Fragment 36   # THE FOUNDATIONS OF AUTOPOIETIC SYSTEMS THEORY

Autopoiesis is the theory of living systems. An autopoietic system is self-organizing, literally self-producing. It is necessary to understand the taxonomy of all possible systems which includes the autopoietic system and its refinement into the reflexive autopoietic system that appears as the epitome of sociality. Unless we have a means of classifying all possible systems, which includes the classes of the living-cognitive and the reflexive autopoietic systems, then it is difficult to understand how autopoietic systems fit into the category of systems constructed by general systems theory. General systems theory treats systems as objects. We have realized that systems must be treated not as objects, but as gestalts, i.e. showing and hiding processes. We have identified autopoietic systems as a special class in which the self-grounding of transcendence of Being is exemplified. This is a lost possibility which was outlined by Plato in his Laws. It occurs at the point just before the collapse of Primordial Being into the artificial unity of conceptual Being. These mechanical systems appear to

be analogous to life and intelligence in their emergent qualities. This is based on the fact that, like the Esher waterfall, they are neverending perpetual motion machines. We have gone on to show that there is a special class of autopoietic systems which are reflexive that embody sociality, and it is the reflexive autopoietic system that is the fundamental embodiment of the social, of the city in its primordial formation. As such, it has the form of emergence itself, and thus it does not suffer from emergent events. It has a meta-stability within the world because it is the source of the world, and when harnessed, becomes the foundation of the Uni-verse. But these postulated special kinds of systems, which are more than gestalts but embody the structure of meta-systems and worlds, need to be differentiated from the kind of system that is a gestalt and from objects contained in systems or the primitives that make up objects. We need a systems theory that allows us to distinguish clearly between these different kinds of systems and those elements that do not have the attribute of systems but appear within systems. Systems are the expression of wholeness that the Indo-European tradition continually strives after once it has shattered the wholeness of natural complexes. To understand the expression of the Indo-European worldview in our own time, we need to have a clear notion of the different kinds of systems and the meta-level structures that appear on the basis of systems. This

means we need to establish the foundations of autopoietic systems theory which is a specialization of general systems theory that deals with the specialized systems and meta-systems that appear as possibilities within our worldview and are associated with life, intelligence, society and all the emergent levels that are the expression of our own nature as Indo-European humans who have broken and tamed the world bending it to our own view of things. Understanding how these systems appear in our world, is to gain some measure of self-understanding. Self-understanding is the obverse of self-organization which can only appear at the level of the manifestation of the reflexive autopoietic system.

Let us begin with B. Fuller's definition of the minimal system. Here we shall only deal with minimal systems because we are interested in the simplest possible manifestations of the phenomena we study in autopoietic systems theory. Fuller suggests that a minimal system has at least four elements overlapping their duration in their spacetime manifestation. We call these elements eventities which signify that they are both objects and events within the primary process of manifestation. The four overlapping eventities may be viewed in many different ways, and our autopoietic systems theory is a taxonomy of the ways in which they may be viewed.

A point made by Penrose in his book on spinors is that 4pi is the minimal movement that can be thought of as being stationary in spacetime. Any movement less than 4pi, or standing still, can be seen as a movement. But a 4pi movement can be seen as the same as not moving from all intertial reference frames. This means that the minimal system is actually a reification of points that are fixed in four dimensional spacetime. It means that a minimal system is the simplest thing that can look the same in all inertial reference frames by all observers. The minimal system is intrinsically intersubjective by the fact that it participates in all possible frames of reference. So when we look into the minimal system, we are looking into the social or the intersubjective in its simplest manifestation within the Uni-verse.

STAGE ONE

The very first way that the relativistically stationary points may be viewed is as isolated independent units. Charles S. Peirce would call these Firsts. Firsts are anything that can stand alone without relation to other things. Thus, the first way we can view the eventities of the minimal system is as having no real relation to each other. We elect to not relate the eventities that make up the pieces of the minimal system. As such, they are pure data or pure events. We might call them infotons. They

do not yet form a pattern. In fact, we are suppressing their patterning and treating them as independent isolated units. In essence, they are each minimal systems themselves, or else they could not be seen. Only minimal systems manifest so that anything that is less than a minimal system is an abstraction from or a dissection of a minimal system. But if we refuse to see the relation between the eventities of the minimal system, then we are treating them as a plenum of pure data or pure events. In systems engineering, it is requirements that have this nature. Each requirement is an aphorism that expresses a need or desire of the customer. Ideally, all requirements are perfectly orthogonal. Thus, requirements appear as Firsts -- independent isolated units. But in the case of requirements, they are expressed as linguistic statements. Minimal systems need not be made up of linguistic statements. A good example is Wittgenstein's book Zettel, which is basically a box of clipped statements from other manuscripts. Zettel presents us with a universe of statements which are independent of each other, floating together like a cloud of aphorisms. They are the best indication of the insanity of Wittgenstein. In fact, it is in the Firsts, the isolated requirements that express desire, that we see the schizophrenic foundation of society manifest that Deleuze and Guattari speak of in Anti-oedipus. Requirements express desire and need. They are the fragments of desiring machines -- not yet

machines, not yet systems or networks of desiring machines, only the effervescing expressions of desires arising out of the void. Firsts appear directly out of the void. They manifest, popping out of nowhere as an expression of desire or need. We see them as a cloud of particles acting under the statistical laws of thermodynamics like a perfect gas. They spread to fill the whole of space. They are everywhere we look. Sensations, sensory data, virtual particles or infotons are manifesting everywhere, pouring out of the void, producing a pure plenum of desire which fills the world.
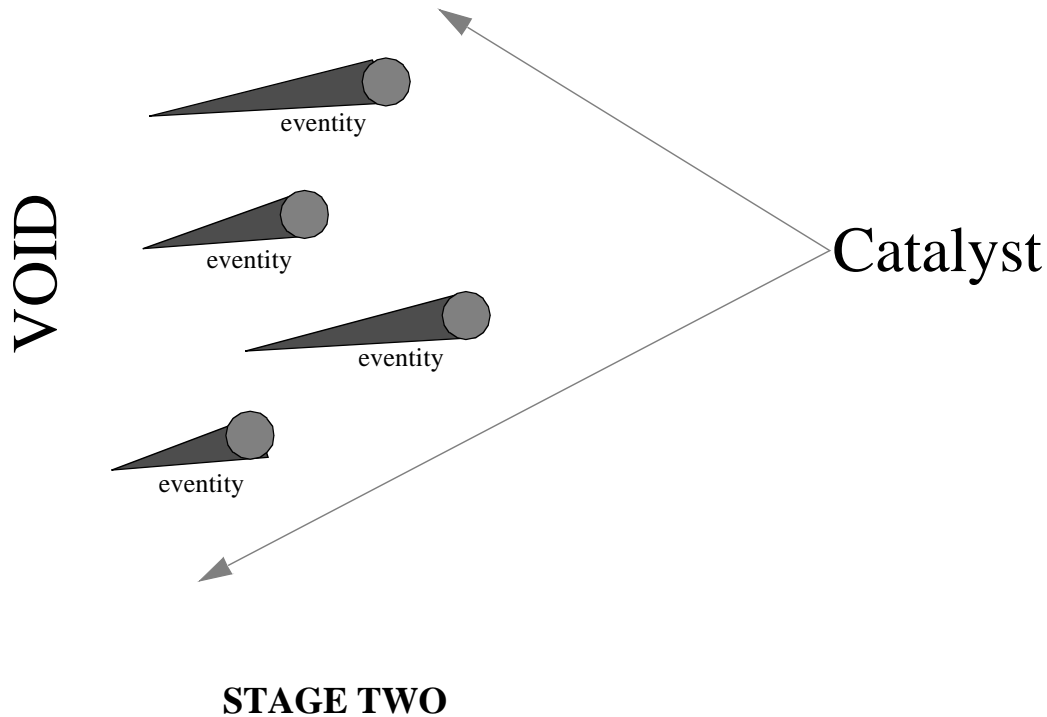
We can take a point of view on phenomena that sees the outpouring of Firsts from the void. That viewpoint has been called the Catalyst. It is called the Catalyst because it does not itself interact with the Firsts, but serves to cause them to change into the primitive, object, system, meta-system, world, etc. by successive transformations. We can see the relation of the Catalyst viewpoint to the eventities of the minimal system considered as Firsts in terms Husserl's concept of the "intentional morphe" organizing the "hyle" of sensation. This is the idealist (Kantian) view that transcendental subjectivity organizes the noumena into phenomenal objects. We must conceive that the eventities are pure content which is formed by the will to power of the transcendental subject in an act of domination. Instead, we take a different view

which concedes that there is a fundamental viewpoint on minimal systems that is inherently disordered. That is to say, it has access directly to the schizophrenic undercurrent upon which all the primitives, objects, systems, etc. float. It is the writhing of spacetime itself at the micro-level where virtual particles are created and destroyed within the limit set by Plank's constant. But this appears only as schizophrenic to the repressive regime. The Catalyst sees it as an outpouring of the cornucopia of variety. Human beings are variety producers. This variety manifests, and upwells from the void. It is the Catalyst viewpoint that sees this upwelling. It is the positive side of the essence of manifestation. As Deleuze and Guttari say, the unconscious, or body without organs, may have various intensities. Its zero intensity is the practico-inert or matter. Substance is the hiding place of the essence of manifestation. It is the source of all interference and resistance within the world. But this pure immanence may also appear at the other extreme of its intensity as the cornucopia of the upwelling from the void of a myriad varieties of partialities. When I say I am partial to something, I express a desire. This is the upwelling of independent isolated desires which is the substrata of sensation. As sensation draws us in to notice it, we then expresses the obverse of our desire flowing out toward the world. The Catalyst viewpoint sees this upwelling of desires and all

the partialities which we interpret as pure data and pure events. They flood in on us and overwhelm us, and it is through them that we get some intimation of the overwhelming of primary process, i.e. manifestation. The Catalyst viewpoint will eventually become one of a set of viewpoints on existence, and in relation to those other viewpoints will have its related set of minimal methods. But at this stage, the Catalyst viewpoint has no minimal methods; it is merely the witnessing of the upwelling of Firsts from the void. This viewpoint has no basis for thinking about the firsts that are appearing. Because logic has not yet appeared, there is nothing on the basis of which to produce relations. This viewpoint can only contemplate or witness what appears to it. It is purely reflective, not in the sense of reflexive in which thought thinks about itself, but in the sense of reflecting, like a mirror, what appears before it. In reflecting the phenomena that appear, the Catalyst has an effect on that which appears. It is not a transcendental subject, a metaphysical illusory continuity, but instead is that which, by its presence, causes a transformation in which it does not participate within the realm of the sensations themselves. In fact, we eventually realize that the unity of the Catalyst is the nihilistic opposite of the ignored relations between eventities of the minimal system, and that the forcing of the eventities to become minimal systems is a repression that hides the minimal system by

distorting it into four minimal systems and the unity of the Catalyst viewpoint. In fact, when we return to viewing the minimal system without repressing its inner unity, we see that it is unnecessary to produce the nihilistic opposites of the pure sensation and the perceiver of that pure sensation. The nihilistic opposites are really repressing the unity of the natural complex of the minimal system. We see that the Catalyst viewpoint is an artificial construct that appears because of the repression which turns the eventities of the minimal system into pure events and pure data -- infotons. But then, all the viewpoints on the minimal system are artificial constructs, and so this should not deter us from seeing their importance. The production of perspectivalization is the action of active nihilism. The Catalyst viewpoint is only one of a set of fundamental viewpoints we will discover in our articulation of the fundamental taxonomy of autopoietic systems theory.

FIGURE 75

STAGE TWO

When we stop repressing relation in the natural complex of the minimal system of eventities, then the first kind of ordering that appears is partial ordering. Partial ordering means that the converse of a posited relation may not hold. Thus, we see the eventities of the minimal system in terms of a series of one-way relations where any one relation does not imply any other relation. It is a web constructed on a case-by-case basis between the set of eventities. This web is an expression of the will to power. It expresses dominance of dualism in which one element lords over another (women, barbarians, slaves, children, etc.), establishing one-way power relations. Partial ordering expresses calculus of domination under

dualism. Dualism expresses the transcendental movement which is summarized by Conceptual Being. Here in Husserl's terms, we see the first appearance of noesis and noema as combinations of formative powers and content. Noesis is where formative aspects are emphasized over content as in ideation, while noema are where content aspects are emphasized as in perception. At this stage, we recognize that the separation of subject and object as pure sensation is a false dichotomy, and that these two are always intertwined. Here we see the single Catalyst viewpoint split into two very different viewpoints. There is the viewpoint which is associated with intention which is called functional. And on the other hand, there is the viewpoint which is associated with autonomy which is called the agent. These two viewpoints see the eventities of the minimal system in two different lights. The Functional viewpoint sees the eventities in terms of the transformative processes they embody. The Agent viewpoint sees them in terms of something that may be indicated as having independent existence. It has already been made clear that the Functional viewpoint expresses the ready-to-hand modality and grasping, whereas the Agent viewpoint expresses the present-at-hand and pointing. Both of these are differentiable meta-levels of Being. They both arise here together at the second stage of our systems theory. They may be seen as the splitting of the Catalyst

viewpoint which witnesses pure primary process (manifestation). For the Catalyst viewpoint, conceptual Being is an indivisible whole. With the advent of these two additional viewpoints, the possibility of secondary process appears. Secondary process is intentional and is carried out by existent eventities. Here the difference between essence and existence becomes clear. The functional is related to the essence of the eventity. Agency is related to the existence of the eventity. To the extent that the eventity is purely present, it can be singled out as an Agent. To the extent that the eventity is a transformative process, it can be singled out as a function. Its functionality tends to show how it is related to other eventities. Its agency tends to emphasize its independence and isolatability from other eventities.

The introduction of partial ordering also allows us to consider the minimal system as a lattice. A lattice helps us express the nature of all the partial ordering one-way relations. Thus, we can see that a tetrahedron, the geometrical representation of the minimal system, is primarily a lattice structure. The tetrahedron is a lattice with a structure of 1-4-6-4-1 as it appears in Pascal's triangle. The partial ordering relations taken together can be represented as a lattice. But because partial ordering and lattice structure work together, it is possible to produce a hierarchy out of the eventities based on both of
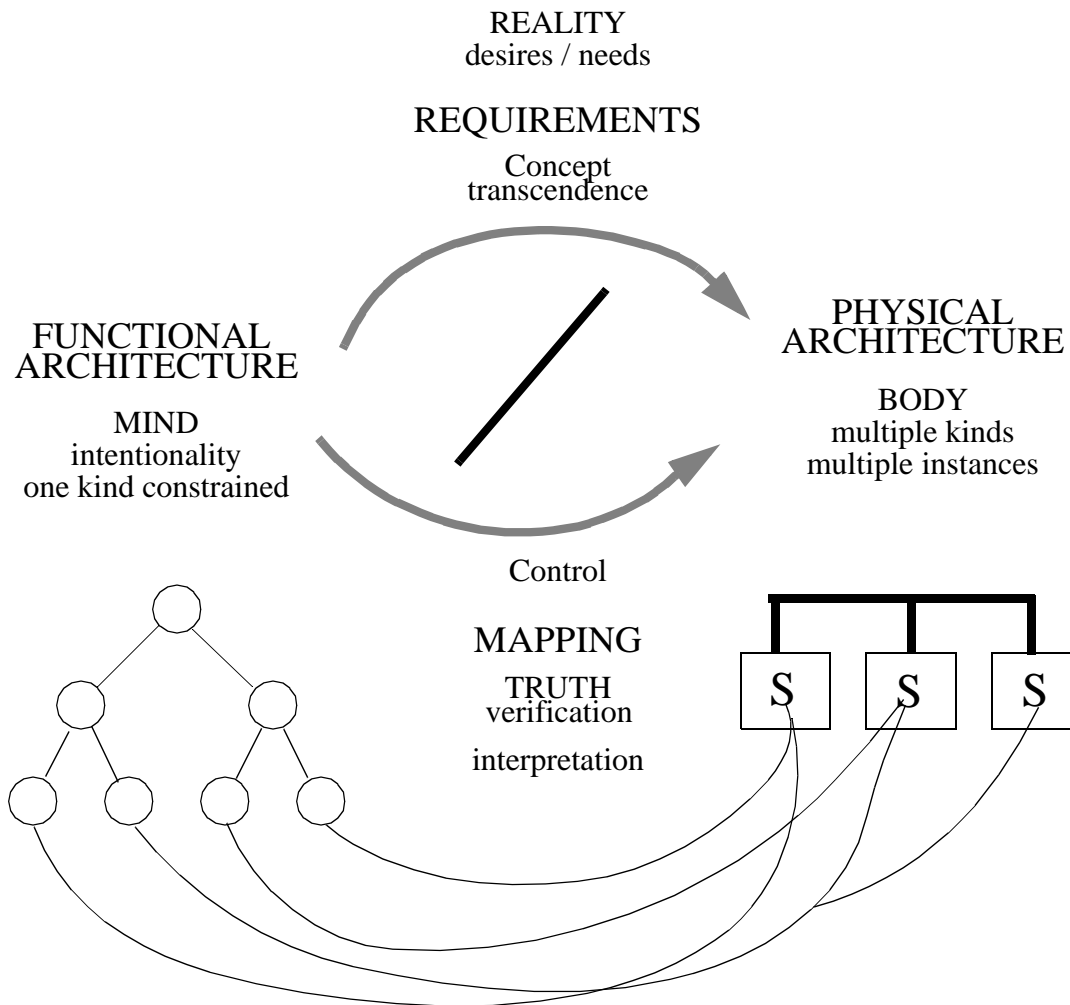
these structures. The hierarchy is the primary expression of dominance as a static structure. In the lattice, we work through all the possible relations between the eventities. All the possible relations gives us a lattice structure that organizes the eventities of the minimal system in total. But the hierarchy is not reducible to just a set of binary relations. Thus, we encounter here what C. S. Peirce calls Thirds. Thirds are when significance is generated as a by-product from sets of dual relations. It is of interest that we jump here directly from Firsts at stage one to Thirds at stage two. The hierarchy has some information which is not captured by a mere list of all its dualistic relations. The hierarchy is a pattern. The pattern has significance. That supplement of significance, or relevance, cannot be captured by the set of binary relations. There is always a third dimension which is generated when the relation is made. Peirce makes this point, and we re-emphasize it here. When the pieces as Firsts are arranged into a pattern, some significance is produced which goes beyond the information given. But what we realize is that this is the entry point of the third thing. We realize that as soon as the relation as a partial ordering appears, we have logic and the syllogism. Here we have entered into the realm of the flaw which connects everything together on the surface with a web of outward relations that depend on secondary causation. The upsurge from the void is covered over by the web of

connections produced by ideation. The Third is the action of ideation which connects the eventities of the minimal system. The Third is the illusory continuity being actively maintained. As soon as any connection is made, this illusory continuity manifests, and we see it as the ability to discriminate sources of secondary process within the primary process. The locus of secondary process is located by looking for autonomy and transformation, i.e. agency and functionality. We see the eventities of the minimal system as parts, even though we do not see the whole yet. We see them as parts as the action of ideation discriminates them in relation to each other.

In systems engineering, we see a fundamental pattern which relates the three viewpoints so far enumerated. The Catalyst viewpoint is that which isolates Requirements. The Functional viewpoint isolates the Functional architecture of the system. The Agent viewpoint isolates the physical architecture. As has been explained in an earlier essay, these are tied together with a set of mappings that express their truth. The requirements establish the connection with reality as linguistic statements are mapped to desires and states of affairs. The functional architecture stands in for the mind as the physical architecture stands in for the body in a dualism that asserts the dominance of transcendence.

The hierarchy of functions are mapped to the hierarchy of agents which are, in turn, mapped to the requirements. Those requirements may be either functional, performance or physical in nature. Also, there is a mapping of functional architecture elements to hardware and software -- that is to technology or meta-technology. The interworking of the three viewpoints together gives us a picture of the will to power of transcendence. This is the advent of the Third thing as a "Third" -- a generated significance -- the production of illusory continuity by ideation. The systems engineering process embodies this in the production of designs. Production of designs is more fundamental than factory production. It is not who controls factory production that is crucial. What is crucial is who controls the means of production of designs. Engineering is the place where new product innovation occurs. Control that, and you gain the technological edge, which is what counts. The real competition is over patents. Patents generate streams of revenue which you do not have to do any production to capture. Other people do production and license the technology from the inventor.

FIGURE 76

REALITY
desires / needs

REQUIREMENTS

Concept
transcendence

FUNCTIONAL
ARCHITECTURE

PHYSICAL
ARCHITECTURE

MIND
intentionality
one kind constrained

BODY
multiple kinds
multiple instances

Control

MAPPING

TRUTH
verification

interpretation

S   S   S

We are now in a position to appreciate the nature of the autopoietic system.   The autopoietic system fuses autonomy and intentionality.   It intentionally organizes itself as an autonomous unity.   When functionality and autonomy are separate, then one has an allopoietic system which must have been produced by an autopoietic system. Autopoietic systems embody secondary process, whereas allopoietic systems embody tertiary process.

The fused agent and function viewpoints are not the same as the Catalyst viewpoint. The difference is between the inside and outside of the autopoietic system. Whatever is outside the autopoietic system is seen as an onslaught of perturbations. Thus, the Catalyst viewpoint sees the arising of these perturbations and their impact on the autopoietic system. The fused functional and agent viewpoints sees the closed inside of the autopoietic system which is independent of all the perturbations by arising Firsts. The fused function and agent viewpoint views the inside of the autopoietic system as a single unbroken continuity which cannot be breached from the outside, and to which anything happening on the outside is irrelevant. The whole focus of the autopoietic system is to perfectly align the functionality of the system with its embodied autonomy. In fact, its function is to remain autonomous by imposing its functions upon its autonomous parts, rendering them a unity. As we move from stage to stage, we will see how this is accomplished. However, it is interesting that the definition of the autopoietic system is implicit in the structure of the three viewpoints which appear when the very first kind of relation between the eventities of the minimal system can be defined.

The functional and the agent viewpoints are intimately involved with language. Were the Catalyst viewpoint

witnesses meanings arising out of the void, these later viewpoints are directly connected with the expression and embodiment of significance as in natural language. Function expresses significance, and Agency embodies significance. Significance appears in the relation between diacritically related things. This is another way of talking about the apprehension of their functionality. But significance must be embodied through signs. The signs have their own life as icons, which in some way must have a material component that gives them independent existence and some measure of persistence, if only fleeting. So for example, words have a function within a grammar which confers and regulates their significance within lkanguage. Words also have a significance in speech as concrete embodiments of significance in a particular context. Many times, words stand in speech alone and only have meaning in relation to this context. Speech can also be the site of the emergence of grammar and the words themselves. When the grammar and the words are mutating and evolving, we get some access to meaning beyond significance. When the function and the autonomy of the words merge and fuse, we get poetry. When the grammar and the words begin to mutate, the poetry breaks down into aphorisms which are the first expression of philosophy. Poetry looks only to its own form, whereas philosophy looks beyond the form of the poem to the world in which

the poem relates. Philosophy and poetry belong together as the Same. The fusion of function and agent within the autopoietic system belong together with the Catalyst viewpoint which looks at what is beyond the autopoietic system. The ring of the autopoietic system produced by the advent of the Third floats within a cloud of Firsts that to it are merely perturbations.

Stage Three

When C.S. Peirce formulates the concept of the Third, which is seen by him as a fundamental category that goes beyond logic, he also posits that there is no further category needed[1]. B. Fuller, on the other hand, posits a further category which we may call, following Perice's terminology beyond his usage, Fourths[2]. Fuller calls the category synergetics. Synergy is the interweaving of parts into a whole where each part has multiple uses within the unity of all the parts and which produces a whole greater than the sum of its parts. In systems engineering, that whole is called the system concept. In software engineering, it is the non-representable software design. It arises as a dialectical synthesis between the Functional Architecture and the Physical Architecture. It cannot be captured directly. So at this stage, there appear

1. See Robert. W. Burch, A Peircean Reduction Thesis: The Foundations Of Topological Logic (Lubbock, TX: Texas Tech U.P., 1991)

2. Synergetics I & II

two kinds of ordering which are duals of each other. There is linear ordering in which any relation has an inverse. As its dual is partial ordering with distance which adds a metric to the partial ordering which says how far apart the ends of the partial ordering relation are as an additional piece of information. These dual methodological distinctions arise at the same level and are the means by which the synergetic concept of the minimal system is framed. Here the minimal system may be seen as either a set of linear relations or as a set of partial ordered relation with distance or a mixture of the two. Through this mixture, the synergetic concept, which is a wholeness greater than the sum of the eventities that make up the minimal system, is defined.

At this stage, we get objects appearing. Objects are shaped forms. They are not two dimensional like hierarchies, but three dimensional. The object may be designed. It is the addition of a metric or of reversible linear relations that allow that design to be effective. Dynamic objects are machines. Machines require design where a set of parts are combined in a particular way which allows them to function. Autopoietic systems are machines that organize themselves. Autopoietic systems are four-dimensional machines that may be perpetual, unlike three-dimensional machines.

The system concept has two aspects: a selection of significant dimensions and a motif. The set of significant dimensions collapses the design space to concentrate on its most important aspects. The motif is a meta-pattern or template from which candidate concrete designs might be produced by varying parameters along significant dimensions. The system concept appears as an eidetic intuition in Husserl's terms beyond the noematic nucleus of the minimal system. Thus, here we see the place where essence perception arises, and what Peirce calls abduction. We step outside the logic of the standard syllogisms that allow induction and deduction and see that the syllogism has a third form which was not considered relevant in antiquity, but can be seen to be the basis of projection of the scientific hypothesis. Peirce pointed out this third form of the syllogism, and used it to construct his pragmatic logic that relied on abduction. Husserl, in a similar move, pointed out that essence perception allows us to understand things without induction or deduction, but by direct apprehension. The system concept is just such an abduction or essence perception. But it is ineffable, so that it can only be represented on the basis of techniques which have a categorical cardinality (in Peirce's sense) between the Thirds and Fourths. We can guess that the categorical cardinality of these techniques is about three and a half. They are based on the duals of Linearity and Partial

Order with Distance. In terms of software engineering methodologies, these are the minimal methods called Mapping and Virtual Layered Machine. Here, mapping that appeared as the link to truth in the systems engineering process is explicitly defined. The inverse of the mapping is the concrete representation of the combined functional and physical architecture as a layered machine. The machine must have an abducted or directly intuited design that is its core. Machines are embodied theories, as Persig has said. So here, at this third stage, the machine which is designed appears at the same moment that the means of mapping is defined. The design occurs through the advent of the dual minimal methods. Other methods bridging between other viewpoints will appear at the next stage of the unraveling of this systems theory.

The concept appears when the minimal methods as defined by the methodological distinction duals are brought into close juxtaposition. But they will tend to collapse into full ordering at which point the abductive possibility will vanish. The application of linearity and partial ordering with distance to the same eventities allows this juxtaposition to occur. Here we can see that linearity has an affinity to that part of the system concept that appears as a motif or template. Partial ordering with distance has an affinity for the part of the system concept

that appears as the selected significant dimensions. This is because distance introduces a spatial metric by which dimensions may be defined. As long as these two dual methodological distinctions are held together yet apart, the system concept can appear. As soon as they collapse into a full ordering, then the system concept as an abduction or eidetic intuition vanishes. The illusory continuity of full ordering covers over their possibility.

Seeing the designed object or machine as a conceptual whole is not yet seeing it as a system. To be a system, it must have a showing and hiding apparatus as well as a mechanical apparatus for movements of parts. The design concept is like the embodies mind as the mechanical aspect is like the body. Thus, we see that the mind/body dualism established at stage two appears again here at stage three in another guise. Here the synthesis of Thirds into a Fourth dominates the machine as an assemblage of parts, giving it a static formal-structural wholeness.

Stage Four

At the next stage, full ordering appears as the combination of linear order and distance. This is where the real number system with its algebras and geometry appear. Here the minimal system appears geometrically

as a tetrahedron, the simplest form and algebraically as a set of four simultaneous equations with four unknowns. Here what Godel called an "arithmetic," which was an algebra combined with a logic, also appears. Godel's proof holds sway here where he shows that the combination of algebra and arithmetic (or geometry for that matter) cannot be reduced to any axiomatic system. Full ordering has an implicit and hidden flaw which is seen with the advent of the transcendental numbers. These are real number sequences that are infinite and cannot be generated by any function. At the very point where full ordering appears, it is undermined by the weakness of its algebra (or geometry) which does not allow axiomization and the appearance of irrational numbers (square root of two) and transcendental numbers (pi).

Full ordering is the production of illusory continuity. It is with real numbers that the possibility of the calculus becomes a reality. Without the real number, you could not integrate or differentiate. The real numbers allow you to approach infinity or infinitesimally in increasing or decreasing increments. Full ordering is the epitome of the present at hand. In real numbers, we can model dynamic systems as systems of differential equations. Both continuous and discontinuous functions may be modeled with precision. In the real number system, not

only are relations reversible, but you have a metric that allows you to know how far apart the related elements are in space or time or both. Here spacetime as an envelope appears. This envelope which encompasses the eventities of the minimal system can be viewed as a place-temporality (x+y+z-t) as spacetime, or in terms of causality as Minkowaski timespace (past-present-future + nowhere). Given these two views, when the actual elements of space and time are broken apart, we get two further viewpoints called Data and Event when related to computation which sees memory and cpu cycles. The advent of these two viewpoints, when added to the viewpoints of Function and Agent, gives us ten more minimal method bridges which have already been described in an earlier essay. There is an unreconcilable gap between the fully ordered viewpoints and the partially ordered viewpoints which the minimal methods attempt to bridge. The full set of the minimal methods give us a means of modeling the behavior of the dynamic system. Thus, when we move to this stage, we are now able to model the behavior of the minimal system fully even though we cannot fully capture its design concept. These models capture exactly what occurs in real space and time as modeled with the real number system. They cannot fully capture the functioning of the designed machine as built which only approximated by either the continuous or discrete modeling. The built machine is a

combination of continuous and discrete aspects -- like a lave (wavicle, wave/particle). Our models of systems are always caught between these two different horns of the modeling dilemma. Our models are projected upon the illusory continuity of the real numbers which give us an infinity of points between any two points along with reversible relations and a metric.

It is at this stage that the system appears as a showing and hiding apparatus, which is to say a gestalt. The minimal system appears upon the surface of the real space as the tetrahedron floating in the endless homogenous three-dimensional space. But that tetrahedron really has three different ways it appears within that three-space. It also appears as a minimal knot, as a torus, and as a mobius strip. Notice that the knot is made up of a one-dimensional self-interfering closed strand with 720 degrees of angular change. Notice that the mobius strip is a two-dimensional surface with one twist that makes it so it only has one side and one edge globally, though it appears to have two sides and two edges locally, and it too embodies 720 degrees of angular change. Notice that the torus is a solid closed form in which there exist two circular components at right angles which also embodies 720 degrees of angular chance. The tetrahedron is also a solid, but can be viewed as a set of surfaces or lines or even just four points where all the elements are equal

length or size. It, too, embodies 720 degrees of angular change if you add up all the angles of its triangular faces. Four pi is a crucial threshold of complexity which has appeared before in this set of essays. The point is that the minimal system has several different faces. It has different geometrical embodiments. But we may also view it as a lattice which appears from one and differentiates and then returns to one. The tetrahedron is a special threshold of complexity in interrelated concepts. The geometrical interpretations are emphasized by us because of our Greek heritage. The Greeks emphasized the concrete representation of conceptual thresholds as objects in real space which we map as a gloss to the lived space of our lifeworld. This is a way to separate ourselves from our own lived space, and objectify it as a flat metricized container. The showing and hiding of the system presents us at different times the different views of the minimal system on the surface of real space. We do not necessarily recognize that it is really the same threshold of complexity appearing differently in different contexts. As a form, we see the different views as orthogonal to each other. It is only when we look deeper that we see the structural relation that says that these are all expressions of four pi self referential change. Thus in real space, we see that the minimal system that embodies possibilities built into that space is both formal and structural simultaneously. Thus, the minimal system is

the simplest combination of formal elements into a structural configuration. This same kind of juxtaposition can be seen in the bringing together of logic and arithmetic to compose a system that cannot be reduced to axioms. The difference between the terms of reference for the four views of the minimal system that renders them orthogonal and non-commensurable is exactly the same that introduces the non-reducibility of arithmetic combined with logic to axioms. It is the same kind of structure that makes non-rational and transcendental numbers a possibility within the real number system. We think of the real system as transparent, but in fact, it is opaque. It is opaque because the views of the minimal system in geometry are non-commensurate despite a clear deep structural relation. It is opaque because algebra and logic cannot be reduced to axioms. Algebra is an expression of the relations between elements in real space or Seconds. Logic is the expression of Thirds. The non-reducibility to axioms of algebra and logic together is more evidence of the split between the partially ordered viewpoints and the fully ordered viewpoints. It is from the vantage point of the functional or agent viewpoints that we see the deep structural connection between the views of the minimal system. It is invisible within geometry itself which would see these as unrelated geometrical forms. But when we compare how they function to each other, and then compare the basis of their

autonomy, we see the deep structural linkage around the locus of four pi. We see that transcendental numbers also are points in the grid of real numbers that cannot be produced by any function. They are autonomous variety producers that go on to infinity. There are certain aspects of the real numbers that can only be seen from the vantage point across the gap which divides them from the partially ordered viewpoints. The real numbers embody Seconds from Peirce's categorical vantage point. They are the epitome of pure relations which are metric and reversible. They are relations that let you know exactly where you are. Relations that make you feel safe. But little do we think that these Seconds are really illusory continuities projected on our lifeworld. Little do we think about the nature of the opacity of the real numbers that allow us to model so exactly spacetime relations between the minimal system of eventities. Here we see the cluster of eventities within the realm of special relativity and Minkowaski spacetime. Each eventity has its own inertial frame of reference. In computing, this appears as the necessary lack of a global clock in a distributed system. It is of interest that Seconds appear last of all. Relations are artificially contrived and must be built up in a series of steps. If we reverse those steps, we enter the substrate of the production of the illusory continuity by ideation.

THE FOUNDATIONS OF AUTOPOIETIC SYSTEMS THEORY

The autopoietic machine must appear in a spacetime region. This is part of its definition that it must be embodied. So we see that each layer of the increasing power of methodological distinctions leads us from one aspect of the definition of the autopoietic system to another. The autopoietic system is fused function and autonomy. It views the rest of the universe beyond its boundaries as perturbing firsts. It is a designed machine and, in fact, it imposes its design on itself in an act of self-organization. And it inhabits a neighborhood of spacetime which gives it an embodiment. The definition of autopoietic machines is implicitly a definition of the autopoietic machine. But we need to go beyond this to understand the operation of the autopoietic machine. Because up to this point, we can merely see how the autopoietic machine is defined in opposition to the definition of the allopoietic machine. By understanding the extension of the taxonomy of the methodological distinctions by the kinds of hyper complex algebras, we can also understand the operation of the autopoietic system and the true difference between it and the allopoietic machine.

It has been shown as we went along how the first two meta-levels of Being became points of view at stage two. It would be good to look at that point again now that we have reached the threshold of the production of illusory

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continuity or ideation. The threshold of illusory continuity is a pure plenum in which all real numbers are equally available. It is the analog in the mathematical realm of Pure Presence or Being[1]. The ability to pick out any number at will and indicate it was associated with autonomy and agency. The indicator and the indicated may be seen as agents. But the realm within which indications are made is the plenum of pure presence or equi-availability. When we make a calculation within that realm using arithmetic or algebra, we are grasping and transforming some numbers into other numbers using functions. Arithmetic does calculations directly on real numbers, whereas algebra does these operations on virtual numbers or variables. Holding a number within a variable is the epitome of grasping. Algebra does the manipulation, and it is logic that determines whether the calculation or manipulation of equations is correct. Algebraic formula can express states of affairs that are not true. Without Logic Algebra does not connect with reality. It is the combination of Algebra and Logic for which Godel's proof holds. Logic sets the standard for the manipulation of equations. That manipulation follows the proof process. But when we attempt to reduce the Algebraic system that includes logic to a series of First principles, the proofs fail. Axioms are Firsts. They, like Requirements, are independent isolated unproven aphorisms. If Logic could ground Algebra in

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axioms, it would be providing its own ground. It would be an example of transcendence grounding itself -- termed by M. Henry: Ontological Monism. The Thirds of Logic would use the Firsts of axioms to capture the Fourth of the Algebraic system that contains many equalities or Seconds. Thirds would be dominating Fourths by using Firsts and Seconds. If this were possible, then Fourths could be reduced to Thirds, then Seconds and ultimate Firsts. Fourths are non-representable and non-reducible to Thirds, Seconds, or Firsts. In fact, each Peircian category has its own sui generis reality. There is no reduction within the series. That is why there is a series. Now Algebra is a Third as well as Logic. Logic is a Third because it uses syllogism. Algebra is a Third because it intersperses operators and equal signs. The simplest formula is *A op B = C*. This is a triangular relation between the two terms and the result, using the operation and the equality sign to structure the three part relation. Thus, we notice that we have a structure like that in the discipline of systems engineering with Functional architecture and Physical architecture where two Thirds emanate from a First. In both the case of Logic and Algebra, there are certain axioms necessary to formulate the basic relationships in the formal system. Out of there two working together arises algebraic mathematics as a whole. The process of simplification or theorem proving, which are opposites, are where Process

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Being enters the picture. Process Being produces the temporal gestalt of the proof which includes time that cannot be represented in the formal system. The fact that the two Thirds working together cannot produce the Fourth is what necessitates the existence of the structural system. The structural system takes into account time. It explains the leap from proof step to proof step. It gives a picture of the system as a whole which is temporalized and bridges the gap between the two Thirds. The best example of a structual system is the General Systems Theory of George Klir. The best example of a formal system is <u>Laws Of Form</u> by G. Spencer-Brown. But as the Thirds stand independently of each other, we see that the Structural system cannot really bridge the gap. It can only offer explanations of the underlying structure. It does not have proofs that are strong like the Thirds are able to produce. The Fourth is a whole defined by the Thirds and explained by the Structural system. That whole is not reducible to its parts, and so Godel's proof holds. The fact that Godel's proof holds, shows us that another kind of Being enters the picture between the two proof structures (the proofs of Algebra and Logic itself). That third kind of Being is called Hyper Being or Being^3. It can, in fact, be seen as the cancellation of the two Thirds with each other. This happens when it is realized that the two thirds are, in fact, nihilistic opposites. But at first it is just a foreboding which appears as Godel's

proof. Once it is realized that the formal systems that work together to try to dominate the Fourth have no foundation and that Being cannot ground itself, then the set of formal systems begin to unravel. We realize that Algebra and Logic are inverted images of each other, and they begin to cancel as functors between concepts appear and we realize that any formal system has the same basic structure regardless of content. Multiple formal systems cannot dominate a Fourth. The most that can be done is the production of structural explanations. But proofs cannot be done in structural systems, only in formal systems. Structural systems are like our minimal methods. They are at some fractal level of methodological distinction between Three and Four. In the depths of the structural system is a gap that cannot be breached between explanation and proof. This gap is the hiding place of the Essence of Manifestation -- pure immanence. Pure immanence hides within the process of manifestation. The discontinuities between the steps of the proof are somehow absolute. This is why new things can come into existence. We can always innovate in our proofs, and the system of Algebra and Logic is somehow cracked so that new configurations are always possible. This crack shows up in the complexity of Real space. Real space has structure implicit within it. This implicit structure, along with the many infinities that inhabit Real space, make it a wild region. Thus, we get a hint of

where Wild Being or Being[4] enters the picture. After the cancellation of the two Thirds, what is left is the implicit structure of the Real numbers and their infinities. They are opaque instead of transparent. When we begin living in this transparency, then we see that there is more in the designated-as-real world than we could have ever hoped to capture with our formal-structural system. In fact, the formal-structural system is an attempt to suppress this upwelling of variety where, for instance, we see that the torus, know, mobius strip and tetrahedron are all the same thing from different kinds of view. We separate mathematics into narrow specialities, but seldom look for the crossover between these specialties that have significance. Category theory provides some relief to this by establishing the ability to create functors between separate categories, and thus see isomorphisms. In fact, we notice that our Catalyst viewpoint, once it connects with the other viewpoints, attempts to establish these connections. It attempts to establish all the relations or all the embeddings of a particular kind of viewpoint. So we see the Catalyst as the positive aspect of the negativity of the Essence of Manifestation. The Catalyst sees the outpouring of variety as positive instead of negative. All possible embeddings and relations between all four viewpoints is the ultimate interference pattern of manifestation itself. From out of that interference pattern, virtual particles arise only to be destroyed again

by cancellation. In the clouds of those particles, many phantoms appear only to disappear as the patterns are seen as not merely random. The patterns are schizophrenic. This is because we are not used to apprehending meaning. We are only used to projecting significance and repressing meaning. If we stop frantically projecting in our anxiety about the groundlessness into which we are falling, then we would see that the meanings have a subtle pattern of their own when undistorted by the repression. That pattern weaves together the Well and the Tree into a single image. The upwelling of the logos is the growth of the physos. The Chi which comes from us and from outside us is unified and lays down a single pattern or Li.

Stage Five

At the point that we have constructed the illusory continuity of the real numbers, we must switch to another way of looking at the structure of systems theory. We switch from looking at it in terms of methodological distinctions to looking at it in terms of algebras. As far as algebras go, there are a finite number of possible algebras that approach the power of the algebra that manipulates the real number system. We are actually talking now about generating the complex numbers as an addition to the real numbers. With the complex numbers, we

generate the dual of the real number system. That dual, like the mobius strip, has a twist in it analogous to the geometrical twist but which defines the singularity i. I is the token that indicates the difference between the imaginary numbers and the real numbers. There is, in fact, no real difference between the numbers as such, but instead, the significant feature is the group which allows $i^2 = -1$. This twist allows the quadratic equations to be solved for their roots. The group structure of the complex numbers has the structure of rotations in four dimensional space. Thus, the move that adds imaginary numbers is similar to the move that posits higher than three geometrical dimensions. It is an appeal that calls for synergy. Here, synergy appears as the twist that allows quadratic equations to be solved, and it also appears as the reuse in higher dimensional platonic solids of lines and points to produce very complex polytopes with a relatively small number of lines and points. The imaginary space, and the fourth or higher dimension, is the place where the synergy of the Fourth is realized. Thus, when we move into that realm we are entering a region in which "synergy" is the by-word, and the inability to reach synergy by the formal-structural system is left behind.

Now we posit that there is a kind of system that exists at this level beyond the formal-structural system suspended

in Real space. That kind of system is the Dissipative system. It has been defined by Prigone and discovered to exist in chemical processes. The dissipative system comes in two forms corresponding to the left and right twist of the mobius strip. Either it is a system that pours entropy out of the system into the environment, thus creating order within the system, or it pours entropy out of the environment into the system. The first example is the neg-entropic dissipative system. The second example is the catastrophic system which is disintegrating into the environment. The dissipative system thrives on the basis of catastrophe either way. The setting up of the boundary of the dissipative system may be seen as a catastrophe from the viewpoint of the environment. The dissipative system is an anomaly that stands against the current of thermodynamics. It is like having water flow uphill. It can occur in special circumstances, but it is a fairly rare occurrence.

We will relate the possibility of the dissipative system to what might be termed the openly-closed system. Dynamic systems modeled in the Real space may be seen as either open or closed. But we will define a system that is closed but at the same time open. It is closed in the sense that nothing crosses its external boundary. However, it is open inwardly instead of outwardly. This is possible because for a given system we can posit that it

has several structures that define its inward articulation within the limits of its form. These different structures do not exactly match eachother because of Godel's proof. This means that no one structure can reduce the formal system to a solid axiomatic foundation, so that each of the different structural explanations interfere with eachother and, taken together, leave singularities of unexplained anomalies within the framework of the overlapping structures. These singulatities are open, and certain influences arrive there from nowhere. In ancient times, these were known as oracles. Today we may call them liminal areas. But the system is open to higher dimensional influences through these gateways. These gates are analogous to the singularity i. They are analogous to the higher dimensional spaces. We can see this kind of structure in the work of Victor Frankl on meaning. We can see that this is exactly what Husserl found in relation to Kant's metaphysical system. Kant laid down some rules for what is admissible to reason, and thus created a closed system which described ideation. Ever since that point, all the philosophers attempted to get outside the Kantian system without crossing the boundaries he laid down as sacrosanct. In the end, it was Husserl who managed to do this by inventing another dimension that is not accounted for in Kant's metaphysic. Husserl can cross in and out of the Kantian base system without crossing the boundary, but

by subverting it in a way that does not directly violate its integrity. The openly-closed system is a model of this kind of higher dimensional bypass. We say that neg-entropy occurs in the dissipative system, and that it orders itself. But no one asks where that order comes from. Order pours into the system from where? We know disorder pours into the environment from the dissipative system, but we do not know where the order actually comes from. Well, it comes from the flaw in spacetime which is the interface between spacetime and higher dimensional spaces or between the real numbers and their mirror image. Order flows from a singularity. In the case of Plato's Laws, it is the lawgiver who is a singular human. In the case of dissipative system, it is from a catastrophic twist in the chemical structure that produces the seed of the pattern which comes to dominate within the boundary of the system. Each dissipative system has a special boundary. That boundary acts as a filter, allowing only passage one way or controlling the passage of materials between the system and the environment in more complex asymmetrical ways. The asymmetry is seen as the notion that the mobius strip has only one side globally but two sides locally. And the same is true of the edges. This asymmetry, which allows one boundary to play two roles at any given point, is the basis of filtering which allows the entropy to flow one way and not the other. The singularity at the center that allows order to

rush into the system is balanced by the filtering boundary that allows entropy to pass but conserves order. The singularity at the center of the openly-closed system and the twisted boundary work together to define the regions of the inside and the outside of the system in terms of the nihilistic opposition of too much order and too little order.

We notice that the fifth stage is opposite the third stage in the unfolding of the methodological distinctions. We note that the formal-structural system cannot capture the Fourth of the system concept that arises as a synthesis out of the two thirds of algebra and logic. At most, the formal-structural system, by applying different structures, can define the singularities within the aggregate that embodies the whole. Then the Fourthness, as order, pours in upon the aggregate from the singularity and thus gives it a wholeness greater than the sum of its parts. The formal-structural system is the opposite of the dissipative system. The dissipative system is a simple neg-entropic dynamic which is equivalent to the rotations in four-dimensional space that can together make possible perpetual motion. The complex twist, the mobius strip, when set in motion, gives us a stable dynamic base that does not exist in ordinary dynamical systems. That stability comes form the appearance of reversibility of the motion around the singularity. The complex numbers are

a very special representation of the interval with its phases. The real part is one phase, and the imaginary part is the other phase of this interval. Here the interval is built into the deep structure of the algebra and not just posited as part of the features of the numbers themselves. Complexity completes the formal-structural system by introducing the interval's reversiblitiy into the structure of the algebra. This lets us see that systems with multiple overlapping structures may become openly-closed, and thus have sources of order within them. These sources of order are seen by the Catalyst viewpoint. But to the formal structural system, they are merely nodes of pure immanence, of what can never appear which, like the unconscious, orders conscious contents through the action of differing and diferring of DifferAnce.

The complex algebra is a halfway house between the system and the meta-system. It is not clear if it deserves its own ontological emergent category. It is a system and not yet a meta-system. But what is important is that it is a system with a very special dynamic. It cannot be said to order itself. Instead, order appears from nowhere at the center of the dissipative system and spreads within its boundary. Entropy moves through its filtering boundary and disorders the environment more than it might normally be to compensate for the addition of order form nowhere inside the system. The difference between too

much order inside the system and too much disorder outside is a nihilistic opposition that is important to note.

Logic appears at this level in some of its characteristics. The double negative is a similar kind of structure $\sim\sim X = X$ is analogous to the $i^2 = -1$ (transposing symbols $-->$ $\sim^2 i$ /1= i /1; this is not to say that these symbols are meaningful, but only that the elements are isomorphic for a reason). We add to this the ability of logic to prove, based on impossibility and the excluded middle, and we have the strong conventional logic which is equally as blind as it is strong. We see that the kind of logic that belongs at level four is intuitionistic logic that does not allow proof by impossibility and perhaps that tempered by reconsideration of excluded middle. But our conventional logic, which we owe to Aristotle, definitely fits at this fifth stage of our unfolding systems theory. So when the algebra is connected to the logic in Godel's proof, we are actually getting some cross talk between the pure Third of Algebra and conventional logic, which are at different stages. But then again, we can see that Algebra has the reversible structures of multiplication and addition where $1^2 = 1$ or $0+0=0$. We note that it is this difference between the operations of addition and multiplication that the complex numbers are meant to solve. A negative multiplied by a negative gives a positive. The complex allows negative numbers to be
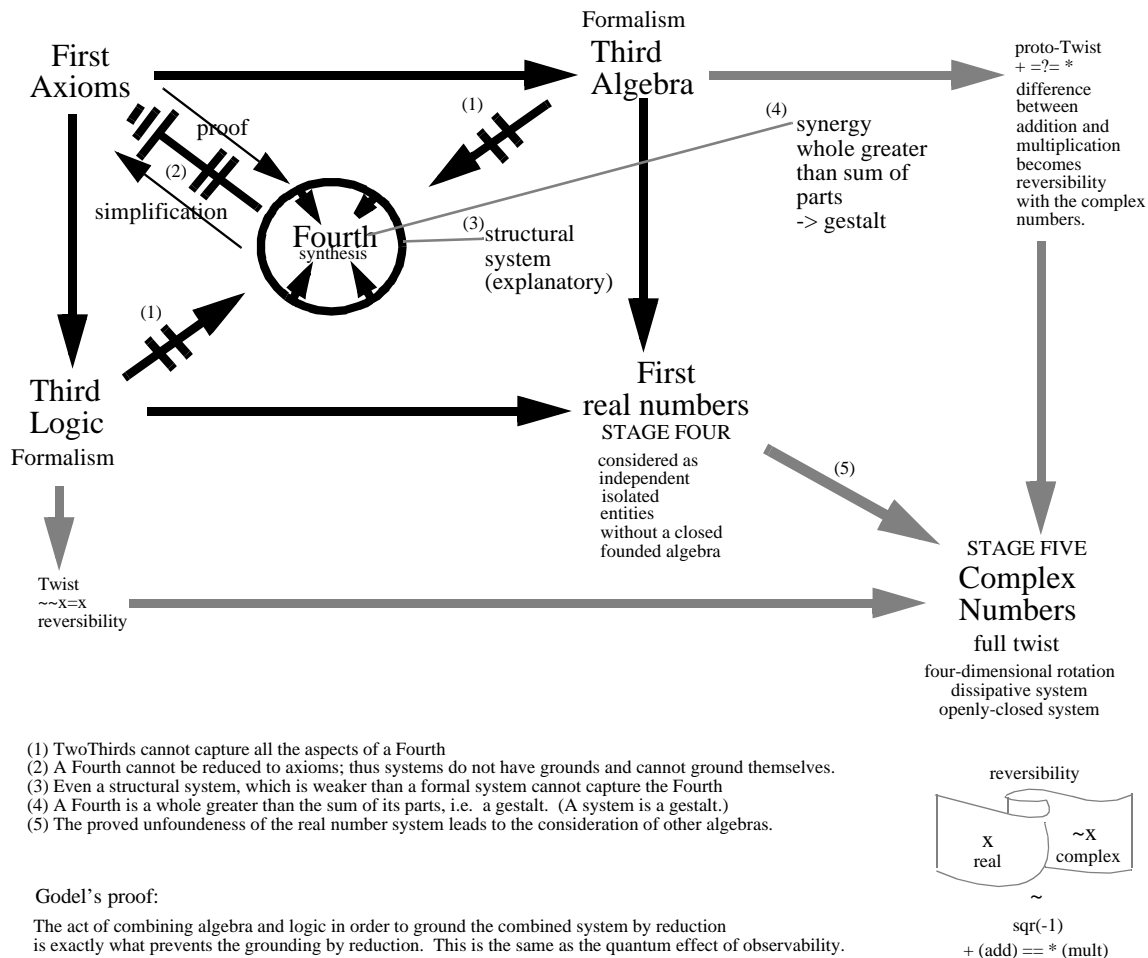
generated by multiplication of the same number by itself. This reduced the difference between addition and multiplication operations. So we begin to wonder if both of these Thirds (both Algebra and Logic) are not, to some extent, contaminated with the reversibility that becomes apparent in the complex numbers. Reversibility in general is what appears at this point in the infolding of the minimal system on itself. Reversibility is the essential precursor of reflexivity. Reversiblity is also in the form of the Chiasm, the essential structure of Wild Being. Here we have some of the inherent structure opaquely embedded in the Real numbers manifesting itself. This gets taken up and expressed in the logical and algebraic systems that manipulate these numbers or logical symbols. It also embodies, to some degree, what it is within the Algebra/Logic complex that cannot be reduced to axioms. Axioms are purely present at hand. If the system of algebra/logic could be reduced to the axioms, then we would be able to say that no other kinds of Being are necessary because everything can be expressed as a function of Pure Presence.

The production of extra dimensions is the dual of the production of singularities. In some sense, the extra dimensions of four and higher dimensional space are the inward structures of the complex singularity i. The singularity is at the heart of the dissipative system.

Through it, information pours into the system from the inside instead of entropy from the outside. As a result, entropy pours into the environment from the dissipative system. The information pouring into the system, which is perceived as increased ordering, comes from higher dimensional spaces or through higher dimensional spaces from lower dimensional spaces, thus circumventing boundary crossing at lower dimensionalities. The flow of information into the dissipative system balances the flow of entropy out of the dissipative system into the environment across the system boundary. We can see this structure in Greek cities where they have an acropolis at the center, where the gods reside, and a wall at the periphery. The gods are a source of order that pours into the city though oracles and other actions of the gods. The gods of the city order the state of affairs within the boundaries of the city. The city goes to war against other cities, and thus creates higher concentrations of entropy outside its boundaries in order to increase the order inside its boundaries. The city is open to a higher dimension inwardly, like the openly-closed system that discovers anomalies within itself due to the wrinkles in the application of several different structural systems. In both cases, these singularities or anomalies, are sources of information which do not come from outside in the normal way, i.e. crossing the outer boundary of the system. But a system with an internal twist like this one,

an Escher waterfall-like structure inside, is still a system and is not yet a meta-system.

FIGURE 77

First
Axioms

Formalism
Third
Algebra

proto-Twist
+ =?= *
difference
between
addition and
multiplication
becomes
reversibility
with the complex
numbers.

(1)

(2) proof

simplification

(4) synergy
whole greater
than sum of
parts
-> gestalt

Fourth
synthesis

(3) structural
system
(explanatory)

(1)

Third
Logic
Formalism

First
real numbers
STAGE FOUR

considered as
independent
isolated
entities
without a closed
founded algebra

(5)

STAGE FIVE
Complex
Numbers
full twist
four-dimensional rotation
dissipative system
openly-closed system

Twist
~~x=x
reversibility

(1) TwoThirds cannot capture all the aspects of a Fourth
(2) A Fourth cannot be reduced to axioms; thus systems do not have grounds and cannot ground themselves.
(3) Even a structural system, which is weaker than a formal system cannot capture the Fourth
(4) A Fourth is a whole greater than the sum of its parts, i.e. a gestalt. (A system is a gestalt.)
(5) The proved unfoundeness of the real number system leads to the consideration of other algebras.

reversibility

Godel's proof:

The act of combining algebra and logic in order to ground the combined system by reduction
is exactly what prevents the grounding by reduction. This is the same as the quantum effect of observability.

x
real

~x
complex

~
sqr(-1)
+ (add) == * (mult)

When we open up four-dimensional space, we notice that the simplest figure in this space is the four-dimensional pentahedron. That structure we have already identified with the simplest possible autopoietic system. There are four views we can take of that structure:

- Pentagrams
- Pentahedral Lattice (1-5-10-10-5-1)

- Kleinian Bottle
- 5 groups of order twenty

In the previous essays, we explored that structure in depth. It is mentioned here to point out that the fifth point that makes that figure possible can be considered as a singularity within the minimal system. If we posit that there is a higher dimensional space, then that point becomes offset into that dimensionality, and the pentahedral figure forms. But if we just consider it as embedded within the minimal system, then it becomes the anomaly that defines the openly-closed or the dissipative system. It stands for the complexity of the Real space. Real space cannot be considered apart form its algebras and the logic we use to make proofs and simplifications. Within the minimal system embedded in real space, a gap opens up, and we describe that gap using complex numbers to relate real space to the singularity at the center of the minimal system. As soon as that singularity appears, we can hypothesize that there is a higher dimensional space where that singularity is just part of the mathematical structure, and, in fact, we unfold higher dimensional space from that singularity. We discover that mathematical structure of higher dimensions has its own complexity and structure. In fact, topologists find that four-dimensional space, unlike any other, have an infinite number of "fake" topologies instead of the expected finite number of minimal

surfaces.   Four-dimensional space has a surprising complexity that is counter-intuitive.   It is the formalization of spacetime, so it is the space in which we actually live.

We have posited in earlier essays that the autopoietic system has as its minimal structure the form of the pentahedron and that each of the views of that structure is a meaningful aspect of the autopoietic system.   This minimal structure is the autopoietic ring made up of five phases and five singularities.   Each phase contains a minimal system, so the pentahedral lattice relates the five Hsing to the four elements of the minimal system to produce the 20 relations between celestial and terrestrial elements.   The pentagrams are attached as values to these 20 possible relations, and the five groups of order 20 signify the orbits of these 20 possible relations.   Thus, the autopoietic system has a very specific structure that appears the moment the singularity embedded in the minimal system moves out into the fourth dimension to establish its own realm and unfolds its implicit mathematical relations.   However, given the structure of the autopoietic system, we have still not established the operations by which it organizes itself.   To do that, we must move to the next stage of the unfolding of the foundations of autopoietic system theory.

The pentahedron may be considered as a model of the static structure of the synergetic Fourth. This means it is a model of the static autopoietic system. However, the autopoietic system is not completely static, but is instead, endlessly dynamic as it strives to organize itself. Therefore, no dissipative system can model the autopoietic system because it has features that go beyond the openly-closed or dissipative system. It is necessary to go further in order to capture these dynamic aspects of the autopoietic system in our model.

Stage Six

Once we have opened up Pandora's box and begin considering other algebras of the kind which gives us the complex numbers, then we can ask whether there are any more higher algebras of the same kind. It turns out that there are only two higher algebras of the same kind. The next highest hyper-complex number is the quarternions which, in effect, double the Complex numbers producing three singularities *i, j, k* that are related to each other in terms of the quarternion group. This is, in fact, the group that relates the four axes of four-dimensional space to eachother.   Four-dimensional space is four three-dimensional spaces with the axes related through the quarternion group operations to eachother. Many times *i, j* and *k* are used as the axes of three-dimensional space so

that rotations of vectors can revolve around them as if they were being displaced through four-dimensional space instead of the axes. For us, the quarternions are very important in that they unite the structure of four-dimensional space with the singularities inherent in the real numbers considered from the point of view of algebra. With the quarternions, we say that algebra is a general structure for dealing with many different sets of numbers like the real numbers, and that these sets of numbers have a very specific interrelation to each other. In fact, we say that the sets of numbers *real, i, j* and *k* form a minimal system of phases, and that there are four singularities *1, i, j* and *k* that generate these phases that each contain positive and negative real-like numbers. So we see here that the singularities are like the points in the tetrahedron, and the number phases (positive and negative) are like the four triangular faces of the tetrahedron. Only here, these are related to eachother via the quarternion group which is the structure operated like two four-dimensional rotations on the real numbers and its cognates. This gives us a very strange inner structure for the minimal system.

However, we must go beyond this formulation because we note that as suggested in the last essay this quarternion, space is embedded in the pentahedron as the fine structure of the Kleinian bottle. We realize that this

means that August Stern's Matrix Logic has an inner quarternion structure that aligns with the truth values of Matrix Logic and the eigenvalues of the Matrices of the logic themselves. We posit that the inner structure of the autopoietic system as a set of operators is identical with Matrix Logic, and that this is embedded within the pentahedral structure of the minimal autopoietic system. We note that Matrix Logic introduces the third truth value (-1, neither... nor...) but suppresses the fourth truth value (2, both...and). By this suppression it generates the 81 operations of matrix logic rather than collapsing back into the sixteen mod 2 logic operations. This introduces the Third again at a higher level. We have seen that the Third has already failed to subdue the synergetic system due to Godel's proof. At this higher level, we see that a composite picture of the synergetic system is produced from the combination of the pentahedron with its views and Matrix Logic. Matrix Logic is simultaneously a formal and a structural system. As such, it has special claims to being able to model the synergetic Fourth. We claim that the combination of the outward structure of the pentahedron and the inward operational structure of matrix logic as the fine structure of the Kleinian bottle which represents the four-dimensional rotations within the autopoietic structure, give an exact model of the synergetic Fourth. Thus, what logic and algebra failed to capture is exactly captured by Matrix Logic that includes

within itself Matrix Algebra and a more robust form of logic that has embedded, within it, conventional logic. The fact that the Fourth cannot be reduced to axioms still holds. But we can model the whole dynamic autopoietic system in terms of these two mathematical structures acting together in a non-reductionist mode of thought which recognizes the independent reality of autopoietic systems as a threshold of complexity and activity that is very useful for modeling the living/cognitive, which is to say, secondary processes with intentionality and independence within the world.

The dynamic autopoietic system is the archetype of the meta-system. We connect the meta-system to this level of the unfolding of autopoietic systems theory. The meta-system is a meta-showing and hiding of gestalts, and we will call it a "show." In fact, it is a five-ring circus in which multiple showings and hidings are going on simultaneously. It is an entertainment system with multiple simultaneous channels. Meta-systems set rules within which systems function autonomously. Thus, meta-systems are formulations of order independent from the autonomous beings that maintain and abide by that order. Meta-systems allow multiple independent things to be going on simultaneously. Sophisticated operating systems with independent threads of execution such as UNIX, qualify as meta-systems. There are a myriad

different possibilities for meta-systems, but as they impose more and more order, they approach the limit of being a system. As they allow more and more independence with respect to more and more realms of action and perception, they approach the limit of being a world. The autopoietic system is merely an idealization of the meta-system that contains exactly five minimal systems which are highly synergistically integrated. This is to say that meta-systems have different levels of harmony according to Chang's levels of harmony (logical, interactive, mutual support and interpenetration). The autopoietic system has interpenetrating harmony. Thus the autopoietic system is actually a meta-system with the highest degree of harmony possible. This makes the autopoietic system a model of the Holoid. Except it is a model that stands away from complete fusion. It is a model of transcendence, grounding itself, in which we can still see the structure of belonging together or the returning of the Same.

The autopoietic system imposes order on itself. It is a network of processes that produce the components out of which it is itself comprised, and then maintains its own organization as a homeostatic variable by replacing itself with those components it has itself produced. The autopoietic system is thus a network of elements that

together do ordering and do producing. The archetypal example is the living cell. Autopoietic theory sees the living cell as having a cognitive component, and that the cognitive component is fused with the living component in the cell. The cognitive component is associated with the ordering of the cell by itself. The producing component makes the sub-components of the cell itself which it uses to maintain itself. The ordering component controls growth, reproduction, the metabolism and a myriad of the functions of the cell that together allow it to live. In higher animals, this ordering component becomes cognition. There is a relativistic point that as observers of other living/cognitive autopoietic systems, we project our intentions on that system. Our projections may be far from the actual internal intentions of the cognitive/living autopoietic system under observation. So we must carefully distinguish the outward expression of cognition in terms of projected intentions from the internal intentions of the autonomous system. But there is no doubt that the autopoietic system, in every case, has its own reasons that our reason may not be able to understand.

We are not actually saying that this network of nodes that makes up the autopoietic system is a pentahedral structure. That network of the nodes in the autopoietic machine will vary depending on the kind of machine it is.

We are not even saying that the pentahedron is the only such structure. In fact, we posit that there are similar structures in every higher dimensionality that may be higher order autopoietic rings. The pentahedron is merely the minimal autopoietic ring structure. The autopoietic ring is the connection between the cognitive element and the living element. In other words, the autopoietic ring in the pentahedral structure allows there to be five singularities and five minimal systems. Components of the autopoietic system must be arranged in systems. The minimal formation of these systems of components (eventities) appears as the phases of the pentahedral formation. The singularities that contain the cognitive component have a specific relation with these minimal systems of components. The pentahedral ring specifies these relations between the cognitive singularities from which order comes the minimal systems of components that represent the organization of the autopoietic system that it is imposing on itself. So the ring structure is very important to the structure of the autopoietic system connecting its cognitive aspect to its living aspect. This structure can be arbitrarily complex. Higher dimensional autopoietic rings merely increase this complexity, but also increase synergy. For instance, the fifth dimensional equivalent of the pentahedron, called the hexahedron, which has the lattice 1-6-15-30-15-6-1, has 15 tetahedral structures but six four-dimensional

structures which connect them. Thus, we immediately go from five minimal systems to 15. And as we go up the Pascal triangle, these numbers grow exponentially. The pentahedron has a single four-dimensional structure to connect is five minimal systems. The next ring up the ladder of higher dimensional spaces have six higher dimensional structures to connect 15 instead of the three you might expect. Complexity grows exponentially. This complexity grows to accommodate the high degree of harmony in these systems. We know that the autopoietic system is a logical unity. But it is a unity with structure. It has not collapsed to identity in fusion without structure. It is a unity just prior to the collapse into unity without structure signified by Conceptual Being. That structure that it has must embody all the kinds of harmony. It is logical because the autopoietic system is closed. Like logic itself, it is a closed formal system. All its actions are in terms of itself. It has interactive harmony because all its nodes interact to produce its self-organization. It has mutual support because the cognitive singularities order the component minimal systems acting together so the different parts of the system support eachother. So we see that it is at the level of mutual support that the relations between cognitive singularities and components in minimal systems becomes important. Finally, it has interpenetration because of the synergy based on the

Pascal triangle where multiple organizational elements are made out of the same materials. This reuse of elements of the organization to produce more complex structures is the hallmark of interpenetration. It signifies a deep and sophisticated ordering of the organization which is built into the nature of things and is specified in a mathematical way as lattices and may be interpreted as geometrical objects in higher dimensional space. This interpenetration of elements, where one element enters into the definition of another element but does not collapse into identity, is a very important feature of the universe and mind which comes from the connection between the living and the cognitive in the autopoietic system. It is not that we discover mathematics as a realm of ideas separate from who we are as living thinking beings. Instead, in mathematics, we discover the inherent connection between the cognitive and the living within ourselves, and project it as part of the universe or mental forms. But in fact, it is the inner structure of our cognitive life. It has a beauty and elegance that is hard to deny. That comes from within us as human beings. But the whole question revolves around how we interpret that resource within ourselves that connects the cognitive to life. We can interpret it as solid geometry as the Greeks did, and introduce opacity. Or we can interpret it as higher and higher thresholds of complexity in the unfolding of binary systems that are transparent

permutations of opposites. The choice is up to us. The same Pascal triangle may be interpreted both ways. It is the difference between the view that there is a material substrate to everything that is independent of us as cognitive-living beings, and the view which we can follow Loy in that the phenomenological reality is prior to the material substrate. Phenomenology is prior to the material, and the social is prior to the phenomenological. We really need to understand the social if we are to understand the autopoietic system correctly. However, the social introduces many factors that are clearly not present in many living systems. It is basically a new emergent level, and we are fortunate to find that there is another level in our hierarchy of algebras that can support the existence of a structure higher than the cognitive-living autopoietic system.

Stage Seven

The next stage is where the Quarternion algebra is doubled again to give the Cayley algebra. This adds four new singularities and effectively doubles the Quarternion structure. The new singularities are called *I, J, K* and *e*. The *e* singularity produces another limit like the real number system is to the complex and quarternion numbers. Each successive algebra has a weaker division property, and the Cayley has the weakest. The Cayley

algebra is, in effect, the production of a mirror image of the Quarternion algebra. The mirroring of the quarternion allows the cognitive-living autopoietic system to reflect on itself. Self-reflexion is the next higher stage from self-organization. Essentially, this self-reflexion allows the social autopoietic system to change its ordering and experience emergence, which means radical reordering of the system.

To repeat this in other way: the Cayley algebraic structure is the mathematical basis for the *Reflexive Autopoietic* system. This structure is equivalent to the Social level of emergent phenomena. In it, the quarternion meta-system looks at itself, and thus can not only organize itself, but make up new orders to follow. Thus, it is at this level that emergent events are defined and are, in fact, the basis of the social, or vice versa as G. H. Mead intuited.

The Cayley algebraic structure is the basis for the projection of worlds. Above the meta-system, the next level of emergent category is the *World*. The social system projects the world based on its reflexivity which radiates among its members in a seemingly infinite ramification of reflecting images between members of the social group.

It is at this level that Stern defines the Hyper-logical

operators. This is the level that computation would occur in his system where multiple (four) matrix logic elements are fractally combined. This computational structure is a group, and there is only one group with an order of 20 that contains a Quarternion. That group corresponds to the 24 cell polytope in four-dimensional space. Only four-dimensional space has such a structure, and it corresponds to a direct mapping from the Hypercube to the Hyperoctahedron which only exists in four-dimensional space. This suggests that the 24 cell polytope is the inner structure of the social operations that are a sui-generis reality over and above the operations of matrix logic alone. Reflected matrix logic has group properties that overcome the forbidden operations. All hyper logic operators have a complete set of operations which allow this computational form to go beyond the blockages of the forbidden operations of matrix logic without abrogating them, forming a whole group structure. This meta-meta-system is the social which projects a world which allows emergent events without blockage because its structure is isomorphic with the structure of the emergent event itself. This is probably the first rigorous definition of the level of the social. We can connect it with what Deleuze and Guattari call the "socius." It is the primal ground of everything we know. Ballard called it the archaic. We turn the normal list of emergent levels upside down and say that it is not

quarks and fundamental particles that are the basis, but instead it is the social from which all other emergent levels devolve. Here, we are saying that the social is explicitly the reflexivity added to the autopoietic system, but that addition comes about by essentially a doubling of the structure of the mathematical basis for the autopoietic ring. This takes us to a new emergent level where there is a unique mathematical structure. It appears as the Hyper operators of Matrix logic, and it appears as the 24 cell polytope that has a lattice structure 1-24-96-96-24-1. It is a unique connection between the hypercube and hyperoctahedeon that produces an all 4-d space filling lattice. It gives the hypercube and the hyperoctahedron a unique intertransformability that does not appear in any higher dimensional space.

This structure is the next higher Matrix Logic form. It subsumes Matrix Logic, and provides us with a very complex Meta-Matrix Logic. As such, it gives an additional layer of inner coherence to Matrix Logic itself which is not blocked by the forbidden operations. Thus, it is a group structure where every pair of hyper-operations taken together gives us another hyper-operation within the group structure. This hyper-operator is composed of four Matrix Logic operators in a larger matrix with a four value vector as input and as output. We can think of this hyper-operator as the simultaneous

interacting logical computations of two independent agents. This combination of logical agents gives the social dimension to this Hyper-logic.

The reflexive autopoietic system has the ability to re-organize itself rather than to merely organize itself. For instance, the cell has its organizational trajectory laid out for it by its DNA patterning. Social autopoietic systems can change that patterning to produce a different trajectory. For instance, Beer talks about the Boss as giving closure to the corporation. The Boss is the one who decides which avenue will be taken. But the Boss can look at the situation and decide to do something completely different than anything the meta-systems of the organization suggest. This ability for the Boss to reflect and change the entire patterning of the organization based on the outcome of that reflection without recourse to any laid down patterning, such as the cell's DNA, is what we are talking about here. Of course, redirection by a single lawmaker acting as a tyrant is only one example of how a repatterning might come about. Another way is for the group to reach consensus that a change is necessary. But however this change comes about, or is instituted it is only social systems that are able to effect such changes in their internal organization with such freedom. All the normal autopoietic systems cannot do this unless they are preprogrammed with

different modes. For instance, the transformation of a caterpillar into a moth is a catastrophic pattern change. But it was pre-programmed into the basic patterning of the organism. The organism did not decide to change itself into something completely different. The same is the case with human beings. We cannot change our bodies at will except by external means. But a society can change its basic characteristics of organization in radical ways by altering the ways individuals interact and even altering which individuals fulfill specific roles in the organization. Society is a meta-organization of creatures. If we consider bee hives, we see that the beehive itself is, in some sense, an organism and it is not truly social because it cannot repattern itself. The transformation of the hive from sedative to flying is an example of a preprogrammed change which occurs given certain circumstances. Everything the bees do as separate organisms is prepatterned. So we cannot call them social in the sense specific to reflexive autopoietic systems.

When we connect emergence, the social, reflexivity, the 24 cell four-dimensional polytope and Hyper Matrix Logic to the Cayley numbers, what are we really saying?

First, we are saying that our autopoietic system's theory clearly distinguishes the level of the autopoietic system from the reflexive autopoietic system. This is important

because there has been a lot of argument whether social systems are, in fact, autopoietic. Our position has been that they are a special case of an autopoietic system which is, in turn, a special case of a dissipative system that is, in turn, a kind of a system. Being able to generate all possible kinds of relations between eventities or system components in minimal systems is the main reason for appealing to methodological distinctions and hypercomplex algebras. These mathematical objects structure the way we look at the phenomena. When we see that the Cayley, like all the series of hypercomplex numbers, are produced by "doubling," we see that there is some sense to the concept of an autopoietic system looking at itself in reflexion through this mirroring of the quarternion. The quarternion is a mirroring of the complex numbers. Thus, an autopoietic system is, in some sense the combination of two dissipative (openly-closed) systems. The dissipative system is somehow a combination of an open and a closed system. The doubling allows us to relate the generation of these more complex kinds of special purpose systems to the symmetry, breaking progressive bisection of complex dynamical systems on their way to chaos. In this case, the symmetry breaking only goes to eight states. Only eight singularities are produced which are the eight artificial intelligence techniques, the eight paradoxes in the software layer. These eight singularities may be read
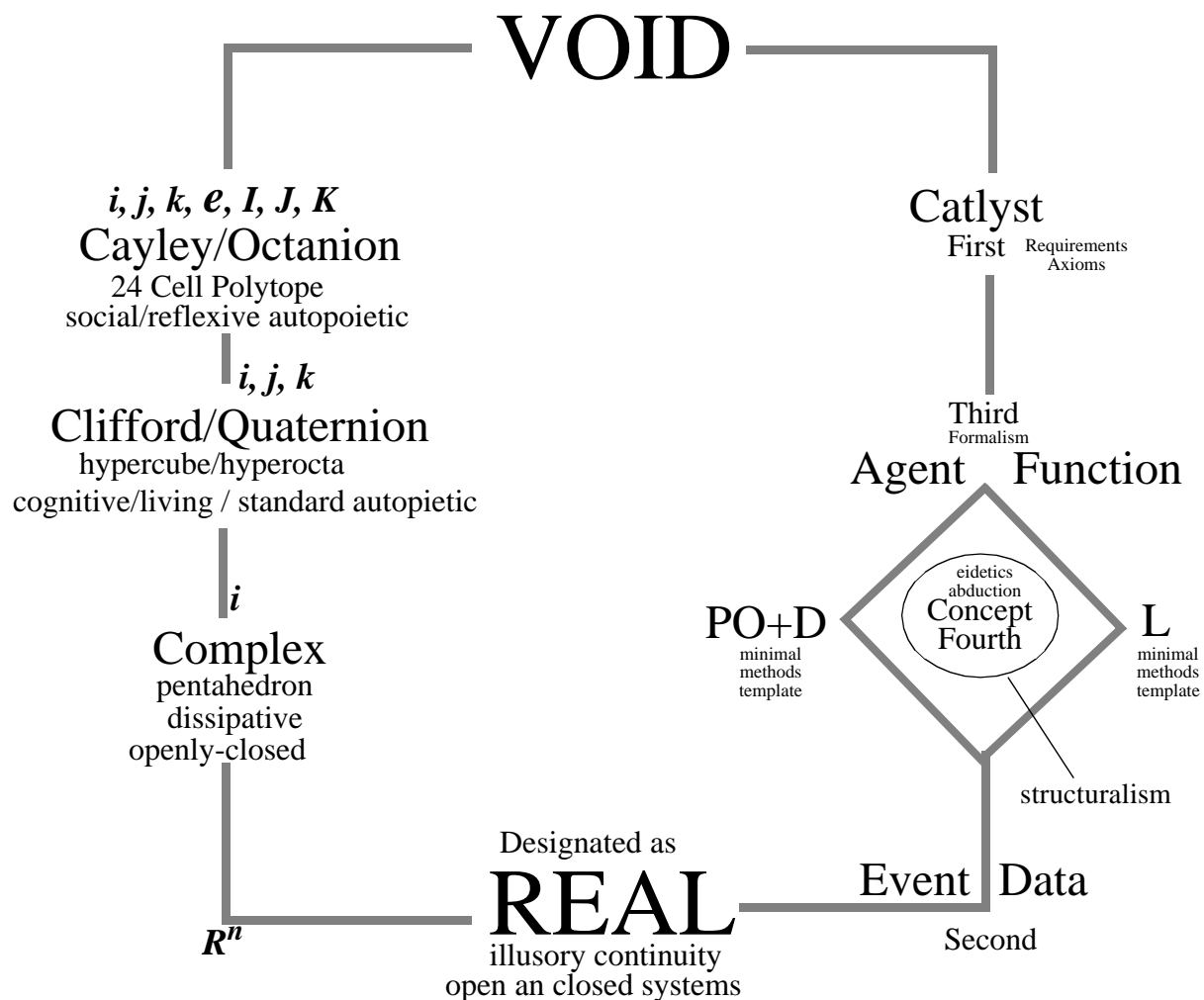
as producers of higher dimensionalities. As such, we can see that at the level of the Cayley algebra, a unique aspect of four-dimensional space to turn in on itself becomes apparent. The hypercube and hyperoctahedron have a special kind of symmetry that revolves around the 24 cell polytope. It is this special symmetry that is made use of by Hyper Matrix Logic with its group structure of order 24. This special property of the Hyper Matrix Logic, or the 24-cell polytope, is the ability to invert inwardly as well as outwardly. If we represent the minimal system as a quarternion group with four singularities being the four eventities of the minimal system, then we see that the quarternion can involute using the rotations of four-dimensional space inwardly. The addition of the Cayley allows a similar involution outwardly. Thus, the ultimate view of the minimal system is that it is possible to combine four-dimensional rotations, both inward and outward in the same structure. This structure is a kind of double perpetual motion machine. It is a perpetual motion machine whose perpetuity is tracked by a second perpetual motion machine. The perpetual motion machine tracks itself and can follow itself. This is the essential nature of reflexivity. It is social because it is two intertwined perpetual motion machines; two intertwined autopoietic systems locked in an embrace. Here, the cognitive sub-system is disconnected from the living sub-system but mirrors it perfectly. The

production of the inverse autopoietic system allows the system to model itself internally. Or we can see it as two autopoietic systems where the cognitive and living aspects are still interembedded. The two together operate in perfect harmony. It is a marriage. And it is the prototype of all social relations where the mutual mirroring between two intertwined autopoietic systems produces a whole greater than the two meta-systems together. This meta-meta-system must be a world. This archetypal marriage, intertwined autopoietic rings, is the foundation of the world. The well and the tree, or the pen and the tablet -- in the primal scene, the duality is an image of this marriage. So we see that marriage is somehow the fundamental non-nihilistic distinction. It is symbolized in the rings couples wear, but it goes very deep as a fundamental non-nihilistic distinction that founds the world by establishing the basic social relation from which all other social relations emerge. It is different from sex together or living together. It is a contract which Mithra and Varuna guard, and they can guard it because they know how to break it. It is an unseen relationship which is founded on the inner possibility of essential harmony. This is not harmony of something with itself we saw in the autopoietic system, but harmony with another which is like the self only different. It is the harmony of two selves intertwined who belong together and are the Same. This harmony

with the other is what the whole of the Western tradition violates in many deep ways. It is a harmony with the other through the realization that the other is ultimately the self. When I make a model of the other, it turns out to be a model of myself. I am the Other. But this does not just mean I am alienated from my self. It also means that there is a possibility of a harmony with the other that I can strive for which is the basis of the social and is represented by the internally and externally involuting minimal system.

Marriage is not a constant relation. Marriage can be repatterned by those involved in it. My partner and I can look at ourselves together and decide that we are going to do things differently together. I cannot get this reflection looking at my own behavior because I have a distorted view of my own behavior that is different from that of a significant other to whom I am married. This is different again from any other significant other's view of my behavior or any non-significant other. Shaykh Abd al-Qadir al-Murabit calls this relation, in which there is an inner freedom to repattern and change, the Collaborative Couple.

FIGURE 78

VOID

i, j, k, e, I, J, K
Cayley/Octanion
24 Cell Polytope
social/reflexive autopoietic

i, j, k
Clifford/Quaternion
hypercube/hyperocta
cognitive/living / standard autopietic

i
Complex
pentahedron
dissipative
openly-closed

R^n

Catlyst
First Requirements
Axioms

Third
Formalism
Agent   Function

eidetics
abduction
Concept
Fourth

PO+D
minimal
methods
template

L
minimal
methods
template

structuralism

Designated as
REAL
illusory continuity
open an closed systems

Event Data
Second

The epitome of the formalism of this highest level of special systems theory is the use of Minkowoski spacetime to explain relativistic information by Jumarie. In this version of spacetime, two subjects observing the same system would, in fact, observe different information. Jumarie uses the concepts of special theory of relativity to work out the invariants by showing what

each observer would observe through the other observer in comparison with what he/she would observe from his/her own inertial frame. When two observers are observing simultaneously the same thing, then the upper left and lower right quadrants of the Hyper logic matrix of four matrix logic operators are all that is used so that the observations are orthogonal. This possibility of orthogonality of observations, and the distortion of information by multiple observers, is the basic framework for the investigation of intersubjectivity. In intersubjective viewing of a system, there are certain transforms by which one subjective viewpoint can be transformed into another. Stern treats the causal chain within the light cones in terms of positive and negative logics. These two views, when put together, give us a powerful tool for understanding the relation of subjects to the same system by their relativistic warps of information. Matrix Logic gives us the means to understand the temporal aspect of causal chains within the unfolding of the worldlines. The anti-logic gives us access to a structuralism within the formalism of Matrix Logic which is a model of the relation of the light cones to nowhere. So together, Matrix Logic and Relativistic Information Systems theory gives us a means of analyzing intersubjective phenomena on a solid formal-structural footing.

The reflexive autopoietic system is not homeostatic, but proactive and projecting. As Heidegger says, it is ecstatic, pro-jecting the world. Its nature is that of Dasein. Instead of homeostatic, we could say hetrodynamic. The reflexive autopoietic system is constantly producing a heterogeneous variety of differences that make a difference. It is in constant dynamic. Because for anything to remain in one place in spacetime, it must move, specifically in circles of 4pi which make it static to all frames of reference. So in order to stand still, the reflexive autopoietic system must keep moving. We can say that the Cayley algebra is more general than the Clifford which is, in turn, more general than the Complex so that the social level is more general than the autopoietic which is, in turn, more general than the dissipative. More general in the sense that the social gives rise to the individual. Individuals cannot function without a social milieu and concretely embody that social milieu. Individuals function as organizers or disorganizers of their situations. The dissipative context of the individual is the situation. The individual's situatedness is socially defined. Deleuze and Guattari speak of the socius and the desiring machines. The desiring machines are the partial situations which may be positively or negatively entropic. The individual, from his/her perspective, is an epiphenomenon of the connection between the desiring machines that are the

intersections of multiple overlapping situations and the socius that is the social context in which all situations are embedded. We do not go so far in denying reality to the individual. The individual is the autopoietic unity with its cognitive (functional) and autonomous (agent) components. All cognitive intentions function within a situation, and all actions of the agent occur within the situation. It is only in the situation that the individual desiring machines come into play. We take these myriad situations that form the patchwork of our lives and attempt to produce a narrative or a designated-as-real illusory continuity. So we can see that from one point of view it is the socius and the situations in which desiring machines manifest that are real. But normally, in the common sense world, it is the individual and his life narrative that is real. Different theories will emphasis two and de-emphasize the other two levels and vice versa. But when we realize the parallelism between the Cayley formation and the First Catalyst viewpoint, then we say that the Catalyst viewpoint holds the position of the generalized other of Mead. The Thirds of Function and Agent are opposite the Clifford formation which is equivalent to the autopoietic system. These viewpoints are the cognitive and the embodiment of the living individual in their reversibility. They express the ability to formulate formal systems, either as algebras or logics. The algebra counts the individuals. And what is

countable is deemed real. The logic verifies the truth of the individuals. The cognitive (functional/intentional) and the autonomous (agent/existence as isolated individual) aspects form a wave particle duality. This form of belonging together is a weak kind of identity with difference built in. Opposite the dissipative system is the Conceptual Fourth. It is constrained by the structural system and confined by the set of minimal methods, but is not captured by any of these. Thus, the Conceptual Fourth which has a complexity analogous to the Cayley formation, is diagonal to it. The simple-to-complex movement is opposite on the two sides of the diagram. The concept appears as a view of what is beyond the singularity at the center of the openly-closed system. It is like the otherworldly forms of Plato. It is the non-capturable synergy that is the source of order that pours into the dissipative system through the singularity to order the system. The simplicity of the dissipative system points to the complexity of the synergetic un-capturable eidetic abductive Fourth of the System Concept or System Design. This is interesting because the same is true of the relation between the Catalyst and the Cayley formation. The simplicity of the First, which is the Generalized Other, is balanced by the complexity of the minimal social, i.e. reflexive, system. These two sides to the diagram are duals of each other. They form a complex interval with the point of reversibility being the

illusory continuity of the real numbers, and the limits being on both ends the void. Each phase has its own sub-interval, in the one case being expressed in terms of algebra formations, and in the other in terms of methodological distinctions. The Quarternion formation and the Thirds of Function and Agent are the points of reversibility in these sub-phases. The Quarternion formation expresses how the autopoietic system can connect the function and agent aspects together in a wavicle or wave/particle unity. This is made possible by the existence of four-dimensional rotations that make possible perpetual motion in higher dimensional spaces. The autopoietic system can ground itself or cause itself with this very efficient higher dimensional causation. Because we are four-dimensional creatures, we can harmonize our processes to approximate these rotations which is done by setting up resonances. We can only do it through time, not in the frozen presentation of space which is seen as present-at-hand only. It takes all four kinds of Being to effectively produce this perfect rotation of the temporal gestalt, and that is why the four kinds of Being are necessary within the autopoietic system as the levels through which self-grounding Being passes, and this is why the autopoietic system has the structure of the emergent event. It does not experience emergent events from the outside because it is a closed self activating emergent event.

The eight singularities correspond to the eight kinds of artificial intelligence techniques which are hypothesized to be the paradoxes in the software layer. They correspond also to the eight trigrams from the I Ching which appear in Sidi Ali al-Jamal as the permutations of inward/outward, sensory/meaning, and Celestial/Terrestrial. These eight points which appear as the singularities are the counterpoint to the 24 cell polytope. They are central to human cognition of the universe. As kinds of artificial techniques, they are opaque and as trigrams, they are transparent. This is the difference between the binary and the triadic ways of viewing the world. We see that the progression from complex to quarternion to Cayley numbers produces a progressive bisection of singularities. These singularities operate as a system to organize the world. If that system is viewed through the flawed lens of logic that relies on the Third, then the result is paradoxical singularities in the layer of software minimal methods. If, on the other hand, the world is viewed as merely a myriad of opposites, then these singularities become merely the points of confluence of opposites as the basic opposites are permuted.

The Void

The four eventities arose out of the void, and because

there are no higher hypercomplex algebras, we again encounter the void as the unthinkability of what lies beyond the Cayley algebra. We can think of the seven stages of autopoietic systems theory as being like the seven chakras. They are thresholds of complexity of the unfolding of the big man, which is Das Mann, the They or the preconscious social which projects the world before we are even aware of it as individuals, before we even become individuals. The world is there, discovered as the medium in which we discover our humanity. We can turn it into the uni-verse or the totalitarian single song everyone must sing, or we can discover it as a window on a pluriverse that contains a myriad of worlds arising and returning to a single source who names Himself Allah, glory be to Him. That source is unthinkable, unrepresentable, unassociateable with anything we know. *There is nothing like Him, The Hearing, The Seeing*. All we see is endless worlds, meta-systems, systems, forms, primitives flowing out of the void. All praise and glory belongs to Allah! The path to Allah, glorified is He, is the path beyond the Void. That path is called by Him in the Glorious Quran, His uncreated words, Islam. May He set us firmly on that path and never take us from it.

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