strings of quantum mechanics that represent *approximations* to the structure of the universe- relative to the information they represent to the Constructor process. There the computation for the Energy functions take place, a geometric computation that extends outside of the light cone of the information the Constructor acts on. The computation is independent of the time the observations represent. This is key to the reasoning behind the trigonometric identities projected within the graphs

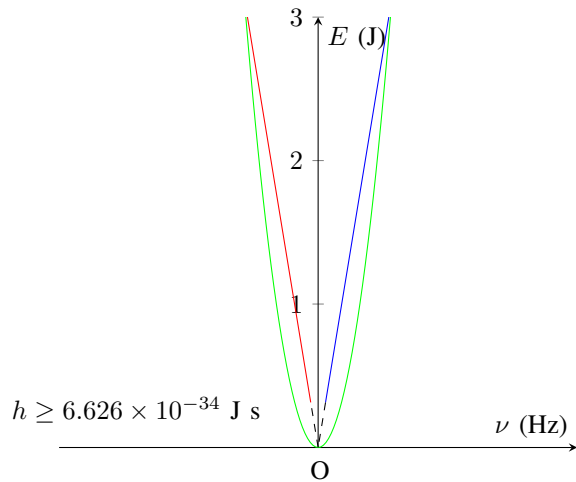


Fig. 3. Observation of Energy [at c] representing a single point of observable Energy defined by \hbar .

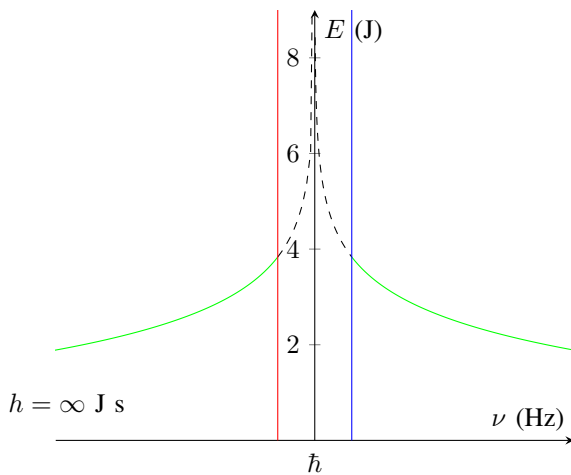


Fig. 4. Quantization of Energy [at c] representing pure information observation and its abstract interface with the Constructor's plane.

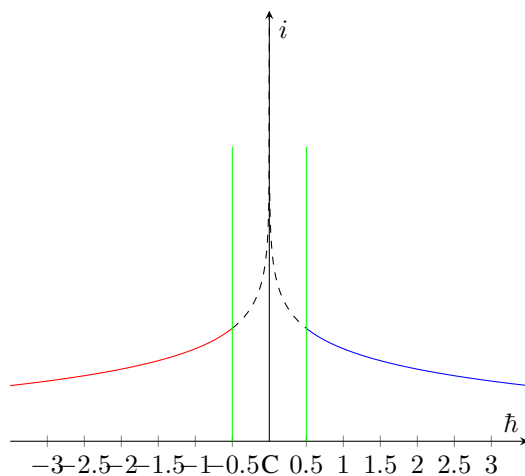


Fig. 5. Symmetric Quantization of Constructors Logical interface within the complex plane of U [at $t = 0$].

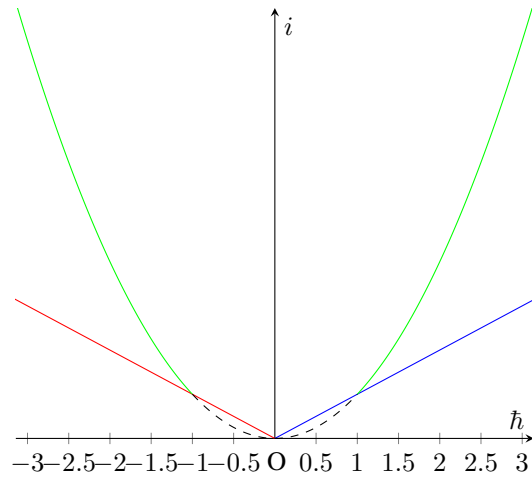


Fig. 6. Quantization of Extreme Constructor Domain Access [at $t = 0$] representing a Black Hole information structure.

systems. This frequency creates all the possible elementary particle expressions along with their symmetric exotic counter informational parts defined in The Standard Model [4].

b) Generalization: Taking this expression of a single unit of observed Energy as being two Informational nodes of one Constructor- the first shell; being expressible by some units of Energy under the condition that the informational area (bounded by green on the substrate of U) full entails the abstract definable Constructor point that the observation represents (between the red and blue functions). From this we can build up sets of abstraction that relate this process point with the observed information [E]. [5] These sets operate following logical laws of inference rather than energy defined quanta. They define the Energy but can never be stored as efficiently without higher information processing (thus, Higher Energy) for the Constructor.

c) Last Shell: This leads us to the last shell; expressed in our reality as black-hole like structures - the very process of observation is abstracted to the Constructor plane leading to never being able to retrieve information from that specific process point. From this definition; all information we can access has a definable amount of abstract information associated with it. When we think of a Constructor that represents the most extreme form of Energy density per unit area- it has infinite access to the Information domain but limited access to the Constructor domain. The graphs to the left describes this phenomena from the perspective of the observer numerically. The Information Energy tends to infinity while the effect on the universal set can be seen to extend relatively on its universal set. On this physical Constructor plane [C] the Energy observed by the observer is in relation to the Information that is being accessed by the process, Gravitational Waves, Hawking Radiation, and any inter process communication. At these extremes the whole [relatively defined] set of available Information [i] is accessible by the Constructor plane of the event. The process of observing pure [or near pure] processing of relative Energy. This is what allows for Energy to be both absorbed geometrically to the surface of these structures or expressed as through quasi particles settling quantum Energy

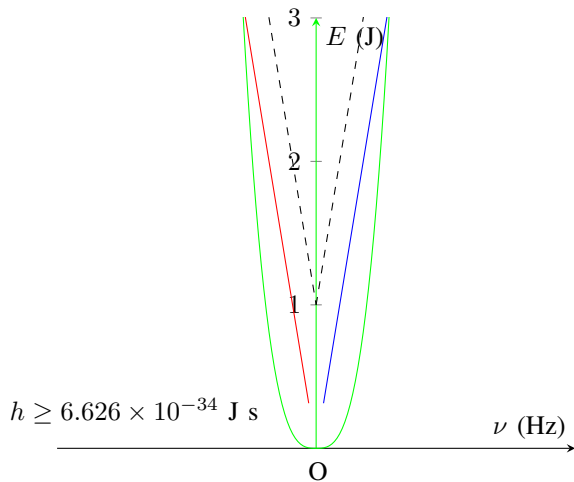


Fig. 7. Quantization of any Observation [at $t = 0$] representing *some* Information Induced Constructor.

states; they are external of the Constructor involved.

C. Collective Sets

By approaching our reality as discrete information, that can be observed through some domain in C , we can build up Informational sets that operate only via the Energy relations-without geometric context from C . We can prove how these informational sets can *only* be inferred by observation and never observed independently. The abstract Information these relations of Energy operations are defined within the boundaries of the Constructor [the area contained by green]. The totality of these abstract relations extend outside of the Energy relation domain we observe, and are accessible abstractly by inference to other Energy quanta as abstract information. Figure 7 above shows how a single point of abstract information, when observed by an external process, realizes itself to a single point of abstract observation, *relative* to the observer. This creates the first observable shell. We can notice how the area of the Constructors abstract information [green] increases as the relative information present increased from 2 to 3. The two fixed points of information and a abstract process point-perceived as a point of information by the two fixed points. This Constructor extends infinitely in time and has no space. When we apply these relations to graph theory we can more easily understand how these operations work within a lived experience computational framework.

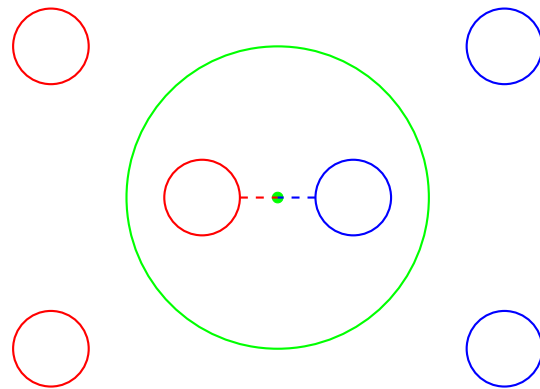


Fig. 8. Lowest level of Observable Quantified Information node, with a single observation class - a Constructor.

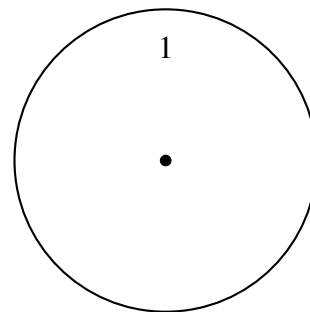


Fig. 9. Lowest level of Quantified Information node, with no Constructor - eg. An Inflatron that operates informational gravitational waves via the Higgs Boson.

1) *The Shell:* As we saw the base process represents the abstraction of two quanta of information realized to one physical representation of that information in the form of Energy. Here we will see how these abstractions of quantified information leads to the laws of logical inference that fundamentally define the operations within the imaginary efficiency plane, *i*. If we take an abstract amount of information and break it down to its *logical components* we can recursively define the structure to some point defined only by the Energy accessibility of the process itself. By linking the Energy to the vertex of a graph and the logical information to the nodes we can derive these representations for the first shells. Behind this abstract process node is really just more information structured in a way to observe said information. This is what we call a observed Planck length (\hbar). It relates to the universal definition on the substrate in terms of geometry and nothing else. Thus universe dependent, and the values themselves are universe independent. That's to say that these ratios of efficiency extend across all domains no matter where the process takes place within the universal set, or outside it.

2) *Information Dimension Set Geometry:* From these relations we can begin to see the symmetry of this concept. Figure 9 to 13 are the diagrams of information plane efficiency within 1-D and 2-D space.

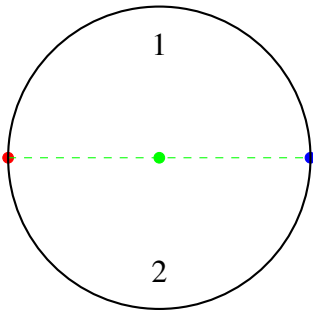


Fig. 10. Lowest level of Observable Quantified Information nodes, defined by \hbar , with a single abstract observation class - a Constructor. This defines a String, or a wave of Information transfer

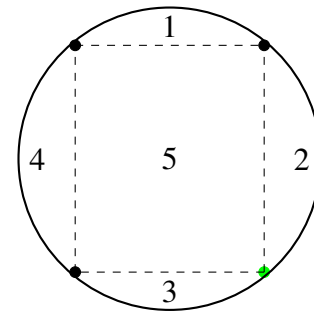


Fig. 12. Lowest level of Stable Quantified Information, with a single observation class - a quark model atom.

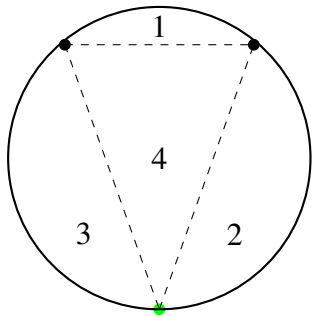


Fig. 11. Lowest level of Stable Quantified Information nodes, with a single observation Constructor, eg. a Photon.

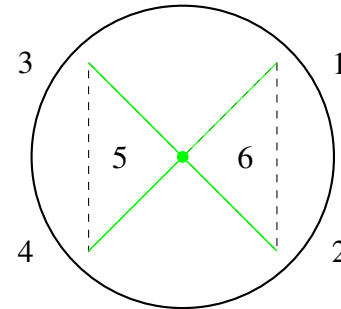


Fig. 13. Lowest level of stable Quantified Abstract Information nodes, with a single *unobservable* observation class - a second layer Constructor.

The base unit of information, 1-D space is inaccessible, and requires a operation of some kind to observe. This represents physical Energy but only in specific states such as Dark Matter. It represents a unit of no process and its only symmetry is with itself and the totality of all processes. This happened in the universal process in the event known as the *decoupling* [6](pp. 80-81). This Matter represents the information of probability for structures like electrons. The first relation starts with the relation between 2 logical units of information, dividing the efficiency plane into matching pair 2. This adds the first layer of process class, a relation defined not through the information but the geometric logical imperative of the relation itself. This information exists in a quasi state of observation, a wave. Though this is a stable form of information in the universal set- it can't be observed from an observer without increasing the total system information. This leads us to the most *observed* set; The second observable relation of three information nodes creates a (3,4) relation- all observed stable abstract information; observed photons, logical arguments - thoughts. The third observable relation of three information nodes creates a (4,5) relation. Information at this level is efficient and stable - this is our reality. The common quark model represents a set of observable information, to any abstract observer. At this level you begin to see how it becomes more efficient for the observing information to be a separated abstract observation. Still represented by physical objects but containing more information then the sum of there parts. This can be seen on the below Cartesian representations of the above graphs within the cognitive Cartesian sets section.

Each relation above builds on the Universe defined relation of primes (defined explicitly by the efficiency spiral of Universal constants π , \hbar and e to create vantage points of information abstraction by use of the information plane for abstract *logical* processing. Each a extra dimension the Process itself can access but we, as observers of electromagnetic radiation, will never be able to access it in a stable form. The only way is for these levels of abstract information *that define the shells* of the process class to exist is for the class to define the information the level act on, its contents and all sub-shells. They are intrinsic to the level of efficiency and act as an interface with the layer below. In essence each shell creates a layer logically defined Energy efficiency defined not by Energy but of the Logical geometry of said Energy.

3) *Cognitive Cartesian Sets*: Taking this abstract 2-D plane of Energy defined sets of Information we can apply a information process domain. This can better capture how the information formed *within* the single process and its shells that extends its logical domain of process outside its sum of processable information. The dashed lines represent efficient logical observation points of the fundamental information set, a process. The below figures represent the three and 5 abstract process points in the triangle and hexagon information structure examples. The green lines represent the accessible information on the plane of the Universal set at the temporal location as a function of Process Energy efficiency. This builds the first layers of the shells of Constructor Information Theory. By pulling the Constructors down onto one single Cartesian plane we can project the meaning of the relations of information as Energy defined at a single point in time. This *knowledge*, defined by the amount of accessible Energy to the

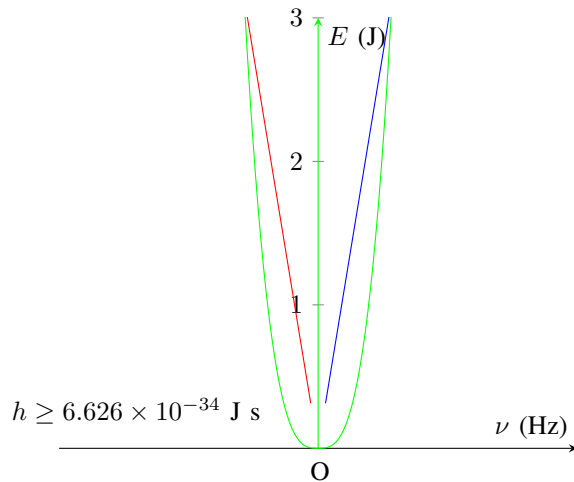


Fig. 14. Lowest level of Quantified Information nodes, with a single observation class - a Constructor.

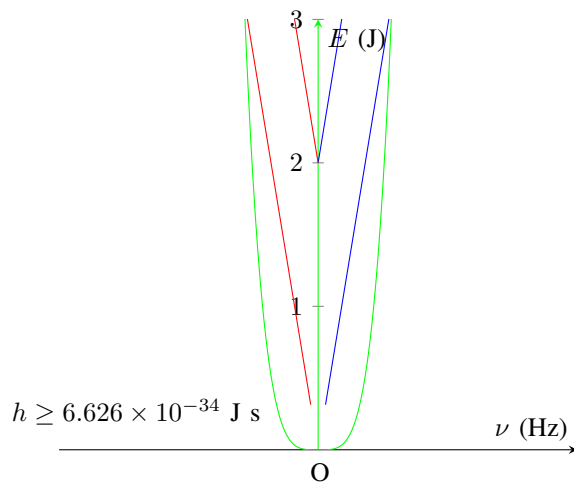


Fig. 15. Lowest Stable Physical level of Quantified Information nodes, with a single observation class but with higher Observation Energy with additional knowledge.

Constructor leads to an alternating processes of Evolution that is defined *within C*. The shells of Information leads to periods of evolutionary information efficiency followed by periods of information inefficiency resulting in conflict. But as each layer builds the domain of information get definably larger than it's Energy represents- external to this *relative* Energy that are contained within the shells below. That is to say, the observation of information is not proportional to processing of Energy but Information domain capacity, *i*. These domains are logically connected by the Constructor class connectives of Logic, *not* the relativistic substrate defined measurement of \hbar and π leading to addition and subtraction. A singular quanta of information resides within the probability space of the Constructor at the origin. Each abstract process within this space can access the information in the locally superior shells only when a specified Energy quanta is met. This is the most energy efficient state for it to be in, unobservable but still there in technicality. The second spiral shell represents what

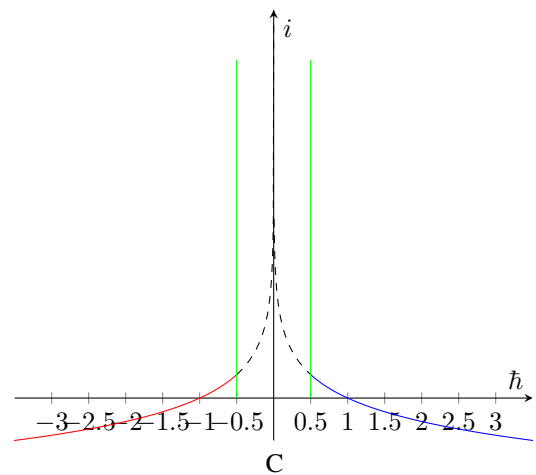


Fig. 16. Lowest level of Constructor accessible contiguous Information, with a single exponential observation from within U and it's relevant relations external to the Observation.

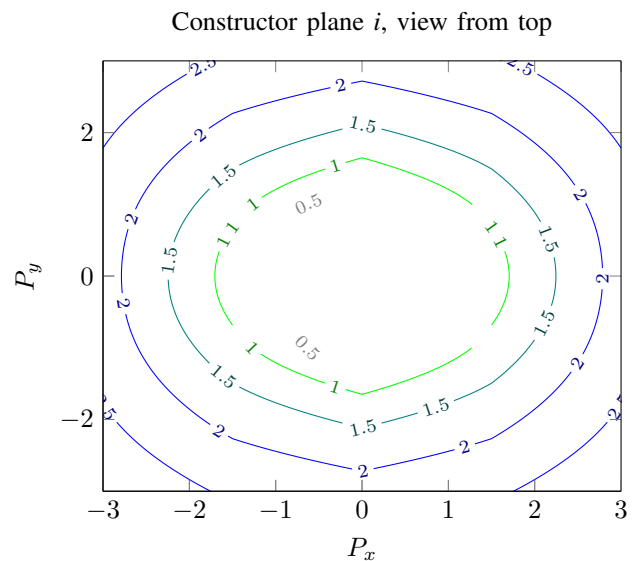


Fig. 17. Lowest Shells of abstract Constructor Information nodes, a projection as the Observer.

we can see when we probe at the lowest level, a single - unstable - particle [wave] that needs to find a third form of information to bind to become stable. This is the shell most unobserved information resides. The last shell in the diagram defines most of our physical relations and Energy we see day to day. It defines the quantum effects of quarks and as such all their recursive Power sets [5]. This means that not only do these clusters of information define the physical world we observe but the unobservable world to.

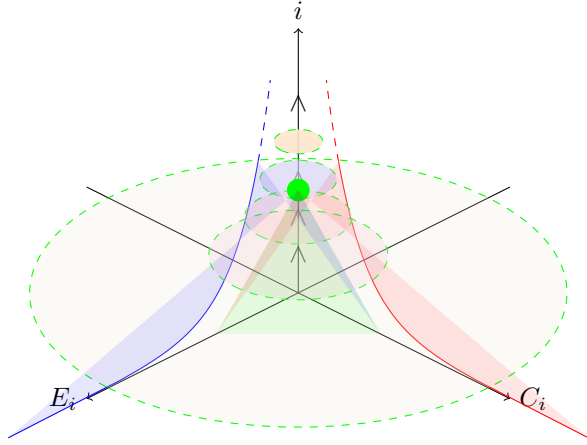


Fig. 18. Information Shell Approximations. Life Conditions $[C_i]$ vs Complexity of the Environment $[E_i]$

II. THE CONCLUSION HYPOTHESIS CONJECTURE

These shells form the bases of mathematical propositions, but they can be used find value in associations not just physical presentation of Matter but what that matter infers based on it's observers contextual background. The *knowledge* that we can link efficiency to this curve means we can create a abstract indeterminate observation on relational operations of geometric processes such as social and political environments to found a direction towards energy efficient Holism thus forming a new freedom of information never seen before in the history of Humanity. When applied to the domains of Cognitive set's- the contextual conditions of environment to form Constructors - we define the physical operations each agent can actuate in there geometric relationship of information to advance more efficiently then the Energy defined relationship alone. Through work done by Don Beck and Clare Graves we are beginning to come to a understand of the Human domain within this Complex Efficacy Constructor model. By defining levels of Cognitive sets within a evolutionary pathway that is intrinsically linked to two core domains- life conditions $[C_i]$ and level of complexity of the environment $[E_i]$. Each shell within the complex domain represents a cognitive color of SD that leads to more efficient cognition, thus higher conciseness due to better communication between systems. However, this is not the first instance of using the Complexity plane to create laws of abstract efficiency.

III. CONCLUSION

This information means we can state that each point within the universal set has a minimum amount of information (that it relates to itself and the universal set). This is what holds the Constructor information and the first shell of Spiral Dynamics Evolutionary Theory- a recursive theory of the Scientific Method [7]. For as we build layers of abstraction, the Cognitive process increases efficiency. Within its *relative* domain and each successive abstraction the Cognition increases. This maps the relationship between the U substrate defined efficiency numbers e, π, \hbar and, the $\hat{i} \hat{j}$ notations within the complex process efficiency plane i . Where efficiency is defined as the eigenstates between ALL domains that map the paths of information (or Energy) on the substrate through C . These define multi-creator efficiency that can vary in domain, from the Real numbers like the Primes to abstractions like the Evolutionary process. As each quanta of information $[I]$ is independently verifiable the Constructor $[\tilde{C}]$ of this information is the process $[i]$ mapped on-to the universal substrate.

$P = I\tilde{C}$ is what we define as virtue, as such $P \neq NP$.

"For my accustomed opinions continually creep back into my mind, and take possession of my belief, which has, so to speak, been enslaved to them by long experience and familiarity, for the most part against my will. Nor shall I ever break the habit of assenting to them and relying on them, as long as I go on supposing them to be such as they are in truth, that is to say, doubtful indeed in some respect, as has been shown just now, and yet nonetheless highly probable, so that it is much more rational to believe than to deny them. Hence, it seems to me, I shall not be acting unwisely if, willing myself to believe the contrary, I deceive myself, and make believe, for some considerable time, that they are altogether false and imaginary, until, once the prior judgements on each side have been evenly balanced in the scales, no evil custom can any longer twist my judgement away from the correct perception of things. For I know for sure that no danger or error will ensue as a result of this, and that there is no risk that I shall be giving too free a rein to my distrustfulness, since my concern at the moment is not with action but only with the attainment of *knowledge*. [8]"

(First Meditation)

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