**(February 2019) UNBELIEVABLE similarities between (2018) von M¨uller- Zafiris and my ideas (2002-2008)**

* (2018) **Albrecht von M¨uller • Elias Zafiris**, *Concept and Formalization of Constellatory Self-Unfolding - A Novel Perspective on the Relation between Quantum and Relativistic Physics*

Metaphorically speaking this deprivation could be

characterized as a “facticity imprisonment” of our thinking. By this we inadvertently

reduce reality to its factual footprints and time to its sequential structure. Both are correct and important, but only partial aspects of time and reality. In order to

overcome the rift between the two foundational theories of modern physics we need

to unearth their different, hitherto overlooked categorial underpinnings and develop

a richer, overarching categorial framework. In the novel account, facts turn out to be just the traces of the actual taking

place of reality, left behind on the co-emerging canvas of local spacetime. The

actual taking place of reality, instead, occurs still in a primordial form of time, the

nonlocal “time-space of the present” (TSP).

Interestingly enough, already Albert

Einstein complained vis-à-vis Rudolf Carnap, in their discussions in Princeton

between 1952 and 1954, about the “painful, but inevitable abandonment” of the

present in physics. The necessity of this abandonment, however, exists only as long

as time is reduced to its linear-sequential aspect, and, directly related, the notion

of the present being reduced to a point-like now. A nonlocal TSP as an aspect of

time in its own right and even as its primordial form (from which the sequential

structure of time emerges as a derivative feature) is, instead, fully compatible with

GRT. One can even argue that GRT implicitly contains such a richer notion of time

and reality, e.g., for what there remains once the local space-time fabric unravels

in singularities. The TSP provides the primordial “stage” or “platform” on which

reality can occur in the first place. Only by “taking place” (!) there, reality gains the

chrono-ontological format of facticity. In the novel account, our human experience

of a present needs no longer to be derogated as just a subjective confabulation. In

the new framework our experience of a present turns out to be the hitherto most

advanced adaptation of cognitive evolution to the actual taking place of reality, as

it occurs in this primordial form of time, the TSP. Obviously, this richer notion of

time changes also our notion of reality. Without the sequential structure of time

there is no causality. In the TSP, reality occurs as a constellatory self-unfolding: Out

of itself, within itself, and towards itself. Based on this richer notion of time and

reality, QP can now be understood as addressing the “reduction” of reality to the

format of facticity, respectively the “crystallization” of time to its linear-sequential

format. Classical and relativistic physics, instead, turn out to be focused on the

resulting factual portrait. But, the singularities of GRT, an integral part of the factual

portrait, indicate the possibility of an inverse transition: They are the instance where

the fabric of local spacetime, and with it the chrono-ontological format of facticity,

dissolves again. Quantum physical reduction and the singularities of GRT, thus, turn

out to describe inverse transitions: Into and out of the chrono-ontological format of

facticity, respectively spacetime locality. (x)

Fundamental for the new theory is to overcome our implicit fixation on a

“monolithic ontology.” In the novel framework, three chrono-ontological portraits

are united like Borromean rings, i.e., every two of them are linked only via the third.

There is (a) the—today erroneously generalized—factual portrait, painted on the

canvas of local space-time, (b) the statu nascendi portrait, covering the actual taking

place of reality, as it occurs in the TSP, and (c) an aspect of inseparable, eventually impredicable unity—with reference to Anaximander, called the “apeiron portrait.”

In this new, three-faceted chrono-ontological framework, it becomes possible to

unite QP and GRT as they stand, i.e., without subduing one to the other—just by

recognizing that they address different, but complementary aspects of time and

reality. Convergence is achieved by adding a “third step” to both, QP and GRT,

in which spacetime locality itself is put into perspective.

The two perennial problems in this context, namely the quantum state reduction

or quantum measurement problem in quantum physics, and the problem of singularities

in general relativity, may be considered as targeting precisely the issue of

transition into and out of a local space-time event structure respectively, pertaining

to the factual layer of reality. This naturally generates the question, if there exists

a universal mechanism of a topological or logical nature, which would manifest

appropriately these two inverse types of transition, and concurrently provide a

concrete mathematical modeling of the categorial apparatus characteristic of a

“statu-nascendi” layer, according to the autogenetic theory. If such a universal mechanism

is actually functioning, then the autogenetic theory, beyond its philosophical

impact, acquires significant interpretative power in relation to the resolution of these

pestilential problems of physics. Here, we propose to explore the viable possibility

that this universal mechanism is based on the logical and topological characteristics

of the “Borromean link,” displayed below:

The “Borromean link” consists of an interlocking family of three rings, thought

of as topological circles, such that if any one of them is cut at a point and removed,

then the remaining two become completely unlinked. The “Borromean link” can be

encoded algebraically in terms of the structure of the noncommutative free group in

two generators. Its unique ubiquity lies on seven distinctive roles that constitute the

main focus of this treatise:

1. The “Borromean link” is threefold symmetric and can be iterated selfreferentially

ad infinitum by replacing simultaneously each one of the rings

by a “Borromean triad” of rings. All other topological links can be constructed and expressed algebraically in

terms of two simple algebraic operations within the same noncommutative

group-theoretic model, namely the operations of forming “Borromean stacks”

and “Borromean chains” out of “Borromean stacks.”

3. It serves as a universal singular locus in the algebraic-topological theory of

branched covering spaces.

4. The “Borromean link” can be characterized topologically by means of a higherorder

homological invariant pertaining to the complement of the rings.

5. It provides the simplest model of nonlocal linkage in 3-d space independently of

metrical distance.

6. This nonlocal topological linkage can be extended to 4-d spacetime by adjoining

a temporal symmetry axis of rotation perpendicular to the rings, which is linked

once with each of them.

7. The noncommutative group-theoretic model of the “Borromean link” admits

irreducible representations in both the Lorentz group (local symmetry group

in general relativity) and the unitary group (local symmetry group in quantum

mechanics).

The connection between the “Borromean link” and the dynamics of autogenesis,

i.e., the dynamics of constellatory, self-referential unfolding, emanates from the adjunction

of an observer, as referent of the “time-space of the present,” located inside

a 3-d sphere (compactification of 3-d Euclidean space), where the “Borromean link”

may be realized. We consider that each one of the three rings surrounds a puncture

on the 3-d sphere, assuming a well-defined physical semantics, and thus it gives rise

to a nonbounding cycle. The existence of each single puncture is associated with the

topological property of multiple connectivity.

First, it is instructive to consider the case of a single puncture together with the

corresponding ring. The internal observer perceives multiple connectivity by means

of the universal covering space of this ring. The concept of a universal covering

space is rooted in algebraic topology and is formulated to depict precisely the process

of dynamic unfolding of a multiply connected space. The term universal refers

to the property that the unfolding space becomes eventually simply connected. In

other words, the perception of the internal observer is dynamically completed when

the unfolding space becomes simply connected. The semantics of the universal

covering space, in the considered case, is that the multiple connectivity induced

by a ring is being dynamically unfolded as a helix, which is spiraling around the

surface of a cone based on this ring and extended to infinity. With reference to a

single ring, we may easily visualize the first steps of this spiral unfolding, where the

emerging levels are indexed in terms of the integers. (x-xii)

The two fundamental

and still imperishable issues in the interface between quantum theory and general

relativity, namely the quantum state reduction and the problem of singularities, can

be thought of as targeting the issue of transition into and out of a space-time event

domain respectively. Given that the quantum state reduction is necessitated in virtue

of entanglement between the quantum system and the measurementmeans, the latter

being in this way the conceptual inverse of the former, the “ER = EPR” conjecture

may be refined by thinking of it in the categorial context of a universal topological

mechanism by means of which the folding out of a local space-time event domain

takes place. It is proposed and demonstrated that the Borromean topological link

provides the sought for universal mechanism to qualify and understand the relation

between entanglement and wormholes, and thus addresses effectively the validity of

the “ER = EPR” conjecture.

In a nutshell, the present treatise argues in favor of a fundamentally different

way of conceptualizing time and reality. In the new conceptual framework, both the

sequentially ordered aspect of time and the factual aspect of reality are emergent

phenomena that come into being only when the actual taking place of reality

is over. In the new view, facts are just the “traces” that the actual taking place

of reality leaves behind on the co-emergent “canvas” of local spacetime. Local

spacetime itself emerges only as facts come into being—and only facts can be

adequately localized in it. But, how does reality then actually occur in the first place?

This “taking place” (in a most literal sense) is conceived as a “constellatory selfunfolding.”

This self-unfolding is characterized by strong self-referentiality, and it

occurs still in the primordial form of time, i.e., in the not yet sequentially structured

“time-space of the present.” In its primordial form, time is the “ontophainetic

platform”,2 i.e., the “stage,” on which reality can occur in the first place. (xv)

Reality losses its local

spacetime formation and gets back into its primordial, pre-local shape—making

also the use of causality relations, Boolean logic, and the dichotomization of

subject and object obsolete. For our understanding of the relation between quantum

and relativistic physics this new view opens up fundamentally new perspectives: Both the quantum physical and general relativistic picture are internally consistent

and legitimate views of time and reality—they just address very different chronoontological

portraits. Thismeans that all trials to subjugate one view under the other,

i.e., trying to find hidden variables “beneath” quantum physics, or trying to quantize

gravity, are profoundly erroneous and lead nowhere.

The task of the book is to provide a formal framework in which this categorially

richer view of time and reality can be addressed properly. The mathematical

approach is based on the logical and topological features of the Borromean rings. It

draws upon concepts and methods of algebraic and geometric topology—especially

the theory of sheaves and links, group theory, logic and information theory, in

relation to the standard constructions employed in quantum mechanics and general

relativity, shedding new light on the pestilential problems of their compatibility. (xv-xvi)

Around the conjecture “ER = ERP” there emerged a very interesting and productive

debate about the pivotal challenge of modern physics, the relation of general

relativity theory (GRT) and quantum physics. In the followingwe introduce a new—

and not so new—conceptual framework that has been developed quietly over the

last three decades. It allows to substantiate the “ER = ERP” conjecture in the refined

version of arguing that the singularities of GRT and quantum reduction can be seen

as *inverse transitions* into and out of the chrono-ontological format of *facticity*,

respectively the applicability of *local spacetime* and *causal accounts*. In addition, an

algebraization of Borromean topologies will be introduced as a new mathematical

tool for elaborating this approach.

The novel approach is rooted in a philosophical analysis of the incompleteness

of a purely sequential notion of time and in the development of a richer notion of

time in which a *nonlocal time-space of the present* moves to the center. The linearsequential

structure turns out to be an important, but derivative aspect of time that

is applicable only for the “traces” of the actual self-unfolding of reality, the facts it

leaves behind on the co-emergent canvas of local spacetime. It follows directly from

this modified conceptual framework that quantum reduction describes the transition

of reality into the state of facticity. Causal account become available only there,

i.e. they are not yet available for the transition itself. Pari passu, it allows to see

the singularities of GRT, i.e. the meltdown of the local spacetime, as the inverse

transition by which reality returns into its primordial, pre-factual and pre-causal

state. (1)

ImmanuelKant drew our attention to the fact that all further thinking about reality is

based on initial “symmetry breakings” in our appreciation of time and reality. Based

on the physics of his times, Kant saw Newtonian space and Newtonian time as the

inevitable prerequisites of any consistent account of reality. Today, we enjoy a much

richer notion of space—but, in general we work with a still rather narrow notion

of time that limits it—even in GRT—essentially to its linear-sequential structure.

This deprived notion of time prevents us from understanding (a) the crucial role of

singularities, (b) what happens in quantum reduction, and (c) that and how GRT and

quantum theory describe complementary aspects of the taking place of reality.

In order to overcome this pitfall and develop a richer notion of time, it is,

however, necessary to go a philosophical extra mile—so to say “with Kant beyond

Kant”—and to recognize the existence and role of underlying categorial apparatus

(pl.) which enable but also constrain all subsequent thinking.

A categorial apparatus consists of four interrelated components:

– a basic form of connecting predications,

– a basic aspect of time,

– a basic relation between events,

– a basic epistemological setting.

The four constituents of the “classical” categorial apparatus are

– Boolean logic (implementing the principle of “tertium non datur”),

– the linear-sequential aspect of time (i.e., as the ability to order events),

– the principle of causal closure (historically called “causa sufficiens”),

– full separability of subject and object (resp. observer and observandum).

This set of underlying pre-configurations constitutes the *factual aspect of reality*.

It is a very important and powerful *portrait of reality*. But this portrait alone does

not yet give us a comprehensive *picture of reality*—as we know, e.g. from quantum

physics or Gödel’s incompleteness theorem of 1931.

The main structural deficit of the classical apparatus, respectively the factual

portrait of reality, is that it is incompatible with the twin phenomena of *strong selfreferentiality*

and *autogenetic unfolding* (in which something unfolds in and out of

itself, i.e. in the absence of external causal drivers). (2)

In order to *think* what happens in quantum reduction and for better understanding

of the relation between GRT and quantum physics, we need to dig still one layer

deeper in our analysis and to unearth the different categorial underpinnings, situated

“beneath” the two foundational theories of physics. Only “down there” we can

recognize the fundamental differences in their portrait of reality, and develop a

richer, overarching conceptual framework.

Having discovered the apparatus character of the underlying categorial setup, one

can formulate a second (and eventually even a third, but for scientific concerns less

important) apparatus. It consists again of four interdependent constituents which, so

to say, “fill the four slots” of a categorial apparatus:

– a *constellatory logic* (i.e., a predication space in which different, and even

contradicting, propositions unfold their full meaning only mutually, and the

overall significance emerges only in the constellation of all of them),

– a *nonlocal time-space of the present* (as the temporal platform on which the

primordial self-unfolding of reality actually occurs; only once this “taking place”

(!) has occurred, spatiotemporal locality is available),

– the phenomenon of *autogenesis* (resp. the principle of constellatory selfunfolding

by which something unfolds out of, within, and toward itself, i.e.

in the absence of external causal drivers),

– the structure of *strong self-referentiality* (respectively the phenomenon of a rich

identity, like a person, in which something refers to itself in its entirety, thus

further unfolding what existed before this self-reference). Each of these four constituents may initially seem quite strange, especially if

we project them—as we almost automatically do—into the rest of the classical

categorial framework.But, taken together, they form a full-fledged second categorial

apparatus in its own right. This apparatus does not give us a comparably precise

portrait of reality like the first one, nor does it allow for formal conclusions or farreaching

predictions. But, it allows us to appreciate and address the actual taking

place of reality, i.e. its ongoing self-unfolding.

By (a) recognizing the existence and role of categorial apparatus, (b) understanding

the inherent limitations of the classical apparatus, and (c) complementing it with

a second one, capable to address “reality in the making” respectively the “statunascendi

aspect” of reality, we have fundamentally expanded the space of possible

theories. (3)

The qualification of the unfolding as ‘out of itself’ refers to the absence of

external drivers. ‘Within itself’ refers to the fact that an autogenetic universe does

not unfold within local spacetime, but the emergence of the latter is part of its

unfolding. The qualification as ‘towards itself’, finally, refers to the phenomenon

that at a certain stage there have emerged entities which became aware of themselves

in an explicit (i.e., language-based)manner.As they are part and parcel of the overall

unfolding of reality, this very process starts—in them, i.e. in every single human

being—to become aware of itself.

An autogenetic universe has three complementary portraits that are related to

each other in the topology of Borromean rings, i.e. taking one of them away leaves

the other two in unmitigated duality. (4)

Only all three portraits together allow for an adequate appreciation of an

autogenetic universe in its essential self-unfolding. By reducing our notion of reality

to facts, and our notion of time to its linear-sequential structure, we deprive our

appreciation of both, the world in which we live and ourselves in a most dramatic

way.

To overcome this “facticity imprisonment” of our thinking is the prerequisite for

overcoming the present obstacles in understanding matter, life, Consciousness, and

mind. But before discussing at least the implications of the new approach for the

foundations of physics in some more detail, I would like to make still a few remarks

on the idea of an autogenetic universe.

The notion ‘autopoietic’ refers to processes in which an entity uses existing

material and configures it in a way that the system reproduces itself. In an

‘autogenetic’ process also the material—and even the framework in which all takes

place—emerges as part of the overall self-unfolding.

A universe that starts to become aware of itself is completely different from

one which just “drags on blindly”. By starting to become aware of itself, the

whole universe gains a fundamentally novel quality—in every single instance where

this happens. This new quality of the whole is the reason for the infinite and

nonnegotiable dignity of every single human being.

With constellatory self-unfolding as themost fundamental andmost cross-cutting

principle a radically novel way to appreciate our universe becomes feasible. The

self-constitution of physical matter/energy can be seen as “first order autogenesis,”

which is addressed in quantum physics. Out of this emerges life as a kind of “second

order autogenesis,” characterized already by a higher degree of self-referentiality,

i.e. of self-constitution and self-unfolding. The emergence of consciousness, and

eventually even mind, can again be interpreted as still higher orders of autogenesis

respectively self-unfolding. (6)

In the new way of appreciating reality we draw on three instead of only one

categorial framework, respectively “apparatus”. These three apparatus constitute

three different but complementary chrono-ontological portraits of reality. Their Borromean

interrelatedness is a self-confirming aspect of the novel, above described,

dynamic combination, Integration, and mutual deepening of unity and diversity.

The thought pattern of an autogenetic universe, thus, offers a new way of

describing our world that combines openness for genuine novelty with conceptual

coherence, i.e. it constitutes what has been characterized as a “modest ToE”. In

an autogenetically unfolding universe also, explainability and wonderfulness are no

longer at the detriment of each other—they, too, deepen mutually. (7)

**1.5 Step IV:What All This Means for the Understanding**

**of Quantum Physics, General Relativity, and the Relation**

**Between the Two Theories**

In quantum physics the actual taking place of physical reality, i.e. its ongoing selfconstitution

is addressed. Relativistic physics, instead, focus mainly on the factual

portrait of reality—with the important exemption of singularities which can now be

seen as the fascinating instance of *de-factization*, respectively the meltdown of local

spacetime.

As already mentioned, trying to subjugate one approach under the other, i.e.

trying to quantize gravity or to find hidden causal mechanisms beneath quantum

physics is neither needed nor adequate. The two theories address different portraits

of reality, complementing each other *because* of their fundamental difference. (7)

The two theories can and should remain as they are—understanding their

relation, however, requires (a) to go the extra mile and unearth the different

categorial foundations of the two theories and (b) to make the transition from a

monolithic to multiple chrono-ontology that comprises all three, the factual, the

statu-nascendi, and the apeiron portrait of reality.

All the essential features of quantum physics fit exactly with the statu-nascendi

portrait of reality: non-locality, superposition, entanglement, genuine indeterminacy,

and the a-causal, inherently constellatory nature of the reduction. All of them

require the second categorial apparatus for thinking of them in a consistent way and

as a complementary aspect of reality in its own right.

As long as we have only the factual portrait at our disposal, quantum physics will

inevitably remain mysterious. The situation is a bit similar to trying to cover oneself

with a blanket that is inherently too small. One can cover feet and upper body, but

not both at the same time. By covering one, one bares the other. (8)

The appearance of singularities has often been considered a fundamental weakness

of GRT. In the here offered conceptual framework of an autogenetic universe

they turn out to be one of the deepest insights of GRT and the crucial bridge

between quantum physics and relativity theory: Singularities are the instances of

de-factization, i.e. the points where reality (driven by the strong self-referentiality

of gravity) leaves again the factual portrait, bringing itself back into the primordial

statu-nascendi format of time and reality.

But, in order to see this, one must have a richer categorial framework, and based

on this, the notion of a self-unfolding universe with three complementary chronoontological

portraits.

The phenomenon of reduction in quantum physics and the singularities of

GRT can now be understood as inverse transitions of reality: into and out of the

chrono-ontological format of facticity, respectively, the realm in which the classical

categorial apparatus can be applied properly and legitimately. (9)

In closing the first part of this very brief and sketchy introduction of the theory

of an autogenetic universe, I would like to stress again that both, quantum physics

and GRT, confirm and require the novel conceptual framework and how they both

articulate some of its crucial points in the most elegant way:

– the coincidence of unity and diversity,

– the mutual deepening of explainability and wonderfulness,

– the key role of constellatory self-unfolding as the underlying principle of our

autogenetic universe that unfolds out of, within, and toward itself. (10)

The philosophical theory of an “autogenetic universe” (von Müller 2011, 2012,

2015) proposes new “categorial foundations” for science aiming to overcome the

inherent limitations, incompatibilities and structural pitfalls of the current scientific

paradigm. The basic premise of the proposed new theory is that we live in an

autogenetic universe, meaning that we live in a self-unfolding and strongly selfreferential

universe. In relation to this hypothesis, the theory of an “autogenetic

universe” proposes a novel account of *time* and *reality*, which aims at a deeper

re-conceptualization of these fundamental notions going beyond or underneath the

structural reduction of the former to its linear-sequential aspect and the concurrent

related reduction of the latter to its factual or event-like aspect. This is of particular

significance in relation to the frontier area of theoretical physics aiming at a

unification of quantum mechanics and general relativity, where it is argued that

a key conceptual element for this purpose requires the relativization of facticity,

namely of the event structures pertaining to a local space-time description capturing

exclusively the factual portrait of reality. (11)

**[In my main book 2008, I investigated Quantum mechanics and Einstein’s relativity. Later, in 2014 I ontologized both relativities…]**

The “autogenetic universe” theory proposes a *triality account* constituted in the

form of three interdependent layers, which are connected together in the form of

the “Borromean rings” topology, that is if any one of the layers is removed, then

there remain two unlinked layers. Each layer captures a different aspect of reality,

namely the “apeiron aspect,” the “statu-nascendi,” and the “factual aspect” correspondingly.

The “apeiron aspect” is inherently without any structure and expresses

the irreducible global unity or non-separability of reality at this layer, which acts as

a source for “the actual taking place,” to be thought of as a kind of logical disclosure topos pertaining to the time-space of the present. The observed traces of this

process, viz. the events embedded within a local space-time background constitute

the “factual aspect” of reality. Whereas the “apeiron aspect” is not amenable to

any direct structural predicative determination, both the “statu-nascendi” and the

“factual aspect” constitute layers whose respective characteristic function can be

depicted in the terms of distinctive underlying “categorial frameworks.”

Each “categorial framework” stands for an integral apparatus consisting of four

interrelated and bidirectionally interdependent components:

(a) a *logical structure* of a predication space,

(b) a related notion of a *spatio-temporal background*,

(c) a *causal scheme* accounting for linkages, and

(d) a corresponding *epistemological setting*.

In this way, the “factual aspect” of reality is captured by means of a categorial

apparatus, which consists of the following components respectively:

(a) a Boolean logical predication space,

(b) a local metrical space-time continuum,

(c) a classical scheme of efficient causality, and

(d) an epistemological setting based on the notion of absolute separability between

observer and observandum.

The intrinsic necessity of introducing another categorial apparatus constituting

the “statu-nascendi” layer of reality is based on the inability of the former one to

account for the logical structural phenomenon of *strong self-referentiality* and its

concomitant operational manifestation as *autogenesis*, meaning a process of selfreferential

*folding/unfolding* without any separable external cause.

From this perspective, the issue of quantum state reduction or quantum measurement

problem in quantum physics and the problem of singularities in general

relativity are considered as artifacts caused by focusing exclusively on the categorial

apparatus attached to the factual aspect of reality, while ignoring completely the

categorial apparatus fitting into the “statu-nascendi” layer. In particular, the quantum

reduction problem targets the emergence of a local space-time event continuum

from the fundamental non-spatio-temporal quantum theoretic description of nature,

whereas the singularities problem targets the global breakdown of the metrical

smooth space-time point-event-manifold model of the general theory of relativity.

Thus, both problems viewed from an extended perspective as targeting the issue of

transition into and out of the local space-time event continuum pertaining to the factual

layer of reality point to the conclusion that their resolution requires the explicit

consideration of the *categorial apparatus characteristic of the “statu-nascendi”*

*layer together with the “Borromean rings”-type of topology* interconnecting the

three reality layers. Consequently, the resolution of these problems, which may

be both considered as different types of self-referentiality, the first as a selfreferential

folding into a local space-time point-event stratum and the second as

a self-referential folding out of this point-event stratum, poses the necessity of a

higher-order relativization of facticity targeting the very notion of a local perspective

on reality. (11-12)

**[ALL THESE IDEAS CAN BE FOUND IN MY BOOK 2008!!!!!!!!!! Almost word by word…]**

We claim that the nature of this notion, that is of a “local perspective on reality”

should not refer to the concept of metrical/geometrical locality in a point-event settheoretic

space-time manifold but should be of a *logical/topological origin* to be

thought of as a *local logical disclosure topos* demarcating the logical structural

pre-conditions of reduction from the global to the local and inversely extension

from the local to the global. This higher-order logical/topological relativization

of facticity, called “categorial relativity,” requires a careful qualification of the

categorial apparatus characteristic of the “statu-nascendi” layer of reality.

The

constituent interrelated components of this layer are the following:

(a) a *paratactical predication space* on which some form of “constellatory logic”

becomes applicable,

(b) a *local logical disclosure topos* pertaining to the time-space of the present,

(c) a causal scheme of *autogenetic folding/unfolding*, and

(d) an epistemological setting of *strong self-referentiality*.

The notion of parataxis refers to a mode of logical coherence of a multiplicity

which is independent of linear sequential organization. This is captured by the

functional role of a “constellatory logic,” where an individuated component of such

a multiplicity can be evaluated only in the context of all other components being

compatible with it in an appropriate manner. (13)

The “autogenetic universe” theory based on the triality account constituted by

the Borromean-type of interconnections of the three layers capturing the “apeiron

aspect,” the “statu-nascendi,” and the “factual aspect” of reality correspondingly,

sheds new light on the old problem of time, together with the concurrent problem

of unfixing the conception of reality from its exclusive reference to the facticity

stratum, which disregards completely even the necessary logical pre-conditions for

the manifestation of events. In this way, it becomes important for the autogenetic theory to specify more concretely the appropriate conceptual and technical bridges

which bind together the three layers forming the triality account, as well as to refine

the modeling of this triadic inter-relational scheme to a Borromean structural type

of topological linking. This would be particularly significant for the elucidation and

technical formulation of the principle of “categorial relativity” as a higher-order

relativization of facticity, which would create a common ground for the resolution of

both the problem of quantum reduction and the problem of singularities as inversetype

of transitions into and out of a local space-time event stratum. The specification

of these bridges would be ultimately necessary for the consistent formulation of

a strong self-referentiality scheme, which would involve the triality account as a

whole, and would give rise to a form of “constellatory logic” functioning at the

“statu-nascendi” with respect to the factual layer.

For this purpose, we propose and develop a precise mathematical model of the

“autogenetic universe” theory, targeting in particular the following:

(a) The notion of autogenetic constellatory unfolding together with the associated

notion of strong self-referentiality;

(b) The notion of the “time-space of the present” and the precise formof the relation

with the standard notion of spacetime.

(c) The connectivity among the three chrono-ontological formats of reality and the

role of the Borromean topological link in this respect. (13-14)

**2.2 Chrono-Topological Binding in the Time-Space**

**of the Present**

According to the major premise of the “autogenetic universe” theory, reality exists

in three different chrono-ontological formats, facticity, statu nascendi, and apeiron.

Because of this, all parts of one, coherent reality must somehow be mutually

interrelated, otherwise there would be no point in speaking of one reality.

In this

respect, the autogenetic conception of reality requires that a precise meaning has

to be given to the crucial notion of the “time-space of the present,” which has to

be distinguished from the standard spacetime of events-facts. Given that reality

is characterized by the three different chrono-ontological formats the “time-space

of the present” has to be understood in its potential to bind “the past” with “the

future” in relation to “the present,” not in the sequential event temporal order of

the “continuum of the real line” that models only the factual aspect of reality, but

in another chrono-topological form. The principal argument that is put forward in

this regard is that the sought-after chrono-topological binding form is characterized

by the Borromeanicity property, i.e. it is not chain-like, such that there exists

the possibility that “the very far past” can be glued together with the “very near

future” through the “time-space of the present” if they form a “Borromean temporal

bond.” As a consequence, the Borromean bond pertains to the chrono-ontological

domain, i.e. the “time-space of the present” becomes the temporal topos of the process of topological historic unfolding. In this way, and interestingly enough,

“the past” and “the future” exist paratactically in their potential to convey meaning

with respect to the “time-space of the present,” and not hypotactically as in the

sequential-chain model. In turn, this justifies the need for characterizing reality

in “statu-nascendi” via a different categorial framework. From this conceptual

perspective, the interpretation of the “Borromean link” (Zafiris 2016a,b) as a

“temporal-historic bond” requires the following:

1. Reconciliation of the static three-dimensional spatial representation of the “Borromean

link” with the dynamic constellatory unfolding and self-referentiality

characteristics of reality in “statu-nascendi.” This issue can be resolved by

realizing that the static representation of Borromeanicity is just the spatial

image, or more precisely, the “epiphany” of the temporal bond. Equivalently,

we consider a cross-section of the bond projected spatially and giving rise to the

standard spatial non-local Borromean-rings-type of linkage in 3-d space. This

admits a concrete mathematical formulation via the algebraic-topological notion

of a “covering space” (Hatcher 2002), which is literally the concept of a “selfreferentially

unfolding temporal dimensionality”;

2. Interpretation of the algebraic model of the “Borromean rings” as a “Borromean

temporal bond” among “past,” “present,” and “future,” from the standpoint of

the “time-space of the present,” taking place in “statu-nascendi” with respect to

the connectivity potential of the apeiron. Here, it is proposed that the concepts

of “memory” and “anticipation” play a key role in order to give meaning to the

algebraic model of “strongly self-referential Borromean gluing,” developed in

detail in Chap. 3. (14-15)

This higher-level abstraction (capturing the essence of the “ER=EPR” correspondence)

necessitates a re-thinking of the notion of “time” in Special Relativity

(SR) and General Relativity (GR) as the 4-th dimension of a “spatiotemporal

continuum (Einstein 1956, Hawking and Ellis 1973, Misner et al. 1970).” Not only

this, but the “3-d spatial epiphany” in the form of entanglement is meaningful only if

the “epiphany=3-d cross-sectional spatial hypersurface” is actually a “holographic

boundary” of 4-d, since the “gravity effect” of the “Borromean temporal bond”

is global (i.e., not localizable anywhere). This necessitates the conceptual and

technical differentiation between the notions of “dimension” and “dimensionality.”

Given that the notion of dimension pertains to the standard notion of spatial

dimension, the treatment of time as a kind of 4-th dimension comes only after the imposition of metrical chrono-geometric relations. The “pre-metrical topological

notion of time” (from the standpoint of the “time-space of the present”) should be

thought of in terms of physical dimensionality, meaning an “unfolding dimension”

coming about via a process of temporal division (i.e., in the form of the ancient

Greek notion of dia-stasis). The notion of an “unfolding dimension” is captured

precisely by the algebraic-topological concept of a “covering space” or a “covering

scheme,” which is considered indispensable for the explication of the process of

“self-referential autogenetic unfolding.” (16-17)

**2.3 Multiple-Connectivity in the Time-Space of the Present**

The existence of the three different chrono-ontological formats constituting reality,

i.e. facticity, statu nascendi, and apeiron, from the standpoint of the “time-space

of the present” bears a distinguishing quality as a whole, only if “the past” can

be connected to “the future” in a multiplicity of possible ways according to some

scheme of “temporal division” or “temporal partition.” This should be thought of in

contradistinction to the sequential simply-connected ab initio connectivity pattern

of the “standard real-line event continuum,” which is based on the totally ordered

sequential structure of the real numbers. (17)

**2.4 The Notion of “Unfolding Temporal Dimension”**

**and “Covering Schemes”**

The notion of an “unfolding temporal dimension” (“dia-stasis”) pertains to all situations

that the “past” can be connected to the “future” in a multiplicity of possible

ways according to some scheme of “temporal division” or “temporal partition”

with respect to the “time-space of the present.” *The fundamental example of an*

*“unfolding temporal dimension” is provided by a spiral or helix that is unfolding*

*in a “snake-like manner.”* This can be visualized either as an “Archimedean screwtype”

of unfolding or as a “logarithmic screw-type” of unfolding, depending on the

periodic rule of temporal division, with two possible orientations. Alternatively, we

may simply think of a “topological chord” wrapped around a cone that is extended

to infinity, such that the particular type of wrapping is subordinate to a specific

rule of temporal division. In this case, the cone represents the time-space of the

present in “statu-nascendi” where the “temporal chords” are unfolding with respect

to the multiple potential connectivities appearing at the spatial epiphany of the

present. The latter is a *spatial cross-sectional projection of the spirally unfolding*

*dia-stasis, and clearly bears the topology of a circle. In this manner, an unfolding*

*spiral constitutes a “covering space” or a “covering scheme” of the epiphenomenal*

*spatial circle*. The simplest example is demonstrated below, where a spiral in “statunascendi,”

unfolding according to a constant periodic rule of temporal division from

the perspective of the “time-space of the present,” covers evenly the epiphenomenal

spatial circle. (18)

**[see my book 2017, in which we re-wrote Einstein’s both relativities without spacetime!!!! The same ideas in other words!!!!]**

The crucial idea is that “an imaginary dimension” constitutes the epiphenomenal

spatialized cross-sectional form of a genuine “temporal unfolding dimension” according

to the above, and this is precisely the *major characteristic that distinguishes*

*the notion of the “time-space of the present” from the notion of “spacetime.”* It is

a category mistake to treat an “imaginary dimension” as a “temporal dimension” in

the same footing like the spatial ones. An “epiphenomenal spatialized imaginary

dimension” bears an “imaginary unit” inducing “circular action by rotation” in

contradistinction to a “real spatial dimension” which bears a unit inducing “linear

extension in a specified direction.” (19)

Hence, we are in the case of an “imaginary dimension” conceived as the

epiphenomenal spatialized cross-sectional form of a genuine “temporal unfolding

dimension” projected at the factual level. This “temporal unfolding dimension” with

respect to the “time-space of the present” in “statu-nascendi” is brought about by

the upper bound in information signaling defined by the speed of light *c*, and thus,

it pertains to phenomena approximating that speed. Since the finitude of the speed

of light affects the metrical chrono-geometric relations at very high speeds, and

not the chrono-topological ones, the cone of unfolding of the “temporal chords” is

actually a “metrical light-cone.” In effect, this means that the “spirally unfolding

temporal dimension” is *degenerate topologically*, in the sense that the “winding

stairs of the spiral” are not distinguishable metrically, and thus, the potential of

multiple-connectivity between the “past” and the “future” is reduced only to the

possibility of branching with respect to the “time-space of the present.” (20)

* 1. **Autogenetic Perspective on General Relativity**

**[again see my book 2017 about rre-written Einstein both relativities!!!!**]

Thus, the spacetime metric, and therefore, *the chronogeometric*

*relations are not constant as the case of SR but become variable*. In

turn, the variability of the spacetime metric gives rise to the *observable spacetime*

*curvature* through which Einstein’s field equations are formulated. The important

thing is that due to the variability of the metric a standard of comparison is required

at each spacetime point. (23)

Consequently, as in the case of SR the “spirally unfolding

temporal dimension” is *degenerate topologically*, in the sense that the “winding multiple-connectivity between the “past” and the “future” is reduced only to the

possibility of branching with respect to the “time-space of the present.” The

important subtlety in comparison to the SR case is that *the rate of unfolding is*

*not constant between the “past” and the “future” with respect to the “time-space*

*of the present.”* As a consequence, if we consider the rooting at the same pointevent

in the “time-space of the present” of both the “past” and the “future” differing

in orientation, due to the differing rates of unfolding, the light-cone structure may

twist or tilt. At the “epiphenomenal spatialized imaginary dimensional level,” which

can be thought of as the “{*imaginarily spatialized time*}-{*real space*} *of the present*

*rooted at the same point-event*, *this discrepancy in the temporal rate of unfolding*

*between the “past” and the “future” appears as spacetime curvature*.

Conclusively, in the case of GR at the epiphenomenal level, *change of time*

*amounts to change of phase, but the rate of change is not the same for both “past”*

*and “future.”* Equivalently, “past” and “future” are not differing only in orientation

with respect to the rooting at a point-event in the present, *but they also differ in*

*relative phase that epiphenomenally appears as local metric curvature*. (23-24)

**2.7 Autogenetic Perspective on Singularities, Quantization,**

**Entanglement and the “ER=EPR” Correspondence (24)**

First, a “spirally unfolding temporal dimension” may be characterized by a more

elaborate type of cross-sectional projection in the “time-space of the present,” in the

sense that *change of time at the spatialized epiphenomenal level does not correspond*

*to change of phase with respect to a single imaginary dimension, but corresponds*

*to change of circle*. This happens when the “past” and the “future” do not differ

merely by a change in the rate of unfolding,which can be realized as a relative phase difference within the same “imaginary dimension,” but require *complementary*

*or conjugate “imaginary dimensions” in the “time-space of the present.” In this*

*case, change of time at the epiphenomenal level requires an appropriate process of*

*circle change, which can be interpreted as a higher-order connectivity or “temporal*

*bond.” (24-25)*

The subtlety is now that the *inverse transition from the statu-nascendi to the*

*factual level* does not happen in an unqualified manner, but requires measurement

processes of quantum observables, not all of which are simultaneously compatible

with respect to the “time-space of the present.” From the viewpoint of the previous

analysis, instead of an “imaginary spatialized time dimension” adjoined to 3-d

space metrically, what is required is *a multiplicity of non-simultaneously applicable*

*“contextual imaginary dimensions” adjoined non-metrically to 3-d space* (i.e.,

not as additional spatialized time dimensions) via spectral orthonormal bases

(or equivalently, spectral frames of projection operators) for the measurement

of observables. These “contextual imaginary dimensions” are in the relation of

*parataxis* with respect to each other. Each one of them instantiates the demarcation

of a non-metrical locality (i.e., a locality not based on the notion of distance)

in the “time-space of the present.” *It is precisely this independence from spatial*

*proximity and distance that allows the emergence of syntaxis and cohesion at a*

*higher connectivity level, i.e. the formation of “temporal bonds.”*

Thus, upon entering the quantum domain of discourse for dealing with the

chrono-topological relations pertaining to the singularities of GR in the transition

from the metricized event spacetime to the statu-nascendi, the inverse transition

can only take place *locally* or *contextually* by means of an arsenal of nonsimultaneously

applicable spectral frames for measurement.

The main claim in this interpretational framework of the autogenetic theory

is that *singularities open up multiple connectivity interfaces between the “past”*

*and the “future” at the “time-space of the present” in “statu-nascendi.”* Since the

realization of such a temporal connectivity interface becomes effective only on the

condition of topological non-degeneracy of the genuine temporal unfolding, and

therefore upon quantization according to the preceding, it can take place by thenon-metrical adjunction of “contextual imaginary dimensions” to 3-d s *(25-26)*

Note that the notion of a “contextual imaginary dimension” now is not playing

the role of an “imaginary spatialized time dimension,” but plays the role of an

“event horizon,” since the transition from “statu-nascendi” to the factual happens

always only via a spectral frame of measurement. In a nutshell, what appears

as a singularity at the metrical level of 4-d spacetime, forcing the transition to

the “statu-nascendi,” where quantization is invoked to account for the pertinent

chrono-topological relations, requires *the instantiation of an “event horizon” via the*

*adjunction of a “contextual imaginary dimension”* to facilitate the inverse transition

from the “statu-nascendi” to the factual level.

Following the understanding of a “contextual imaginary dimension” via the

notion of an “event horizon,” it is important to examine now how two singularities

can open up a “higher connectivity interface” between the “past” and the “future”

at the “time-space of the present” in “statu-nascendi.” A necessary condition for

such a type of “connectivity interface,” non-dependent on metrical proximity, is

that *the “two induced contextual imaginary dimensions” of the singularities are*

*“relationally conjugate” in the “time-space of the present,” so that they can be*

*cohesively glued together not in absolute pair-wise fashion, but only in modular*

*relation to the “present.”*

event horizons” can be amalgamated homologically in relation to the “present.” In

chrono-topological terms this type of “modular gluing” pertaining to the “present”

(in the “time-space of the present”) can be instantiated by means of a “holographic

boundary” adjoined to 3-d space at “present,” demarcating the “imaginary oriented

surface of cohesion” of the two corresponding “contextual imaginary dimensions.”

*It must be emphasized that the compatible fusion of the pertaining “contextual*

*imaginary dimensions” does not happen in spacetime, but refers to their modular*

*amalgamation with and with respect to the “present” in the “time-space of the*

*present.”* Taking into account the association of the former with quantum theoretical

spectral “event horizons” at the “statu-nascendi” level, it becomes transparent that

the “modular gluing” of these event horizons pertaining to the “present” is precisely

a process of quantum entanglement. In this manner, the “holographic cohesive

boundary” adjoined to 3-d space at “present” by this “modular gluing” constitutes

the *topological manifestation* of quantum entanglement.

Put equivalently, from an inverse viewpoint, quantum entanglement is the

expression of *modular amalgamation with and with respect to the “present”* of

two “relationally conjugate event horizons” (in the “time-space of the present” and

independently of any metrical proximity) in the form of a “holographic boundary”

adjoined to 3-d space at “present.” The crucial point here is that this “holographic

boundary” can function as a “higher connectivity interface” between the “past” and

the “future” with respect to their modular relation to the “present,” if and only

if it is *oriented*. It is precisely the orientation on the so demarcated “imaginary

boundary surface at present,” adjoined to 3-d space, that makes it a “temporally

synectic boundary” or a “holographic boundary of cohesion” between the “past” and the “future” in their “modular gluing” capacity to the “present.” *(26-27)*

The major objective of grasping conceptually this correspondence is not only to

demonstrate the potency of the implications associated with the notion of a “genuine

unfolding temporal dimension” understood autogenetically, but also to pave the way

for applying this framework to a novel theory of thinking, in particular, to a novel

approach to “decision making.” For this reason, it is worth attempting to transfer

these notions metaphorically in the field of “decision making” taking place at the

“time-space of the present.”

The conceptual grasp of the autogenetic notion of a “genuine temporal unfolding

dimension” via the algebraic-topological theory of “covering schemes,” together

with the crystallization of the idea that a “spirally or helically unfolding temporal

dimension” in the “time-space of the present” always gives rise, either, to an

epiphenomenal spatialized-time imaginary dimension at the metrical level, or, to

an arsenal of non-simultaneously applicable contextual imaginary dimensions at

the non-metrical level, provides an *optimal starting point* for this application. The

abstraction required to perform the metaphor properly is based, on the one hand,

in the preservation of the distinction among the *three chrono-ontological formats*

*of reality*, and on the other hand, in the appropriate utilization of the notion of

an “imaginary dimension” metrically or non-metrically, i.e. as a means of getting

adjoined to 3-d space and induce observable effects at the epiphenomenal level.

In the course of this problematics, we realize that the “backbones” of the

crucial ideas pertaining to SR, GR, and QG (quantum gravity), from the unifying

autogenetic perspective of a “genuine temporal unfolding dimension,” refer to

particular constraints imposed on “imaginary dimensions” at the “time-space of the

present.” In the first two cases, the constraints are of a metrical kind, whereas in

the latter case, the constraint is of a topological kind that forces the necessity of

quantization. To be more precise, the important idea is always to consider *a crosssectional*

*projection of a “spirally or helically unfolding temporal dimension” in the*

*“time-space of the present,” according to a metrical constraint (being constant as in*

*SR or variable as in GR) or a topological constraint*. Then, *this constraint induces* meaning is conveyed to the notion of “change of time” with respect to the “timespace

of the present.” This notion of “change of time” is fundamental, because it

pertains to the connectivity between the “past” and the “future” from the standpoint

of the “present.” What has been shown using the notion of applicable “imaginary

dimensions” arising through the pertinent constraints are the following:

(*α*) “Change of time” in SR amounts to “change of phase,” and this is the same

for both the “past” and the “future” differing only in orientation with respect

to the rooting at a point-event in the present. At the epiphenomenal spatialized

level this induces the non-trivial observable effect of “length contraction” in the

direction of motion;

(*β*) “Change of time” in GR amounts to “change of phase,” but the rate of change

is not the same for both the “past” and the “future.” Equivalently, “past” and

“future” are not differing only in orientation with respect to the rooting at

a point-event in the present, but they also differ in “relative phase.” At the

epiphenomenal spatialized level this induces the non-trivial observable effect

of “local metric curvature” associated with some “matter source,” and thus,

geometrizes the effect of gravity;

(*γ* ) “Change of time” in QG does not amount to “change of phase” with respect to

a single imaginary dimension, but amounts to “change of circle” with respect

to two complementary imaginary dimensions in connection with the “present.”

This is the case because the “past” and the “future” do not differ merely by

a change in the rate of unfolding, which can be realized as a relative phase

difference within the same “imaginary dimension,” but require “relationally

conjugate contextual imaginary dimensions” in the “time-space of the present.”

In this case, due to the capacity of “multiple-connectivity” between the “past”

and the “future” with respect to the “present,” “change of time” amounts to

a “synectic circle change” instantiated by the novel conceptualized process of

“modular gluing” with and with respect to the “present.” At the epiphenomenal

spatialized level, this induces the non-trivial observable effect of “quantum

entanglement” taking place at a “holographic boundary of cohesion” adjoined

to 3-d space at “present.” From then on, in order to distinguish the metrical

from the topological semantics of an “imaginary dimension” we will refer to

the QG-type of “change of time” as a “synectic cycle change.”

The aim of recapitulating the above differences among SR, GR, and QG, from

the unifying perspective pertaining to the *distinctive applied notions of “change of*

*time” via the adjunction of “imaginary dimensions” to 3-d space at the “time-space*

*of the present”* is the underlying realization that these notions can be transferred

outside the strict technical contexts of these theories by *abstracting the content of*

*the relevant constraints*. (27-28)

From the autogenetic perspective,

a “spirally unfolding temporal dimension” may unfold *outwards, inwards, and*

*multi-directionally*.Most important, it can be *subdivided* according to the “synthetic

unit” established by the formation of a “temporal bond” *modulo* the “present.”

Thus, the subdivision property, considered together with the quality of “relative

primeness” with respect to the “present,” characterizing seeds from the “past”

and “the future” entering into a “temporal bond,” leads to the conclusion that

spectral distinguishability relativized with respect to the pertinent “present” takes

place in the fashion of modular integer algebra, i.e. by the *residue modular system*

determined by “relative primeness” with respect to the “present” playing the role of

the “modulus.” (31)

Is there any way to visualize these relations at the epiphenomenal spatial level

referring to the “present”? For this purpose, we remind that we have to utilize

the device of “imaginary dimensions.” More precisely, we have to consider some

seed from the “past” and some seed in the “future” (in their capacity to enter

into a “temporal bond” at “present”) in their respective contexts of two nonsimultaneously

applicable “imaginary dimensions” adjoined non-metrically to 3-d

space. In this manner, a seed from the “past” with a seed in the “future” entering into

a “temporal bond” at present, and thus being “relationally conjugate with respect to

each other” due to “relative primeness” at “present,” can be visualized in terms

of the corresponding “contextual imaginary dimensions” being *transverse*, and

thus *complementary* at “present.” Then, their “modular gluing” with respect to the

“present,” upon establishment of the “temporal bond,” gives rise to a “holographic

boundary” adjoined to 3-d space at “present.” This “temporal synectic boundary”

of cohesion of the “past” with the “future” at “present” demarcates the “imaginary

oriented surface of cohesion” of those “contextual imaginary dimensions.” (32)

What is required for understanding more deeply this “holographic boundary

of cohesion” is to describe and visualize the action of “eliciting seeds” from the

“past” and the “future” at “present” in view of their power or capacity to enter

into a “temporal bond” in the “time-space of the present.” Since a “temporal

bond” is tantamount to gluing the pertinent “eliciting seeds” from the “past” and

the “future” in a “modular manner” with and with respect to the “present,” “the

present” should be thought of as an “Archimedean fulcrum” relative to these seeds,

or more precisely, relative to their respective “contextual imaginary dimensions” in

the “time-space of the present.” It is important to keep in mind that these “contextual

imaginary dimensions” of the “eliciting seeds” from the “past” and the “future”

should be thought *topologically* as *cycles*. (32)



**[Some of my EDWs viewed at the same time…]**

Thus, the “imaginary surface of cohesion” at the epiphenomenal spatial level is

equivalent to a torus bearing three punctures (corresponding to the aphaeresis of

three disks). This is a surface of genus one playing the role of the “holographic

boundary of cohesion” adjoined to 3-d space in the complement of the three

topologically linked cycles instantiating the “Borromean rings” at “present.”

The significance of this “imaginary surface of cohesion” caused by a “temporal

bond” is that physically it can be interpreted as a *“global curvature topological*

*effect” in analogy to the “local curvature metrical effect” associated with gravity*

*due to matter sources in the case of GR*. Not only this, but additionally, this “global

curvature effect” is the “least-action solution” to any physical or strategic problem

that requires a “higher connectivity interface” to glue modularly the “past” with

the “future” at “present.” How can we think of a simple way to visualize at the

epiphenomenal spatial level the instantiation of a “temporal bond,” implemented as

a “least-action solution,” and giving rise to such a “global curvature effect”? (38)

**4.1 On the Notion of Analogical Relations and Metaphors**

The notion of analogy will be considered in its broadest possible sense, namely

as a mode of reasoning or problem-solving in which a phenomenon, or a quantity,

or an object, or a class of objects, or even a category of objects, is intentionally

compared to another in order to establish similarity of relationship. Moreover, of the

two particular instances between which a resemblance (similarity of relationship) is

established, one is generally not directly comprehensible,while the other is assumed

to be better or more easily tractable. It is important to clarify that according to

the above, an analogical relation bears the semantics of a resemblance not between

instances, but between the relations of instances. Thus, an analogy is a resemblance

relation, involving (at least) two terms, each of which is itself a relation.

Hence, if assumed temporarily that the latter are binary relations between objects

(conceived set-theoretically), then, we obtain four terms constituting an analogical

relation. The four terms are being distributed in two distinct levels, two of the four on

each level. Furthermore, three of the four terms are assumed to be known or directly

measurable, or accessible, or more generally, determinable by some method, and the

purpose is to determine the fourth. (61)

………………………………………………………………………………….

Thus, an analogy, formulated as a relation among four terms distributed at two

distinguished levels, expresses a resemblance between two instances at the same

level, only within the context of totalities, or reference frames, or networks of

relations, conceived as corresponding individual instances at the other level. Note

that the unifying conceptual thread on all different manifestations of analogical relations is the following: Starting from a term at some level the determination of

an inaccessible term with respect to the first, at the same level, via a cyclical global

round-trip process through another level, involving three stages:

First, setting up an encoding multiplicative adjunctive bridge of correspondence

of the initial term with a reference domain, or gnomon, conceived individually at

another level. Second, processing or resolving the task at this other level. Finally,

devising a decoding bridge of correspondence, inverse to the multiplicative one,

that facilitates the return at the initial level and simultaneously resolves indirectly

the problem of direct inaccessibility.

Subject to the above observations characterizing the essence of an analogical relation,

resembling the algebraic transcription of the Thalesian theory of proportions

of magnitudes in a generalized conceptual setting, we may attempt to formulate an

analogy in the form of the following symbolic relation: (63-64)

…………………………………………..

In more general terms, the above algebraic localization structural metaphor is a

particular application of the logical conjugation strategy designed for the resolution

of a specific problem involving (at least) two delineated structural levels, and based

on the existence of a pair of inversely pointing bridges connecting these two levels,

as follows: First, by means of an extension bridge, encoding the information of

a structural domain into a new extended one assuming existence at a different

level. Second, performing the required task at that level by realizing an appropriate

equivalence relation, and subsequently forming the associated quotient structure.

Finally, by means of a reciprocal bridge, decoding the acquired information in a

structural form congruent to the form of the structural domain we started with,

according to the specification of the initial level. (70)

Initially, we assume that a set of elements, considered as an individual object

within the genus of sets (characterized by the membership relation), can relate to

itself by separation of a well-defined part of it, viz. a subset bearing the functional

role subsumed by a particular resemblance perspective. In turn, this resemblance

perspective can be applied to the extended object obtained from the initial object

by adjoining the distinguished part. Finally, using the quotient construction, we

collapse the extended object into a new partitioned object belonging to the same

genus. Of course, this is only possible if all of the following conditions can be

fulfilled: First, if the initial object can split its substance between two internal levels

or hypostases within the same genus, such that the latter, formed by extension

with respect to a part, is also an object of the same genus encoding the former.

Second, if the application of the resemblance perspective on the extended object

partitions it into equivalence classes, forcing in this way a homological criterion of

identity, or equivalently an indiscernibility relation with respect to this resemblance

perspective, at the same level. Thirdly, if the equivalence classes of the quotient can

be re-interpreted as elements of a new object of the same genus, being formed at

the initial level by identifying equivalent elements with respect to the resemblance

perspective.

It is significant to realize that an indirect self-referential relation, implicated by

logical conjugation within the same genus, accomplishes precisely the satisfaction

of the above conditions. This is possible by means of two inverse internal bridges

connecting these two separate levels of hypostasis into a non-contradictory circular

pattern as follows: the first bridge carries out the extension process of an object to

another level of hypostasis, being formed by adjoining to it a distinguished part,

delineated by the functional role subsumed under a resemblance perspective. At the

new level, an appropriate equivalence relation on the extended object implements

the functional role of the resemblance perspective, viz. implements a homological

criterion of identity. As a result, we end up with a partitioning of the extended

object into a set of equivalence classes constituted by indiscernible elements with

respect to the imposed criterion. Finally, an inverse bridge performs the transition

back to the initial level, by collapsing the extended object with respect to the

resemblance perspective, and thus, transforming the resemblance relation into an

equality (identity) of elements in the quotient set, formed back at the initial level. (71)

First, the ability to induce a meaningful stratification into different levels which

can be connected by means of encoding and decoding bridges. In the general

case, we may think of these levels as structural ones. The stratification may even

involve substructures of an initially given structure, delineated according to a

specific characteristic and adjoined to the initial structure, as separate levels. The

latter is particularly suited to the resolution of self-referential problems through a

cyclical conjugation process by means of the reciprocal and reflexive techniques of

descending and ascending.

Second, the ability to establish a relation of homology among the stratified levels.

It is precisely the ingenuity of a homological criterion that provides the seed for the

successful implementation of the logical conjugation strategy. Put differently, an

effective analogical relation or metaphor subsumed by logical conjugation requires

an appropriate criterion of homology among stratified levels in order to operate.

We point out that the notion of metaphor literally means transport. (75)

From the above, we deduce that what is crucial for the logical conjugation

method is the establishment of some appropriate homological criterion operating

among the stratified levels. Then, based on this homological criterion it becomes

more tractable to devise appropriate encoding and decoding bridges connecting

reciprocally all different levels and effectuating a metaphor process. It is interesting

to note that from the present viewpoint the notion of homology bears a logical

function although it is usually introduced and implemented via topological means.

At least, it is important to stress that a homological criterion is independent of

local metrical spatiotemporal distance notions. For this reason, it can operate nonlocally

or among different scales. The ubiquity of a homological criterion is that it

establishes some particular measure of invariance among the stratified levels. This

measure can be expressed as an arithmetic invariant, like a ratio or a fraction, or

even in structural terms like a group or groupoid. The essential thing is that interlevel

connectivity, or simply a process of metaphor, requires a homological criterion

in order to be expressed via the logical conjugation strategy and conversely.

In standard mathematical terminology, what we call a homological criterion

appears in a variety of different formulations, which are unified conceptually from

our perspective. This unification is facilitated by means of logical conjugation and

its net effect, which is metaphor according to some qualification, and ultimately

as an effective means of copying with complexity and self-reference. (76)

What is required is a relativization of facticity, which leads inevitably to a

novel account of time and reality.More precisely, the structural reduction of time to

its linear-sequential aspect and the concurrent reduction of reality to its factual or

event-like aspect is inadequate to account for critical processes related with folding

into or folding out of the factual portrait of reality. Thus, the problem of singularities in General Relativity may be accessed effectively from this conceptual angle under

the proviso that these enfolding/unfolding processes can be qualified by suitable

means, enforcing a relativization of the factual level with respect to a statu-nascendi

level. These means give rise to distinctive categorial frameworks distinguishing the

statu-nascendi level from the factual level. (129-130)

**In more detail, the theory of autogenesis introduces a threefold scheme constituted**

**in the form of three interdependent layers, which are connected together in**

**the form of the linking properties of the Borromean rings, that is if any one of**

**the layers is removed, then there remain two unlinked layers. Each layer captures**

**a different aspect of reality, namely the apeiron aspect, the statu-nascendi and**

**the factual aspect correspondingly. The apeiron aspect is inherently without any**

**structure and expresses the irreducible global unity or non-separability of reality at**

**this layer, which acts as a potential source for the actual taking place. The latter**

**should involve both the statu-nascendi and the factual layers. The statu-nascendi**

**should be better considered as a kind of a non-Boolean logical disclosure topos**

**pertaining to the time-space of the present. As such it incorporates the logical or**

**topological pre-conditions for relativizing the semantics of events at the factual**

**level. It becomes visually informative to think of this relativization of facticity in**

**terms of some self-referential process which either folds into or inversely folds out**

**of the factual layer. In this manner, the factual aspect of reality is constituted by**

**the observed traces of this process, viz. the events embedded within a local spacetime**

**context. Whereas the apeiron aspect is not amenable to any direct structural**

**predicative determination, both the statu-nascendi and the factual aspect constitute**

**layers whose respective characteristic function can be depicted in the terms of**

**distinctive underlying categorial frameworks.**

Each categorial framework stands for an integral apparatus consisting of four

interrelated and bidirectionally interdependent components: (a) a logical structure

of a predication space, (b) a related notion of a spatiotemporal context, (c) a causal

scheme accounting for linkages, and (d) a corresponding epistemological setting.

In this way, the factual aspect of reality is captured by means of a categorial

apparatus, which consists of the following components respectively: (a) a Boolean

logical predication space, (b) a local metrical space-time continuum, (c) a classical

scheme of efficient causality, and (d) an epistemological setting based on the

notion of absolute separability between observer and observandum. The intrinsic

necessity of introducing another categorial apparatus constituting the statu-nascendi

layer of reality is based on the inability of the former one to account for the

logical structural phenomenon of strong self-referentiality and its concomitant

operational manifestation as autogenesis, meaning a process of self-referential

folding/unfolding without any separable external cause.

The constituent bidirectionally interrelated components of the statu-nascendi

layer are the following: (a) a paratactical predication space on which some appropriate

form of constellatory logic becomes applicable, (b) a local logical disclosure

topos pertaining to the time-space of the present, (c) a causal scheme of autogenetic

folding/unfolding, and (d) an epistemological setting of strong self-referentiality.

The notion of parataxis refers to a mode of logical coherence of a multiplicity whichis independent of linear sequential organization. This is captured by the functional

role of a constellatory logic, where an individuated component of such a multiplicity

can be evaluated only in the context of all other components being compatible with

it in a suitable manner.

Therefore, from the perspective of the theory of autogenesis, the problem of

singularities in General Relativity targets exactly the global breakdown of the

metrical smooth space-time point-event-manifold model of this physical theory.

Thus, it proposes to understand the means of folding out of the local space-time

event continuum pertaining to the factual layer of reality via consideration of the

categorial apparatus pertaining to the statu nascendi level. We stress again that

the categorial apparatus of this level is indispensable for enforcing a higher-order

relativization of facticity, which addresses the very notion of a local perspective on

reality.

It is clear from the preceding that the nature of this notion, that is of a local perspective

on reality, should not refer to the concept of geometrical locality in a global

point-event manifold. In contradistinction, it should be of a logical/topological

origin demarcating the logical structural pre-conditions that will allow us to perform

indirect self-reference via the statu-nascendi associated with the signification of

folding into and out of the factual level. This higher-order logical/topological

relativization of facticity provides legitimate mathematical modeling means to

exemplify the notion of categorial relativity, related to the function of the categorial

apparatus of the statu nascendi level in the context of the theory of autogenesis. **(130-131)**

**[UNBELIEVABLE similar ideas to my ideas!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!! it is about EDWs, no more or less!!!!]**

The existence of topological links, like the Borromean link, may be thought of as a

form of topological entanglement. From the other side, one of the basic distinguishing

features between classical and quantum systems is the phenomenon of quantum

entanglement. Thus, there arises the natural question if there exists any type of

correspondence between the forms of topological and quantum entanglement. (143)

Therefore, in the case of the double slit experiment, what distinguishes different

pairs of oppositely oriented based loops at the specified reference vertex *\_a* is the

existence of two potential filters *Pψ*1 and *Pψ*2 , which cannot be simultaneously

realizable. Equivalently, the differentiation may be considered by means of their

respective two-valued local Boolean frames of potential position measurement

according to the above. Thus, if we take into account the bijection between an

observable (or its associated Boolean frame) and its corresponding continuous oneparameter

unitary group of transformations, we reach the following conclusion:

A pair of oppositely oriented based loops at a specified reference vertex should

represent the action of a continuous one parameter unitary group at this vertex.

Moreover, since Boolean frames are solely used for localization, the representation

of an observable as a self-adjoint operator should be considered locally,

that is with respect to the local Boolean frame it refers to. In particular, the

position observable is resolved differently with respect to the local two-valued

Boolean frames generated by the filters *Pψ*1 and *Pψ*2 correspondingly, such that

these resolutions cannot be simultaneously realizable. Hence, the action of the

position observable in relation to the potential filters *Pψ*1 and *Pψ*2 at the specified

reference vertex *\_a* gives rise to two different pairs of oppositely oriented based

loops at *\_a*, where each one of them represent the action of a continuous

one parameter unitary group at this vertex in relation to the distinguishability

induced by the corresponding filter or its associated local two-valued Boolean

frame.

The previous discussion, in relation to the double slit experiment, has served the

purpose of introducing the proposed representation of a continuous one parameter

unitary group action at a vertex by a pair of oppositely oriented loops, which

are based at this vertex, as well as the criterion of differentiation among such

pairs of based loops according to the localization properties of local Boolean

frames. What is particularly interesting by this change of perspective is that

there immediately appears the possibility of composition of different oriented

loops based at the same vertex. (162)

**[nothing more than EDWs!!!!!!!!!!!!!!!!!!!!]**

In the absence of an exact quantum gravity theory, the “ER = EPR” conjecture

constitutes a recently introduced proposal by Maldacena and Susskind (2013),

aiming to shed light on the relations among spacetime geometry, quantum field

theory and quantum information theory, which is receiving significant attention

currently in relation to its substantiation, proof, and groundbreaking implications.

The “ER = EPR” is a short-hand that joins two ideas proposed by Einstein in 1935.

One involved the quantum correlations implied by what he called “spooky action

at a distance”, referring to the phenomenon of *entanglement* between quantum

particles (EPR entanglement, named after Einstein, Podolsky, and Rosen) (Einstein

1935). The other showed how two black holes could be connected “non-locally”

via “topological handles” in space-time, known as “wormholes” (ER, for Einstein-

Rosen bridges) (Einstein and Rosen 1935). If the conjecture “ER= EPR” is correct,

then the ideas of quantum entanglement and wormholes are not disjoint, but they

are two manifestations of the same essentially topological idea. Effectively, this

underlying *connectedness* would form the foundation of quantum space-time.

More precisely, the “ER = EPR” conjecture is grounded in the context of *duality*

between a gravitational theory formulated in the bulk and a quantum field theory

formulated on the boundary, targeting the correspondence between ER bridges or

wormholes and entanglement. In a sense, the “ER = EPR” conjecture implicates on a

cosmological scale that a complex network of entangled subsystems of the universe

as a whole is also a complex network of ER bridges. In particular, since ER bridges

refer to the connectivity between black holes, the “ER = EPR” conjecture implies

that *black holes connected by ER bridges are entangled*, and also conversely that

*entangled black holes are connected by ER bridges*. (171)

Intuitively, the criterion of locality is associated with what can be *spectrally*

*distinguished, and thus localized*, by means of the orthogonal projections belonging

into the simultaneous resolution of all observables forming this commutative subalgebra.

Technically, the orthogonal idempotent elements (orthogonal projections)

of this commutative subalgebra of observables constitute a local Boolean frame.

Each local Boolean frame has the structure of a complete Boolean algebra of

orthogonal projection operators obtained by the simultaneous spectral resolution of

a complete set of compatible observables—represented as self-adjoint operators—

with respect to a complete orthonormal basis of eigenstates. We stress that all

possible observables cannot be simultaneously measurable with respect to a single

universal global logical Boolean frame as is the case in all classical theories

of physics. Thus, there exists a multiplicity of potential local Boolean frames,

where each one of them stands for a context of co-measurable observables. In

this way, each local Boolean frame provides spectrally the localization means for

the probabilistic evaluation of all the observables belonging into the associated

commutative algebra. Thus, the evaluation of every single observed event in the

quantum domain requires taking explicitly into account the specific local Boolean

frame with respect to which the corresponding observable is localized. (200)

The essential aspect of entanglement phenomena, besides the explication of a

situation where the behavior of the whole is not reduced to the behavior of its parts,

or else, that the whole ismore than the sumof its parts, is that the parts do not assume

an individuation or localization independently of the whole. Put differently, there

exists a *mutually implicative bidirectional relation* between the parts and the whole,

being reminiscent of a topological structure called a sheaf.

To avoid a diversion into

sheaf theory, it is enough to point out that the notion of a part (i.e., what is called in

standard terminology a subsystem of a composite system) becomes definable only

by means of localization of the whole, which is observable-induced in the quantum

domain and expressed via local Boolean frames (criterion of locality).

After this brief comment, and keeping up with the usual terminology employing

the notion of subsystems of a composite system, we point out the possibility of

assigning a notion of *partial state* to each of the subsystems [1] and [2], although

each one of them does *not* possess an individual, separable state, independently of

the state of the composite system. (204)

However, it is important to realize that the reduced density operators *ρ*1 and *ρ*2

are *not* sufficient to determine the *probabilities of pairs* of correlated events between

the two subsystems. These pairs of correlated events are implied by the entanglement

of the states of the composite system if we consider *compatible local actions*

of the subsystems, meaning measurements which can be performed by *compatible*

*observables* of subsystems [1] and [2]. Equivalently, correlations between events of

the subsystems can be observedwith coincidencemeasurements performed between

compatible local Boolean frames within some Boolean localization system of the

composite system corresponding to these compatible observables. The condition

of local Boolean frame compatibility between observables of the subsystems [1]

and [2] means that, given the reduced density operators *ρ*1 and *ρ*2, they constitute

*restrictions or localizations* of some pure state of the composite system only if their *eigenvalues* are identical with respect to these compatible Boolean frames. (205-206)

In the physical state of affairs the entanglement-correlated pairs of events usually

refer to some *conserved* physical quantity like charge, energy, momentum, or spin

orientation of the composite system in relation to its subsystems (corresponding

to some specified observable of the combined system) and persist *irrespective* of

the metrical distance between the subsystems. It is important for the understanding

of these entanglement correlations to emphasize the significance of the locality

criterion in the quantum domain pertaining to the crucial role of compatibility

between local Boolean frames (with respect to which events occur by measurement

of corresponding observables) in Boolean localization systems. This is the case

because entanglement correlations *cannot be reduced* to correlations between

assumed pre-existing states assigned to the subsystems before the occurrence of

events (with respect to their corresponding local Boolean frames).

In this manner, we realize that the criterion of locality in the quantum domain

should be invoked explicitly in the analysis of quantum entanglement. More

precisely, it is instructive to summarize the main points as follows:

1. The notion of a quantum subsystem becomes spectrally distinguishable, and thus

localizable, only insofar a *complete Boolean frame* is designated corresponding

to the measurement of some observable and followed by the registration of some

observed event. In particular, the notion of a subsystem before the existence of

some observed event should be thought of as a *potential locality*, which under the

designation of some Boolean frame acquires the interpretation of a *probability*

*function* (via its partial state description) for the evaluation of event-probabilities

pertaining to the realization of this subsystem as a reference linkage among

observed events referring to the corresponding observable;

2. The separation of a composite system into subsystems does not correspond to a

partition of a system into subsystems with respect to their corresponding density

operators pertaining to their partial description. The only consistent description

is via the *algebraic (sheaf-theoretic) operation of restriction or localization of*

*the algebra of observables* of the composite system into appropriate subalgebras

of observables corresponding to potential localities (subsystems) which can be realized only after the designation of local Boolean frames. Intuitively, these

subalgebras contain only observables which are “visible” by the so designated

subsystems, distinguished in this way only after the appearance of concrete

events. Furthermore, the observable-induced localized spectral distinguishability

of subsystems within a total system, for example of the subsystems [1] and [2]

according to the preceding, is effectuated by considering observables of the form

*A*

[1] ⊗ 1[2] and 1[1] ⊗ *B*

[2] within the algebra of observables of the total system;

3. The observable-induced localized spectral distinguishability of subsystems

within a total system allows an understanding of entanglement correlations

between the subsystems under the condition of *compatibility* between their

corresponding local Boolean frames within a Boolean localization system of

a total system. The condition of compatibility means that given the reduced

density operators *ρ*1 and *ρ*2 in the case of two localized subsystems, they

constitute restrictions of some pure state of the composite system only if their

eigenvalues are identical with respect to these compatible Boolean frames.

Reflecting on the above, we conclude that the notion of entanglement or

non-separability pertaining to the description of a composite quantum system

with reference to its localized parts and conversely requires to take seriously

into account the *intrinsic relativity* of this notion with respect to the depiction

of certain *compatible local Boolean frames distinguishing the subsystems* and

corresponding to compatible observables. (206-207)

*actions of observables on the boundary and using the “ER=EPR” correspondence*

*in this generalized setting*. More precisely, we already know that if we consider

a maximally entangled pair of two parties, then a local action of an observable

of any of them corresponding to an observational procedure of a complete set

of commuting observables (and thus, incorporating the criterion of locality in the

quantum domain) carried out by a third party leads to a GHZ-type of entanglement,

which in turn corresponds to the Borromean linking property. Therefore, by

applying the “ER = EPR” correspondencewe can instantiate a Planck scale Einstein-

Rosen bridge that links three circular singular boundaries and defining a closed and

nowhere dense subset of an open set of *S*3. This can be extended to the bulk, so

that we obtain a closed and nowhere dense subset of an open set in the bulk bearing

the property that its restriction to the boundary forms a Borromean link. Clearly the

same procedure can be employed for higher order links given that all of them can

be constructed in terms of Borromean building blocks. In this setting, the singular

loci in the bulk form closed and nowhere dense subsets with respect to an open

set in the bulk. Moreover, *local actions of observables can be partially ordered,*

*which corresponds to an ordering of the formed link components*. The pertinent

problem now is to construct *distinguishable extensions of the smooth model of the*

*bulk entering the quantum gravity regime using the obtained partial order of forcing*

*conditions*. (209)

**[My conclusion: MANY UNBELIEVABLE similar ideas to my ideas (2008-2014 + 2016, 2017) referring to my EDWs, Einstein’s both relativities, quantum mechanics (entanglement, etc.), the relationship between Einstien’s general relativity and quantum mechanics!!!!!!**

**In 2008, UNBELIEVABLE similar ideas to quantum mechanics; in 2014, 2016, and 2017 - unbelievable similar ideas to Einstein’s both special and general relativity; in 2014, 2016, 2017, unbelievable similar ideas to the relationship between Einstein’s general relativity and quantum mechanics, etc. etc. etc.**

**All their ideas are written using mathematical and physical notions (old or invented by them), but their ideas are UNBELIEVABLE similar to my ideas (in philosophy and Physics)… Just another (“complicated”) language, the same framework, the same ideas….]**