TELOS AND COMPLEXITY[1]

Kigen William Ekeson

ABSTRACT. I will develop a general model of causality based on conditionality. From there I will develop a topological hierarchy whereby distinct categories of natural phenomena are modeled according to their relative complexity. I contend that it is only in doing so that the nature and function of telos can be convincingly identified and defined relative to other phenomena that exhibit no teleological behavior. I will then show how both quantitative and qualitative modes of describing conditioned states arise as expressions of teleological agency. I will conclude by summarizing some of the broad implications of what the entire model suggests regarding telos and the human condition.

autoricerca.com

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INTRODUCTION

Ours is a universe of complexity, and telos is its highest expression. In order to show how this is indeed the case, a broad model of causality based on the ideas of the 3rd century CE Indian philosopher, *Nāgārjuna* will be presented. Then, a way to topologically differentiate this broad model into discrete orders of complexity will be developed such that the emergence of telos (i.e., purpose) can be clearly identified and defined.

To do this, it will be necessary to clarify the difference between intrinsic and extrinsic properties of complexity. By intrinsic properties, I mean the inherent conditions that give rise to some entity, while extrinsic refer to properties projected upon one entity by another. Take for example a fork; mass, shape, and molecular composition are all intrinsic properties that comprise fork. Many of these properties can be quantified with great precision. However, one cannot quantify the purpose that a fork has towards food, or to the humans who use it, as such properties don't depend only upon intrinsic physical properties, but are extrinsically created and projected upon forks by what I will refer to as some type of subjective agency.

I contend that although every element of space and time expresses itself as an intrinsic subjective condition (i.e., an entity), extrinsic properties can only be created by and are only useful for subjective agencies. I further contend that subjective agency is indeed the equivalent of teleological agency and that any such agency is only expressible through and as some autopoietic entities. Therefore, by describing how autopoietic entities come into being as a specific order of complexity, I will also be describing how teleological agencies comes into being.

My conclusion will show how the deeper implications of the relationship between teleological agency and non-teleological entities suggest a new way to understand the true nature and scope of telos and our place in the cosmos.

BACKGROUND

Circa 250 CE, the Indian Mahayana Buddhist philosopher *Nāgārjuna* introduced the doctrine of Dependent Co-origination

(*Pratītyasamutpāda*) [1]. Through this doctrine he asserted that all phenomena are completely conditional and therefore empty (*Śūnyatā*) [2] of any unconditioned reality, character, or characteristics (*svabhāva*) [3]. This position stands in general contrast to Western-style empirical approaches, where either material or abstract building-block-type entity(s), forces, fields, or properties are often considered as fundamental [3].

Thus, according to Dependent Co-origination, no objectifiable conditions nor non-material subjective qualities (e.g., panpsychic or implicate conditions) can describe the universe in its fullest sense, as any such constituents must always themselves be conditional. Therefore, I contend, it is only the dynamic and eternal interaction between (conditional) conditions that continuously gives rise to all expressions of reality.

I propose three postulates that I posit are common to any conditioned state:

Postulate 1. Unity; there is an aspect to every conditioned system that corresponds to some single, commonly held boundary for that system, and can be either intrinsic or extrinsically created.

Postulate 2. Polarity; there is an aspect to every conditioned state that corresponds to some relative diversity within the common boundary of a system, describable in terms of conditional opposites, whose interaction over time defines that system.

Postulate 3. Change; there is an aspect to every conditioned state that corresponds to the change brought about through the simultaneous and continuous interaction between the conditional opposites that constitute any system.

A General Model of Causality

In order to illustrate a simple example that models these three postulates, let two polarized circles, one black and one white, continuously merge and then again separate from each other. Thus, in Figure 1, Postulate 1 is modeled by the overall relationship that includes both black and white.

Postulate 2 is modeled by the division of that overall relationship into the conditional opposites of black and white.

Postulate 3 is modeled by the function of the two conditional opposites switching places with respect to each other.

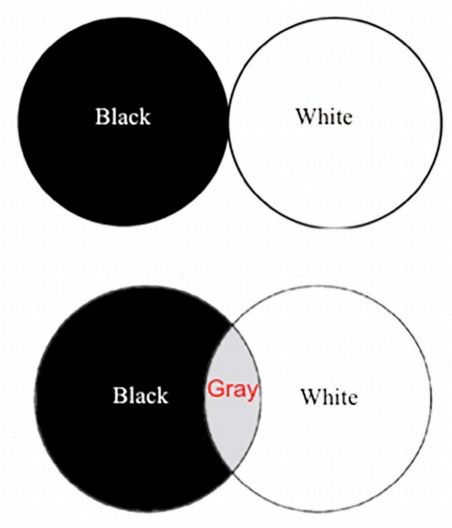

Figure 1. The Intrinsic Entity-Context

In their initial state, black is completely polarized from white. In this state, no internal subjective entity can be modeled because there is no way to intrinsically draw contrast between black and white. However, when black and white begin to overlap via their functional interaction, a new and completely conditional entity of grey is created. It is this area of overlap that I contend models any subjective condition.

Note that once grey is formed, the remaining portions of the two original circles make up a contextual, bifurcated object-field relative exclusively to that newly formed subjective condition. For this reason, I will refer to the entire conditioned state after the subject has been formed, as the entity-context. For example, when a male and a female of some species mate, it is not until their offspring is born that they become 'mother' and 'father'. Here, the pre-subjective context, i.e., male-female, is transformed through the birth of their offspring into the new and unique conditions, relative to the child, we call mother and father.

The entity-context includes both the child and the parents.

Therefore, if the above grey area could think and talk, it would be able to recognize its own intrinsic relationship to both opposites of black and white because it has the unique condition of sharing in the content of both. This quality cannot be modeled by either black or white in their initial polarized state. The area of gray overlap can also be abstractly understood as information [4] because it models the creation of intrinsic data within a given set of parameters in a way that is not coupled to an outside observer.

In order to illustrate the above ideas in a more formal and complete way, let us begin with a single circle (see Figure 2). Let this circle represent any single boundary imaginable (Postulate 1). Let us set the pair of conditional opposites that defined the circle as being the circumference and the exact center (Postulate 2). In order to model continuous and simultaneous change (Postulate 3), let the circumference and center continuously switch places.

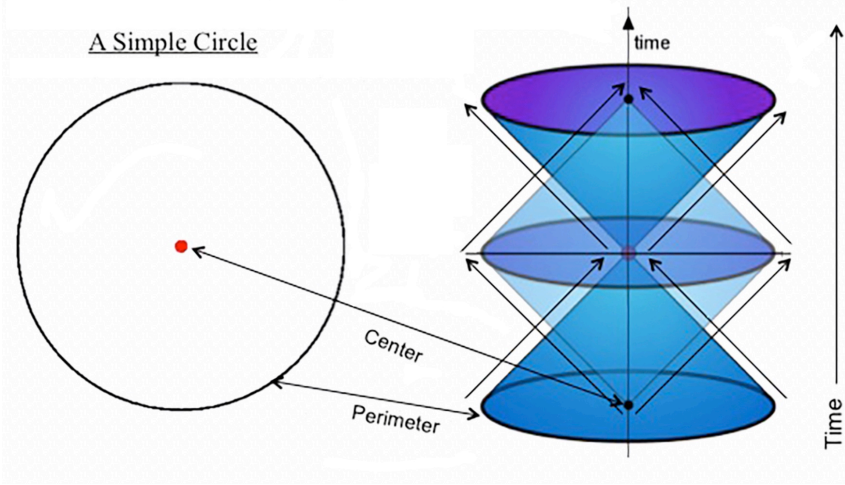

Figure 2. Conditional Opposites Change over Time [color online]

In Figure 3, the two opposing functions of circumference and center are indicated at Polarity I. These two functions change

with respect to each other (Prehistoric) and eventually meet at Unification I. This initial point of unification models a state of relative non-differentiation (i.e., unity) between the conditional opposites, relative to their initial polarized state. After unifying, the conditional opposites switch functions with respect to each other. That is, what was functioning as center, now functions as the relative circumference and vice-versa. In so doing, an area of overlap between the switched functions is formed and expands (Figure 3, Historical Event; Formation).

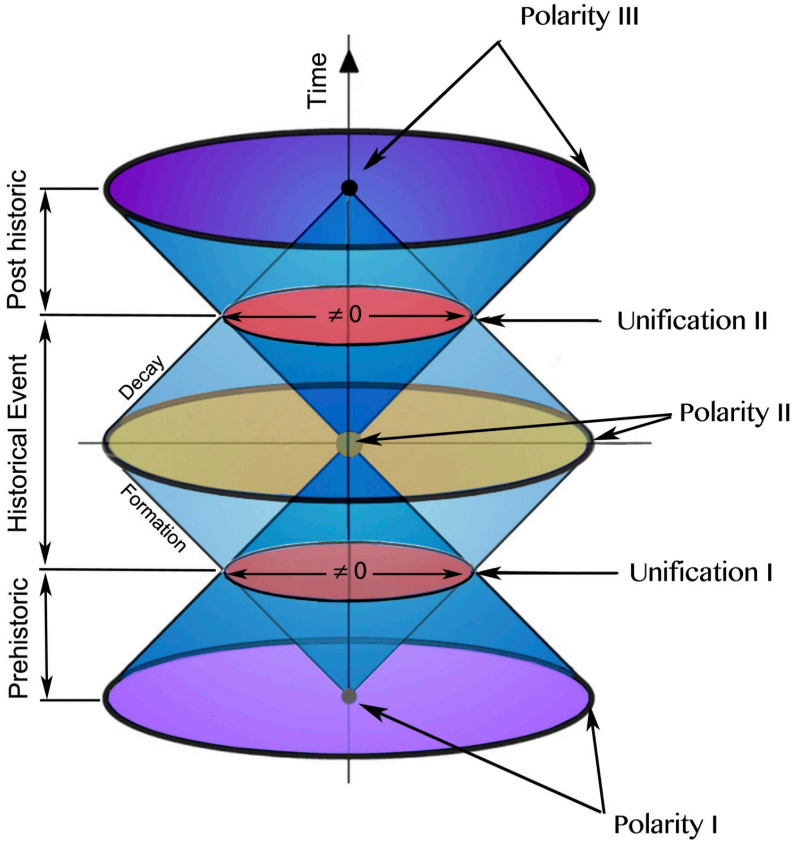

Figure 3. The Cycle of Change [color online]

This area of overlap expresses the same relativistic condition between the opposing functions modeled by the grey area in Figure 1, but is now depicted as dynamically bounded by the contracting circumference (turned relative center) and the expanding center (turned relative circumference). Thus, the growing area of overlap between the progressing functions models the creation of any intrinsic subjective entity surrounded by its opposing contextual limits.

This can alternatively be understood as any historical event, or (as stated above) as the creation of information. This new condition will grow until the opposing functions reach the origins of their conjugal opposite (i.e., Polarity II). Then, as continuous change is required, the opposing functions of center and circumference must begin to move back towards their original orientations. When this begins, the entity-context will simultaneously begin to decay.

At the area where the returning functions meet at their second point of unification (Unification II) and cross back into their original functions, the annihilation of the entity/context is complete (although a new one will immediately be formed). Just as in Figure 1, every entity/context relationship (i.e., Historical Event) is necessarily 'bookended' by pre-event and post-event conditions relative to itself. Thus, 'Pre-historic' and 'Post-historic' conditions are pre-informational and post-informational states relative only to some specific Historical Event i.e., unit of information.

COMPLEXITY

What I have shown is that a general model for the conditioned nature of all entity-contexts can be described using *Nāgārjuna*'s ideas about Dependent Co-origination and a few simple diagrams. What I would like to do now is to present a model made up of four (ultimately, five) orders of complexity that correspond to different types of physical entities, in order to show how their differences might be understood in terms of relative complexity rather than from any purely objective states or qualities.

However, I am not a scientist, and the following is meant to be

a philosophical thought experiment using broad swaths of different phenomena as a way to explore a link between entities exhibiting teleological agency and all other entities. The list below in no way implies that it is exhaustive of all possible orders of complexity, but hopefully these four can serve as an interesting beginning. The four orders of complexity will be:

(1) *Massless entity-contexts in super-position.*
(2) *Massive entity-contexts in super-position.*
(3) *Non-autopoietic macro-level entity-contexts.*
(4) *Autopoietic macro-level entity-contexts.*

In Figure 4, we see the same oscillation between polarity and unification as in Figure 3, expressed as simple black, white, and gray circles, and described as a 720º cycle. Of course, this diagram only shows a single cycle. In reality the cycle repeats: continuously creating new completely conditional expressions over time. Therefore, if we take the abstracted black and white diagram cycle of change in Figure 4 and join its pre- and post-event polar states, we get a continuous 720º loop (See Figure 5).

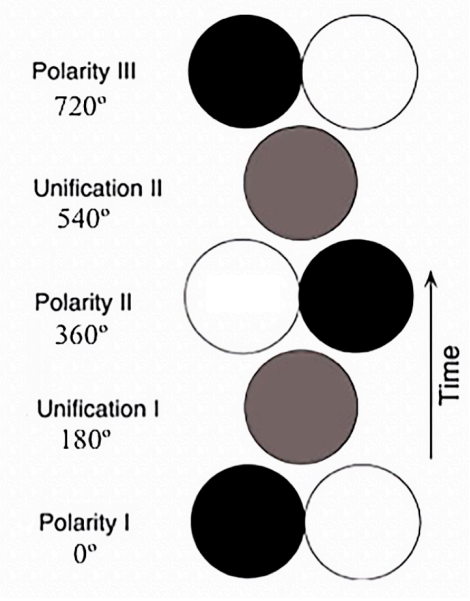

Figure 4. Abstract Cycle of Change

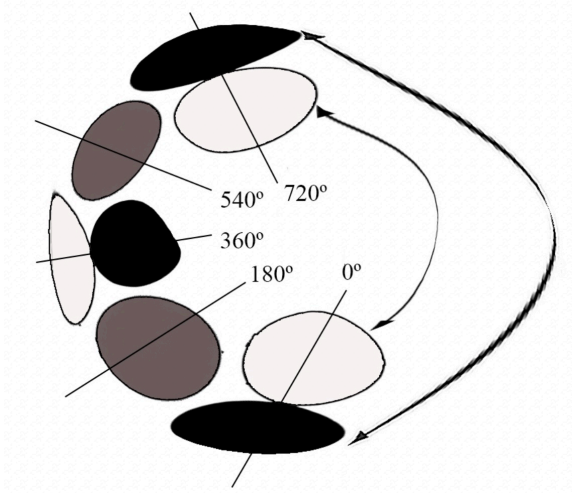

Figure 5. Abstract Cycle Loop

This 720º loop is expressible using a shaded Möbius strip (Figure 6). The Möbius strip is a two-dimensional topological manifold with only a single edge and one side [5].

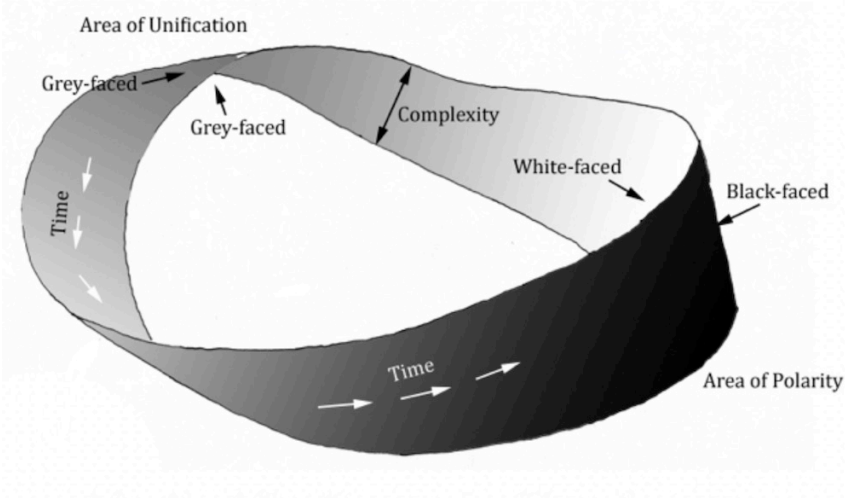

Figure 6. The First-order Complexity

However, in cross-section, its one side can be divided into two conjugal faces at every point along it. Let these conjugal faces represent the conditional opposites that define any overall conditioned state. To exactly mirror the abstract diagram for change (Figure 4), at some point along the strip, let one face be completely black and the other white. At the point 180° from this black/white area, let both faces be uniformly gray. Let the area between the black/white faces and uniform gray gradually transition to each other. Because it takes a 720º progression (i.e., two times around) along the face of any Möbius strip to return to the starting point, if we begin on the point of greatest polarity on the black face, it will take a 720º progression to return to that same black/white orientation, but in so doing, the orientations of black, white, and gray will have cycled through the unification and polarized "switching", relative to their conjugal face, in perfect keeping with the abstract cycle for change diagram (Figure 4).

In all the topological examples to follow, let the longitudinal dimension represent the temporal change for whatever system of opposites is being modeled, while the latitudinal dimension will represent the relative degree of complexity within the entire four-order system. In the Cycle of Change diagram (Figure 3), the entity-context (Historical event) is produced as a new spatially distinct condition created by the switching circumference and center. However, in the case of the first-order of complexity (Figure 6) there is no new spatially (or temporally) distinct area created between the conditional opposites of black and white. That is, relative "space-time" does not manifest at this simplest of levels. Rather, the "switching" expressed by this most fundamental of systems (i.e., as some massless micro-level particle in relationship to everything that is not that particle) only express a kind of temporal re-orientation with no secondary/spatial dimension whatsoever.

One might say that these simplest expressions manifest as time rather than within it. Thus, the first-order of complexity can be as simple (and awesome) as a single photon in direct relationship with the rest of the universe. It is this type of one-to-one relationship that offers a simple explanation for quantum entanglement [6, pp. 290–294]. That is, even when the first (or

second)-order particle is itself divided into conjugal sub-particles (by various means), there can be no intrinsic "distance" separating them because spatial complexity is meaningless for such systems. Therefore, both entangled parts of a split photon are still intrinsically unifying and polarizing as a single photon from the rest of the universe. It is only we, as complex higher-order systems, who observe a non-local [6, p. 294] correlation between the two (what we perceive as) spatially separated sub-particles and extrinsically label as "spooky action-at-a-distance" [7].

The difference in complexity between our higher-order conditioned state and the first-order also suggests a simple explanation for why the speed of light is the universal speed limit, and is always measured as constant, regardless of the speed of its source [8]. That is, since first-order complexities are the simplest expression of conjugal opposites, the speed of light could simply be understood as the fastest rate at which any Cycle of Change can occur. Furthermore, it also stands to reason that no matter how fast any particular macro-level entity embedded within the universe is traveling, the speed of the "light" i.e., the electromagnetic wave, originating from it will always be the same (when measured by any macro-level observer) because every photon is, by this hypothesis, definitively engaged with the universe as a whole.

Therefore, it is as though any pair of macro-level eyes are the universe's eyes, and so every pair sees photons polarizing from itself (over time) at the same rate, regardless of how fast different sets of "macro-level" eyes (different reference frames) are moving relative to each other. One could paraphrase *John Donne*'s famous lines from "Devotions Upon Emergent Occasions" [9] to read: Ask not from what the beam of light is bursting forth from (nor be concerned with the speed of its point of origin) for it bursts forth from Thee!

How then to model massive entities in superposition? In the second-order of complexity (Figure 7), we add another level of contrast between the grey and black/white faces by letting the width become wider where black/white is polarized (i.e., greater contrast), and narrower at the gray area (i.e., less contrast; see Figure 7). In order to do this, it also necessitates the inclusion of

a lateral curve along the entire longitudinal dimension. This lateral curve begins the evolution of the Möbius strip topology towards that of a Klein bottle [10] (i.e., the third-order of complexity), and models some profound differences relative to the first-order. The open edges of the Möbius strip in the first and second-orders represents the lower limit of complexity: as freely moving entity-contexts in global superposition with the entirety of the universe i.e., a wave-function [6, pp. 290–294].

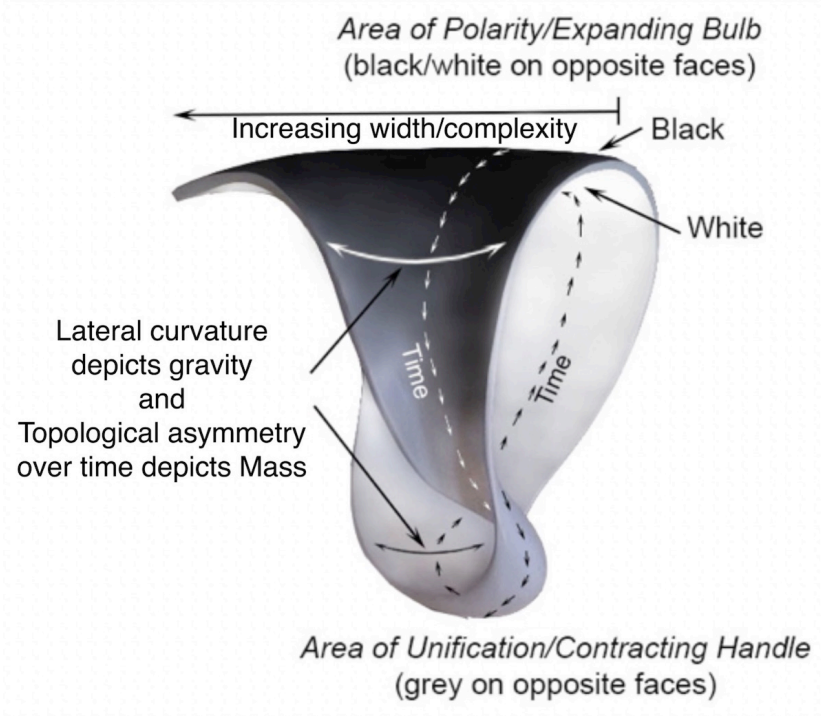

Figure 7. The Second-order Complexity

However, the addition of the second-order's lateral curve quite literally introduces a physical bend into the previously flat, first-order fabric of time. Thus, I hypothesize that the lateral curve present in all the proceeding levels of complexity represents gravity (i.e., the curving of space-time), while the resulting topological asymmetries created over the 720º Cycle of Change (in contrast to the topologically symmetric first-order) model the

Pauli Exclusion Principle [11] and thus, indicate mass [12]. Therefore, in this general mapping of complexity, first-order complexities could correspond to massless bosons and second-order to freely moving fermions [13].

Like the Möbius strip, a Klein bottle is also a two-dimensional manifold embedded in three-dimensional space, but unlike the Möbius strip, the Klein bottle has no edge: it is a closed surface [13]. The third-order of complexity (Fig. 8) can be modeled as a modified Klein bottle (MKB), and depicts a cycling entity-context that topologically has no edge. This means that the system represented does not exist at the lower limit of complexity, i.e. not able to manifest as a super-position between some entity and the entire universe. Rather, third-order expressions give rise to localized, structurally distinct entity-contexts embedded within some larger limited context. Therefore, the exact point of transformation from freely moving lower-order super-positions (first- /second-orders) into a third- (or fourth) order complexity can be understood as the collapse of the wave-function [6, pp. 290–294].

Diagrammatically, there are differences between a normal Klein bottle and the MKB shown in Figure 8. One of the most important being that at the point where both faces are uniformly gray, the handle of the bottle collapses to the smallest point of unification possible for the system (corresponding to Figure 3, Unification I). Then, in keeping with the Cycle of Change, inner and outer faces actually pass through and invert their functions with respect to each other. Diagrammatically, this creates a new dimension of contrast (i.e., greater distinction between unity and polarity) modeled by an inner and outer switching of sides.

This switch creates a progressing “wave” along the length of the MKB representing the macro-level creation, growth, and decay of any inanimate localized and historical event. By contrast, in the first two orders of complexity (see Figures 6 and 7), have no such temporally limited and spatially structured macro-level progression created between the cycling opposites. The lack of such structure in the first two orders makes quantum superposition and entanglement possible for them, and largely impossible for third-order entities (with qualified exceptions). That is, because every third-order system is characterized by

being embedded within the universe as a whole rather than manifesting as the totality of it, they necessarily have a local space-time past, present, and future that changes according to local interactions. This is just another way of saying that third-order complexities can evolve deterministically.

Thus, once the elements making up third-order conditional opposites have been quantified, then the structure of future entity-contexts for the system can be predicted, often with great accuracy. This is modeled by the third-order MKB having only a single handle through which its entity/context is formed, grows, decays, disappears, and is re-formed. However, although third-order complexities are macro-level localized relationships that involve deterministic processes, they exhibit no autopoietic characteristics.

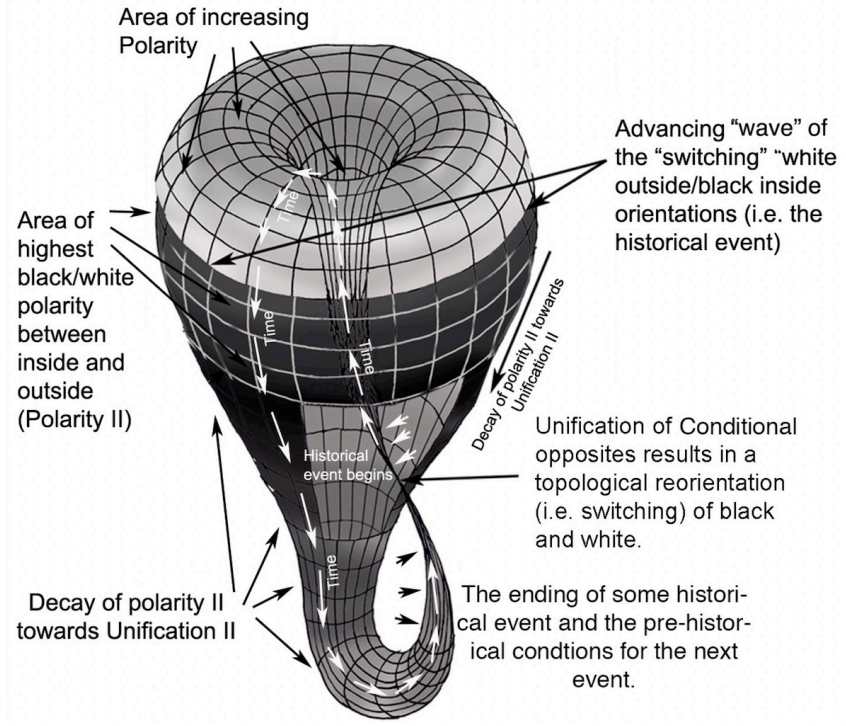

Figure 8. The Third-order Complexity

The fourth-order of complexity (Figure 9) is distinguished from the third-order in that it manifests a completely new level of ontological organization beyond that of merely for accounting for either quantum-level or deterministic expressions. Specifically, the fourth-order gives rise to an intrinsic, non-material condition that expresses subjective agency (autopoiesis).

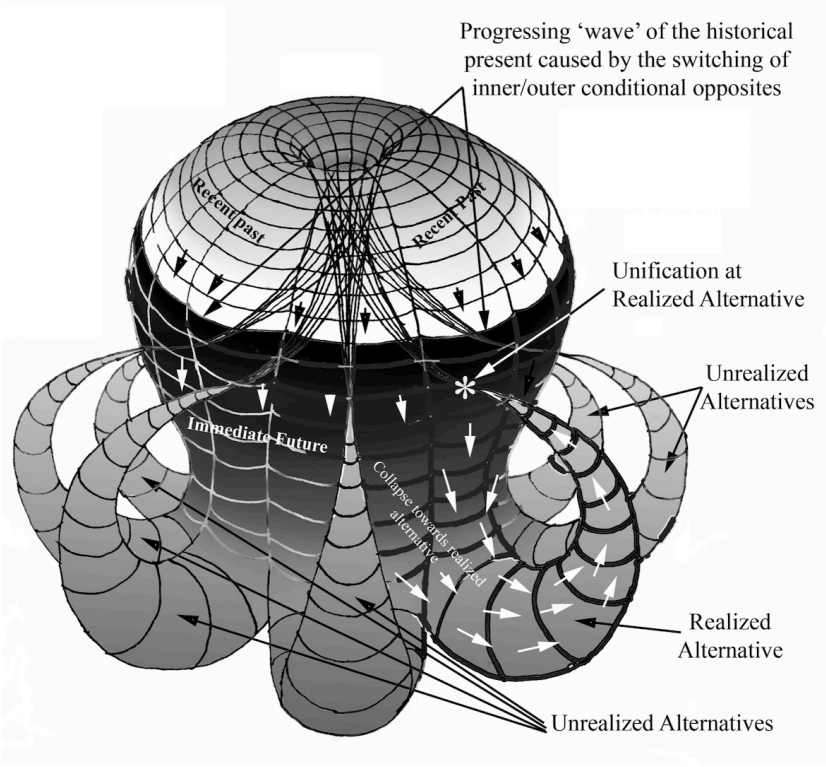

Figure 9. The Fourth-order Complexity

Going back once more to Figure 1, this subjective agency might be crudely modeled by the actual line that differentiates the grey area of overlap from its black-and-white context. Indeed, the simplest fourth-order entities require little more than specialized membranes [14] surrounding primordial "goo" in order to function. These membranes have the capacity to regulate the manner in which their inner and outer conditions reconnect over time (at Unification II, Figure 3). However, it is a fundamental

error to mistake the membrane itself for the fourth-order agency. Rather, it is the actual, non-material capacity for regulation itself that is the fourth-order subjective agency, not the material constituents that allow for such agency. That is, to regulate is to control, and at the simplest biological levels, control transforms a system of single-outcome deterministic conditions into some innovative expression of control that ultimately promotes the survival of that control through the generation of more or better adaptive alternatives.

Once this level of intrinsic complexity comes into being, evolution begins, giving rise to more and better ways to connect inner and outer conditions. These alternatives are modeled in Figure 9, via the addition of extra handles to the modified Klein bottle. Each alternative depicts a different type of inner and outer connection possible for some system with the result being some degree of subjective agency. Each successful connection resulting the continuation of control, in turn gives rise to some new subjective agency, depicted as a newly switched progressing wave (see top of Figure 9).

From this approach it is not hard to see how primitive fourth-order entity-contexts evolve into those with more and more sophisticated, interactive alternatives yielding greater and greater success at survival. Thus, control evolves to behavior, and behavior to experience (i.e., qualia [15]). I suggest that it is with-and-as the arising of intrinsic subjective agency, that teleological agency, in all its forms, comes into being.

Of course, one might argue that this is not true purpose; that it is just the various processes of the universe mimicking purpose. But if, as I contend, that the progressive differentiation of all known entities is fundamentally based upon an increase in complexity, then I would argue that the function of the universe is indistinguishable from purposeful behavior in the broadest sense because there are no entities of equal or greater physical complexity than those expressing subjective agency. Thus, the universe appears to have a definitive and hierarchical goal.

Specifically, that goal is: to bring about greater complexity whenever circumstances allow. And, since subjective agency appears to be the penultimate expression of complexity, one can rationalize two alternatives. The first is that the universe is

simply blind causation that happens to give rise to teleological agency (i.e., the purpose of survival) or one can suggest that the entire universe is purposefully working toward the creation of teleological agency. As to the question of whether or not there is conscious intentionality behind said hierarchical goal, it is not something that we, as limited denizens of this universe can conclusively either affirm or refute, as any such answer is, as it were: "above our pay grade".

As mentioned above, every fourth-order agency-context gives rise to its own expression of ontological control, yet it is completely dependent upon extrinsically transforming and incorporating lower or like-orders of complexities into its own intrinsic fourth-order alternatives. Therefore, just as a photon (first-order) hitting a stone (third-order) is physically transformed into the stone's third-order entity-context (via its molecular structure), the fourth-order human can also physically "collapse" a photon's first-order state into its own fourth-order condition by the mere act of experiencing it (via some physical observation/measurement) as alternatively existing either "here" or "there".

Even though the Quantum Measurement Problem [6, p. 312] is not the topic of this essay, it is this same principle that I contend, explains how and why all measurements and observations extrinsically transform lower or like-order complexities into higher, fourth-order alternatives i.e., qualia. Essentially, through observation (or any thoughts, actions, or sensations) we have the capacity to collapse first, second, third, and other fourth-order conditions into our own intrinsic fourth-order content. Thus, even our quantitative knowledge about a fork, no matter how precise, is still not an actual third-order fork but rather, is an extrinsic fourth-order transformation of some intrinsic localized third-order conditions that give rise to a bit of steel that we call a fork. However, because fourth-order experiences are not limited only to quantitative analyses, we are also able to transform the fork into other astoundingly complex qualitative abstractions that are created as we learn to use forks in a multitude of ways.

If all forms of quantitative and qualitative analyses are fundamentally fourth-order creations used by us in order to transform lower- or like-order systems into our own, intrinsic

fourth-order content, then in so doing we literally create a truly new dimension of reality: a world of fourth-order imagination. That is, mathematical formulas, observed photons, as well as poetry, or any ideas about the best way to use a fork, all spring from and return to the exact same source: our own intrinsic fourth-order ability to extrinsically transform lower or like-order into new ways to purposefully connect (i.e., regulate) our own inner and outer conditions.

However, quantitative analyses are typically far more useful for describing lower-order or deterministic fourth-order experiences than say, poetry, because deterministic and quantum-level systems all tend, due to their intrinsic complexity, towards single, highly predictable pathways (see Figures 6, 7 and 8); pathways that can be precisely calculated using mathematics or other forms of quantitative summation. But, even if our mathematics progressed far beyond our current capabilities and allowed us to predict complex qualitative fourth-order experiences, they would still be just further stunning, fourth-order expressions of the human condition, extrinsically transforming more and more of our inner and outer environs into our own ever-expanding and purposeful content.

However, there is something much more profound than simply our intrinsic ability to transform and describe elements of both lower and like-orders. That 'something' is (as I have outlined) that all orders of complexity share in a single common cycle of change, i.e., an ultimate algorithm, that lies at the heart of everything from a photon, to a sad love song, to the universe itself.

This leads me to one last order of complexity in this already perhaps too-elaborate thought-experiment. That is, suppose the entirety of the universe is also engaged in its own continuous Cycle of Change as a fifth-order of complexity. Then, just as in the third and fourth-orders, perhaps there is a "moving wave" of the currently expanding universe, where space-time is continuously "ripped" into existence by its own crisscrossing and expanding set of conditional opposites. Perhaps each great, universal cycle alternatively gives rise to matter- and then anti-matter expressions of itself. Of course, this would mean that all lower-orders of complexity would necessarily be part of this

great, shared and universal cycle. This would perfectly explain the Arrow of Time i.e., entropy, as the general and inexorable universal flow of time in one direction experienced by all.

CONCLUSION

If, as I have just suggested, the universe as a whole, and all of its known parts, can be understood as various interacting and ascending (whenever circumstances allow) layers of complexity, then the vast expanses of space and time, energy, size, and speed, all of the things we feel dwarfed by in-and-as this vast universe, are in fact dwarfed by us, in terms of intrinsic complexity.

That is, since the fourth-order of complexity is the most concentrated expression of complexity we have yet encountered, and is the sole vehicle through which a wondrous and uniquely supervening dimension of human reality comes about, could not the whole universe be understood as evolving towards purposeful agency? Evolving towards us? Does this not make the human condition indeed the pinnacle of Creation?

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