Fragment 34   AUTOPOIETIC STRUCTURE

In this essay, a hypothetical structure of the autopoietic system will be explored. This structure has been alluded to throughout the foregoing metaphysical development of the importance of the autopoietic concept. But it is good to have a purely structural model to refer to in order to develop the metaphysical concepts at a more concrete level of the general architecture of autopoietic systems. This development will depart from the structure given by Plato, and will attempt to give a model that is clearer and more internally coherent, developed from first principles. This is not to say that all autopoietic systems necessarily have this form, but that it is closer to the archetypal form and more clearly of an axiomatic simplicity and purity. It is posited that autopoietic systems may take an unknown variety of forms, and that we are merely giving one which is closest to the threshold of minimality. Much of the contents of this essay owes its insights to work cited earlier on software development methodologies and software development work process. This concrete discipline lent itself to developing these ideas in

unexpected ways. Some steps toward the position stated here may be found in my series on *Software Engineering Foundations* and the article on *The Future Of Software Process*. In the latter article, I attempted to articulate what an autopoietic software process might look like. In the course of developing those ideas and realizing their connection to the work on software design methods, the following approach to defining the autopoietic system arose. But what is presented here is meant to be completely independent of any particular field and owes much to the synergetic thinking of Buckminster Fuller who taught me to think of theoretical systems from a geometrical viewpoint. Geometry of thought is a convenient way to approach the inner relations between theoretical concepts which still hold when the geometrical scaffolds are taken down and the pure structure considered independently.

Let us start by considering the Pentahedron of four dimensional space. This figure is the simplest Platonic solid in fourth dimensional space. It is composed of five points, ten lines, ten triangles, and five tetrahedrons. This figure has been our model for the simplest autopoietic system. The five points are taken to correspond to the five transformations the Chinese call the five Hsing which are Earth, Water, Wind, Wood, Fire. These Hsing correspond to five distinct viewpoints which describe any

general system which may be called Catalyst, Function, Agent, Event and Data. It turns out that the last four of these are the necessary viewpoints any real-time software design. But we can extrapolate these as general viewpoints on any general system that exists in spacetime. It has already been shown in an earlier essay how Software Engineering and General Systems Theory are dual meta-disciplines.

TABLE 21

HSING	VIEWPOINTS	Meaning
EARTH	Catalyst	Distinctions
METAL	Agent	Autonomy
WATER	Data	Space
WOOD	Function	Intentionality
FIRE	Event	Time

The major realization that occurred to me was that adding another viewpoint to those I knew were important for describing real-time systems, allowed me to generate the five essential transformations that occur in software engineering as an autopoietic ring. These transformations are Requirements, Design, Implementation, Integration and Test. In my paper of *The Future Of Software Process*, I attempt to show that these form a ring structure with bidirectional flows of information, and that these achieve closure when a development team clicks and begins working well

together. I believe that these autopoietic rings occur generally in the world of work process as intersubjective differentiations of the work to be done in the world into essential transformations. So for instance, I think the scientific method is a similar structure. My work on software engineering starts from the premise that it exemplifies many of the characteristics of science found in philosophy of science. Any time people get together to transform things in the world by working as a team, it is possible for autopoietic rings of essential transformation to appear unless they are suppressed by social control structures. Of course, this is a hypothesis which needs to be tested by isolating other examples of autopoietic rings produced by intersubjective cohorts working as a team.

The realization that these essential transformations may be produced by permuting five viewpoints, and that these viewpoints are equivalent to the five Hsing which the Chinese have isolated as their major categories for understanding the world, was a major step forward because it finally made the five Hsing comprehensible and showed how the pentahedron of four dimensional space articulates both the five viewpoints and the five essential transformations. The pentahedron in four dimensional space has been clearly the form on which the five Hsing was based ever since it was realized many years ago that the pentahedron were two intertwined
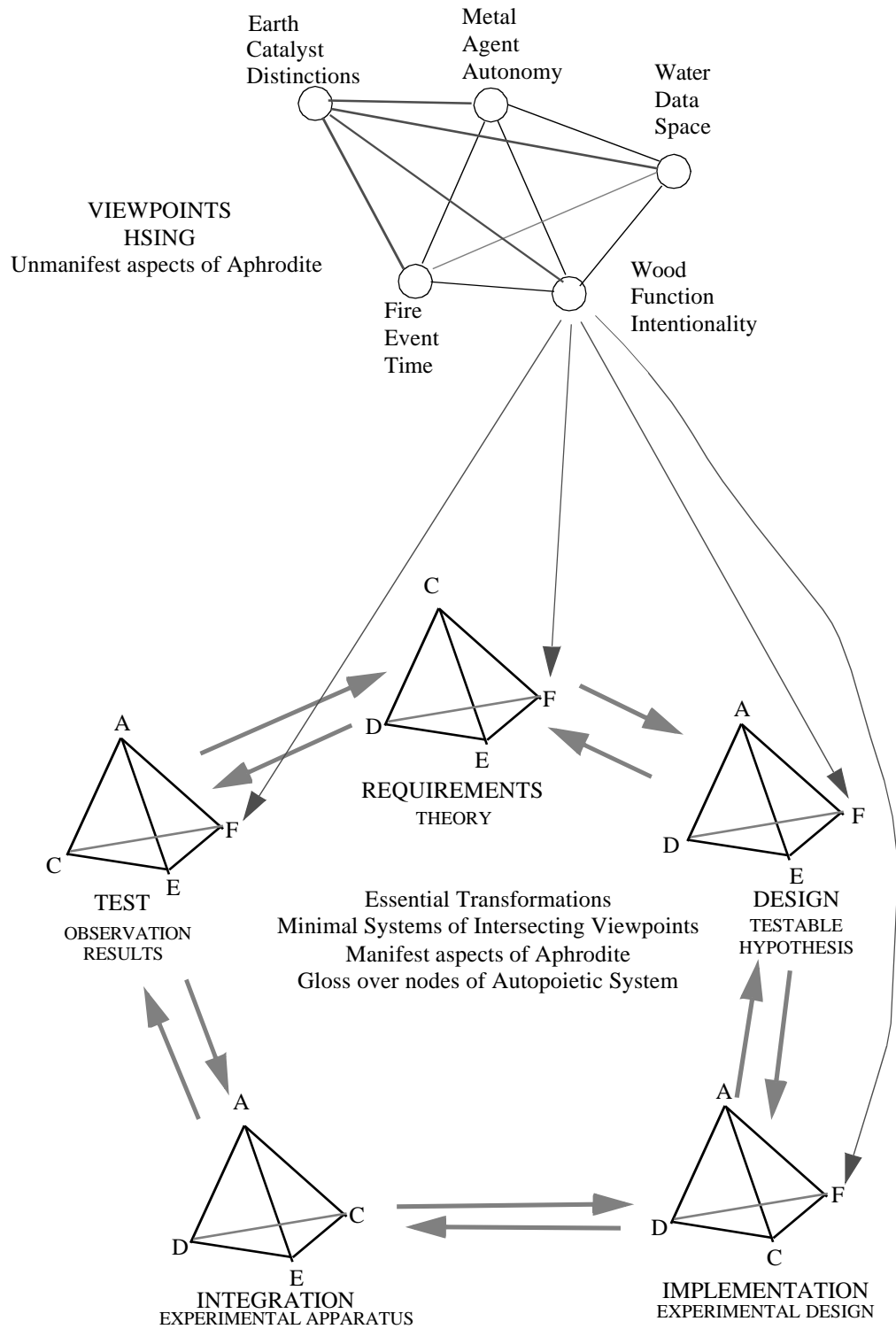
mobius strips. These intertwined mobius strips have exactly the same relationship with each other as the production and control cycles that appear in the Chinese theoretical constructs out of 32 permuted possibilities. What was new in my thinking was the fact that the pentahedron's five tetrahedrons were defined by permutations of the Hsing (viewpoints), and that these tetrahedrons were the five essential transformations which form autopoietic rings like those that occur in software engineering. This finally related the five Hsing to elements that could be seen as important from the perspective of general systems theory such as that of George Klir. Here, for the first time, East met West in a compelling connection between basic theoretical structures. We see here how viewpoints are connected to the minimal systems of essential transformations. Viewpoints are the duals of the essential transformations which are generated out of the permutations of the viewpoints. From each viewpoint, some specific aspect of the system being viewed is seen. Other aspects not associated with that viewpoint only appear when we change to other viewpoints. Any higher dimensional Platonic hyper solid simplex may produce a similar structure, and we may hypothesize that more complex autopoietic rings are the embodiments of these hyper simplexes. The pentahedron with five viewpoints and five essential transformations represented by minimal

systems (tetrahedrons) is merely the simplest possible of all these structures, and therefore will here represent the class.

In what went before, we saw that the windegg represented the autopoietic ring's closure, and we hypothesized that what lay inside that closure may be identified with Aphrodite. When the closure is smashed, we get the manifestation of the Furies. When closure is partially obviated, then we get the manifestation of one of the five aspects of Aphrodite: Longing, Desire, Eros, Action and Persuasion. In the theogony of Aristophanes, it is Eros that appears out of the crack in the cosmic egg. From Eros arises the birds, or bees, or partial objects, or desiring machines. These would form minimal systems when understood conceptually. The pattern upon which the minimal system is projected is a constellation of either a swarm (bees) or flock (birds) or some other rough hewn formation of the nodes of the autopoietic network. What is added to this picture is the conceptual gloss that sees how the five unmanifest aspects of Aphrodite are conceptualized as viewpoints, and how the different swarms of nodes that appear after manifestation are conceptualized as minimal systems within the field of a particular manifesting aspect of Aphrodite. So the geometric idealization is laid down on the rough hewn formation revealed in the spoof theogony of Aristophanes

that we have taken seriously.

FIGURE 72

Earth
Catalyst
Distinctions

Metal
Agent
Autonomy

Water
Data
Space

VIEWPOINTS
HSING
Unmanifest aspects of Aphrodite

Fire
Event
Time

Wood
Function
Intentionality

C

A

D

F

E

REQUIREMENTS

THEORY

A

D

F

E

DESIGN

TESTABLE
HYPOTHESIS

C

E

F

TEST

OBSERVATION
RESULTS

Essential Transformations
Minimal Systems of Intersecting Viewpoints
Manifest aspects of Aphrodite
Gloss over nodes of Autopoietic System

A

A

D

C

E

INTEGRATION
EXPERIMENTAL APPARATUS

D

F

C

IMPLEMENTATION
EXPERIMENTAL DESIGN

Once we recognize that it is possible to gloss the relation between the aspects of Aphrodite inside and outside the windegg with the structure of the Pentahedron (or some other higher dimensional simplex), then we have a basis for conceptualizing the structure of the autopoietic system. The unglossed autopoietic system is difficult to deal with conceptually. But once it is glossed by this geometrical metaphor, it is possible to extend our analysis and produce an elaborate model of the autopoietic system. In what follows, I will attempt to develop this elaborate model in brief form. In doing so, we move away from the implications of the autopoietic system for understanding manifestation to a model of a generalized autopoietic system with specific features. This exercise is somewhat like the formalization done by Plato in his lower utopia. But here we will not develop a utopian social model, but will instead stick to the geometrical analogy.

The next development of the pentahedral model of the autopoietic system is the realization that each of the five minimal systems representing essential transformations has four faces. The tetrahedron is just one form or face through which the minimal system might be viewed. The other complementary forms or faces are the Knot, Mobius Strip and Torus. These four figures share the attribute of having 720 degrees of angular change

embodied in their form. These are four completely different, orthogonal ways of viewing the minimal system. The 720 degrees (4 pi) is an important threshold from a topological point of view.

The concept of curvature helps to characterize minimal surfaces. Because each point on a minimal surface must have a mean curvature of zero, such a surface must be either flat--as a plane or a cylinder--or shaped like a saddle. In saddles, the surface at each point smoothly curves both away from and toward the pint. A four-legged creature standing anywhere on a true minimal surface would find two of its legs sliding down and away from its body and two edging down and closer to its body. That would happen at any spot on a minimal surface, unless the surface happened to be perfectly flat. In terms of soap films, saying that the mean curvature must be zero is equivalent to noting that the pressure on both sides of a soap film is the same.

Another important measure is that of total curvature. An ant following a circular path tuns itself through 360 degrees over the course of one complete circuit. That total amount of turning can be expressed as the number 2pi, which represents the total curvature of any circle., regardless of its radius.

Twisted, closed loops of wire have a total curvature that may be greater than the curvature of a simple circle. A wire that loops around twice before its ends join, for instance, has a total curvature of 4pi. As one step in solving the Plateau problem, mathematicians have been able to prove that for curves or contours with a total curvature of less than 4pi, only one disk-type minimal surface is bounded by that contour. However, if the total curvature of a curve is even slightly larger than 4pi, then quite wild and unimaginable things can occur.

Surfaces also have a total curvature. In the case of a sphere, it turns out to be 4pi and is again independent of radius.[1]

The sphere has a curvature of 4pi, or 720 degrees of total curvature. It is a very important threshold beyond which myriad forms appear. It is the minimal surface that gives the simplest possible from. The Knot, Mobius Strip, Tetrahedron and Torus take this 720 degrees of angular change and spend it in different ways, but still adhere to that threshold. These different ways of expressing the minimal structure are orthogonal to each other. They are totally independent forms. Their independence shows, according to Deleuze, that there is some expression of the
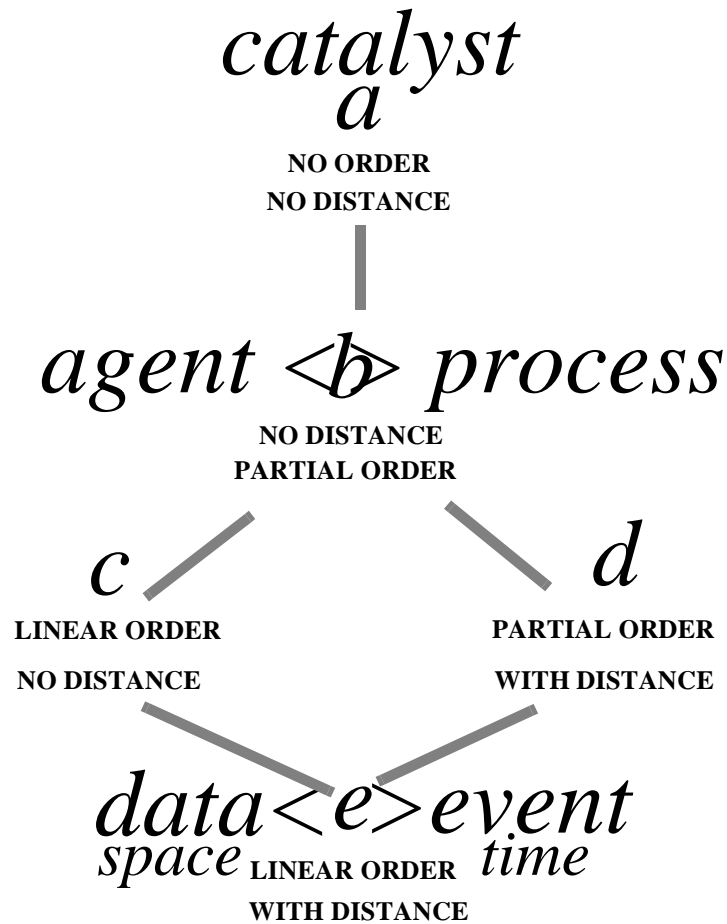
---

1. Ivars Peterson THE MATHEMATICAL TOURIST (NY: WH FREEMAN, 1988)

true unconscious in the emanation of these forms.

Realizing that each of our essential transformations which are glossed as minimal systems may be seen in any of these four faces, or deformations of the sphere, allows us to view the tetrahedrons that represent each phase as faces of the minimal system rather than sets of permuted viewpoints. This means that there are five minimal systems, each with four faces, rendering us 20 faces in all. These twenty faces are equivalent to the 20 Mayan day names or the 20 sources in the <u>I Ching</u> beyond mirroring and substitution. These are the 20 basic forms which are seen as the interaction of the 5 Hsing, as celestial causes, with the four earthly Greek elements of Earth, Air, Fire and Water. These 20 permutations of viewpoints and minimal system faces allow us to schematize the nodes of the minimal autopoietic system. Each node has a specific quality based on the essential transformation, the viewpoint, and the face of the minimal system represented.

FIGURE 73

The four faces of the minimal systems have an interpretation relevant to the representation of the autopoietic system. The mobius strips of each face, and the twin intertwining mobius strips of the pentahedron, may be seen to represent the bi-directional information

catalyst
a

NO ORDER
NO DISTANCE

agent <b> *process*

NO DISTANCE
PARTIAL ORDER

c *d*

LINEAR ORDER   **PARTIAL ORDER**
NO DISTANCE   **WITH DISTANCE**

data<e>event
space **LINEAR ORDER** *time*
WITH DISTANCE

flow within the ring of the autopoietic system. The knots of each minimal system relate to the interference pattern where outside inputs cause perturbations in the autopoietic ring which is continually homeostatically adjusting itself. The torus of each minimal system represents the whole ring from the point of view of each essential transformation. The tetrahedron represents each minimal system as a whole structured conceptual unit. The tetrahedron is a lattice, and as such, represents the coming into existence and going out of existence of the structure of the single essential transformation. So the minimal system of faces of the minimal system serve

specific purposes in representing the salient features of the generic autopoietic system.

Another important point that came out of the study of the relation of the viewpoints on software systems to General Systems Theory of George Klir is that the viewpoints do not all have the same ordering capability. Specifically, there is a lattice of what Klir calls methodological distinctions for support variables. The different viewpoints appear associated with different methodological distinctions in this lattice.

Generally, the less order, the more meaning or significance is attributed to the viewpoint. Thus, the Catalyst viewpoint is the source of all the semantics of the system which is expressed in terms of Autonomy and Function as Linguistic patterns. Full ordering has the least significance. The different ordering characteristic of the viewpoints contribute to the differences between the essential transformations described by sets of these viewpoints.This also explains some of the differences between the five Hsing. Generally, we may associate the three different layers of ordering with the levels of the analogy of the Geode. The Catalyst viewpoint is the cornucopia from which all the possible orders and permutations of the possible configurations of the system unfold, so it is related to the empty core of the Geode.

The Function and Agent viewpoints are related to the crystalline structure of the Geode. The Event and Data viewpoints are related to the surface of the Geode. The Geode is the analogy for the meaning structure of things where everything with meaning is seen as empty. The Catalyst viewpoint represents a positive view of the essence of manifestation. When we view the essence of manifestation not as a blackhole but as a white hole or source of forms within the world, then we get a picture of what the Catalyst viewpoint is all about. The outer layer of things is their spacetime/timespace organization. The structuring of things relates to their embodiment of autonomy and intentionality from a human perspective. The ability to make distinctions characterizes the Catalyst viewpoint. These distinctions are the source of the semantics in the system and the selector of the specific forms out of the myriad possibilities may arise from the cornucopia of the sources of the system. The Catalyst viewpoint is what drives the form of the system in a particular direction in its embodiment of Autonomy and Intentionality in the spacetime continuum. The Catalyst viewpoint gives that specific embodiment its semantics through its relation to all other possible structures and forms.

Once we see that the essential transformations are minimal systems with different faces related to different

viewpoints which each have their special relation to ordering and to the bestowal of significance, then it is possible to make another leap in our path of unfolding thought about the structure of the autopoietic system. That leap is to realize that just as the minimal system has four faces, so to, the pentahedron itself may have four different faces that correspond loosely to the faces of the minimal system. We get some inkling of this when we note that the two mobius strips glued together in the form of the pentahedron are really a Kleinian bottle in four space. This Kleinian bottle has been studied and has various forms when projected on threespace as shadows. These forms are called the Etruscan Venus, Roman surface, Boy surface and Ida surface[2]. These four surfaces are transformable into each other and represent the Keinian Bottle's form in fourspace. This is the pentahedral equivalent to the mobius strip face of the minimal system. Looking for the equivalent of the Knot and Torus faces are not so straightforward, but there is a way to see them. First, note that the pentahedron may be seen in terms of the permutation of Yin and Yang in five places, producing a set of figures like the Hexagrams of the I CHING only with five instead of six solid or broken lines. This is the 2^5 level of the progressive bisection. Such a system of 32 figures can exhibit mirroring and substitution transformations, and may be seen to exhibit

2. Ivars Peterson ISLANDS OF TRUTH (NY: WH FREEMAN, 1990) pages 35-46

some of the dynamics of an interference pattern and so represent the knotlike face of the pentahedron. Also when we turn to group structures, we see that there are five groups of order 20. These groups may be seen to form a ring of logical types were the 20 elements are combined under five different operations. A group with two operations is called a ring. This super-ring has five different operations on 20 elements. It is like the torus in that the elements of the groups form a closed system that no operation takes us beyond. Thus, the group exhibits closure and some of the same relations between opposites that can be seen in the 32 pentagrams. In fact, it is possible to see the 20 elements as the fore mentioned combination of the Hsing with the Greek elements, and these act as places to hold the qualities of the pentagrams. In this way, all four faces of the pentahedron may be represented concretely.

It will be noted that the Sporadic Group J2 of order 604800 elements, which is 4x5x6x7x8x9x10, or the number of seconds in a week, is of particular interest in the way it encompasses all the discrete elements in the faces of the pentahedron. The pentahedron has the group A5 along with the icosahedron as its symmetry group. This group prevents all equation with more than four variables from being solved except by analysis. It is the major closed door of higher mathematics. J2 is A5 times

a group of order 32 which is a quaternion times a dihedral. Also, J2 can be analyzed as a group of order 6048 times 100. This 100 can be seen as five groups times 20 elements. J2 functions for this model of the autopoietic system as the 5040 households of Plato's model. It is a larger number, but is divisible by a large number of divisors. J2 offers a way to encompass and relate all the discrete elements of the different faces of the minimal autopoietic system.

When we begin thinking through this model of the autopoietic system based on the faces of the Pentahedron in fourth dimensional space, the first striking thing is that our concept of the windegg must alter radically. We now see that the windegg is the Klienian bottle in four dimensions. Unlike that same bottle in three dimensional space, this higher dimensional version does not have to pass through itself. Using the tricky relations between things in four dimensional space that allows us to travel from the inside of a sphere to the outside without crossing the boundary, the Kleinian bottle can achieve its aim of having a single surface which is both inside and outside without passing through itself. This is what makes the Kleinian bottles' surface so complex in the fourth dimension. But if we take this mathematical fact and read its ontological implications, we immediately realize that wind egg is this Kleinian bottle, and that the inside

and outside of the windegg is the same surface without any edge like a mobius strip. This means that there is really no inside different from the outside except in the sense that any two points on opposite sides of the surface are differentiated by a journey around the surface in order for them to coincide. Inside and outside is relative in all cases. It is not like the kinds of eggs we see here in the third dimension which definitely has an inside and outside. It is not even like the sphere that can be manipulated to pass its boundaries without touching them. It is a special system where the inside IS the outside. When we think of the soliton and its channel, we might say that this surface is the endless channel which is negentropic. We know it is possible to have perpetual motion machines in the fourth dimension. Well, here, the Klienian bottle is a in four-d serves as that channel such that both sides of the channel, the inside and the outside, are both the same channel. Here soliton waves move endlessly across a channel that is endless but is not entropic, thus making perpetual motion possible. Reading this back into our metaphysical model, we see that talking about Aphrodite being inside the windegg, and Eros being a manifestation of an aspect of Aprhodite, and the Furries being a broken cosmic egg is nonsense. The egg is a strange mirror surface that allows the distinction between points on one side and the other, but every point is in some sense transformable into every

other point without crossing any boundary. Crossing the boundary is, in some sense, meaningless. The boundary is a distinction in which the two sides of what is distinguished are the same thing and this is true of all the points on the surface that might be distinguished. This is a remarkable property which tells us that whatever the negative and positive fourfold refers to, does not really have any hidden part as opposed to the exposed part. Everything is equally hidden and exposed. What is hidden at one moment may be exposed by an operation of transformation. Gliding over the surface gives a showing and hiding effect without ever finding a singularity or hidden point that cannot be transformed into a seen point. But from the viewpoint of the third dimension, this perfect showing and hiding mechanism with no hidden workings becomes full of singularities and catastrophes. Thus, the folding and crossing through itself of the Etruscan Venus, Roman, Boy and Ida surfaces which are shadows in three-d of the four dimensional Klienian bottle. In these three dimensional models, there is something always hidden in the folds of the three dimensional projection of the four dimensional surface. These three-d surfaces may be transformed into each other by moving the folds, but in all cases, the folds and singularities prevent smooth showing and hiding transformations.

The projection of the four-d surface onto three-d space causes the immanent aspect of the windegg to appear. It appears to us because we are inherently limited. If we were not limited, we would see the pure showing and hiding of the four-d Klienian bottle. This says that it is our limitations that places the essence of manifestation in play. It is not a feature of the windegg itself. The darkness is something we project on manifestation. It is not all sweetness and light, but the unconscious aspects come from our limited perspective and are not built in from the first. The windegg or Klienian bottle in four-d is a surface that separates night and day, but this distinction is purely relative, and night and day may be interchanged by moving across the surface. The windegg is a covering and uncovering simultaneously because to uncover all you have to do is move across the four-d surface. Whatever is on the other side and out of sight locally is covered. Uncovering means moving around the surface to see what is on the other side. The windegg, or Klienian bottle, has a strange order dictated by the structure of four dimensional space. That order is strange but not chaotic. Perhaps the projection into three dimensional space makes it appear chaotic but it is, in fact, very carefully ordered in a non-intuitive way. The windegg, or Klienian bottle, is both abyss and foundation simultaneously. What is like an abyss is that it makes a never ending distinction, and as such, it provides its own

support. It is in some ways a perfect model of transcendence grounding itself. The flow of the solitons in the channel is endless, and the channel wraps back on itself precisely as an Escher waterfall, only in this case, what is outside the channel on one side is inside on the other. Rolling across this surface is a never ending fall as in the Abyss of Tartarus, but the never ending surface is itself a foundation where nothing has to be on the other side. No elephants or turtles holding up the world. The other side is the SAME as this side, only different. This is an example of a difference where what is different is simultaneously the same without paradox. So the positive and negative aspects of the manifestation model are seen to be a chiasm in which in each case the difference drawn is a difference in the sameness. The principle of identity cannot comprehend these seemingly paradoxical surfaces which are, in fact, structures within the world but at a higher dimension so that the projections we must deal with appear different from the source of those projections. It is the limitation of our point of view that makes these structures appear complex and folded in on itself.

If the windegg is different from what we expected, then let us look at the pentahedron view of the same object. This view immediately makes us consider the group A5 which is the bane of all mathematicians. It is a closed

door in mathematics which prevents equations with five or more variables from being solved except by analysis. We cannot rotate the answer in from the unseen as we can with four or fewer variables. Thus, where the windegg is seen as an open surface in four-d, there is associated with it a real barrier from the group structure aspect. This barrier is like the unconscious itself because it is a complete denial of access except by trial and error, luck or subtle pattern recognition. This closed door is the opposite of that which the heroes tread to Hades. It is a closed door that inherently cannot be opened. Thus, the pentahedron has a hidden aspect that will always remain hidden. Thus, while the windegg appears to make showing and hiding accessible and the culprit our limitations of three-d perspective, the pentahedron's symmetry group displays an obvious barrier to manifestation which can only occasionally be crossed in special cases. This same symmetry group connects the four-d pentahedron with the three-d icosahedron. The icosahedron embodies the golden mean in multiple ways which is based on the square root of five. Thus, here too, there is a projection into the third dimension from the fourth, but in this case, the very group that prevents access to higher order equations is exactly the same group that provides the mapping from the fourth to the third and vice versa. The golden section is the ideal relation between two parts of anything. It appears as the

Fibonacci series where parts of parts of parts are related by the same ratio. Thus, the very denial of access to higher order equations solution gives us a view of how the part and whole should be ordered. The disorder of higher order equations is balanced by the perfect order within the three dimensional realm. Permanent hiding is balance by perfect showing in which each part has its proper due in a perfectly complementary relation.

We can see that ordering as well in the way the five viewpoints generate the five essential transformations, how the five hsing interact with the four greek elements, how each of the five minimal systems have four faces as orthogonal geometrical objects. The pentahedron multiply orders its elements in a very subtle and sophisticated way. An example of this is how with only five points, the 20 points of five tetrahedrons are defined. With only ten lines, the 30 lines of five tetrahedrons are outlined. With only ten triangles, the 20 faces of five tetrahedrons are shown. This reuse of points, lines and surfaces in higher dimensional figures reveals how the same element may appear again and again, doing double duty many times over. Thus, manifestation has an unfolding property out of a super coherence that makes it like a self-embedded multifaceted jewel. In that jewel, the facets have perfect harmony with each other, expressed in the presence of the golden section. And that

jewel has an aspect that hides forever the inner coherence of its hidden facets. This model tells us something deep about the nature of manifestation. It is an infolded, perfectly ordered jewel with inherently hidden aspects.

The aspect of the pentahedron that is like a knot which shows us the characteristics of an interference pattern relates the pentahedron in the form of the five Hsing with their Yin and Yang qualities. According to the Chinese, there are ten celestial stems (5 Hsing times 2 Yin/Yang) and 12 terrestrial branches. The terrestrial branches can be seen in the structure of the icosahedron that has a lattice of 1-12-30-20-1. The 12 points or faces in the icosahedron or dodecahedron duals may be seen as the 12 terrestrial branches. In the Chinese system, the 12 branches are permuted with the 10 stems to give a cycle calender with 60 different combinations (order does not matter). So here in the Chinese system, the precise relation between the pentahedron and icosahedron through the group A5 is mirrored. The assignment of Yin or Yang to each of the five Hsing allows us to generate the 32 pentagrams which are like the hexagrams of the I Ching. The pentagrams stand for different qualities, where the different Hsing are either present or absent. The presence of all the Hsing is major Yang, and the absence of all is major Yin. In the pentagrams, because they are odd, there can never be balance like there is in

the hexagrams. The pentagrams always tip the balance one way or the other like the golden section which is not ever equally weighted either. All the other 30 pentagrams show us a spectrum of all the possible combinations of the five Hsing. This spectrum gives a picture of different qualities of combinations of the five Hsing. Applying the same rules of combination of hexagrams to pentagrams, we see that the result is a set of qualities that can be combined to transform into each other. Studies of the I Ching show that this is a ring with two operations, and that these operations (substitution and inversion) allow any one pentagram to transform into another pentagram through the auspices of a third pentagram. The third pentagram is invisible in the operation, but appears as the reconciliation between the two pentagrams that are operated on. It is as if the third pentagram is the glass that separates the two combined pentagrams from their result. Thus, we get a picture of a structure where the quality contained in a compartment is enclosed by other qualities which sometimes act as wall, and other times act as qualities. The saying that "the wine is the glass" is actually modeled here. So we get a picture of the interconnection of quantity and quality here, which is very rare. It says that manifestation is a process of intertransformability in which the same 32 qualities may act as either container or contained. This gives a picture of manifestation which is like a hologram

in which the parts are, in some sense, mirrors of the whole, and the whole has a transparency which comes from the use of the same elements as either quality or containing quantity. Manifestation in this vision is the process of transformation between the poles of quantity and quality where qualities role over into their opposites by a binary logic. This picture of manifestation has been present in the Chinese philosophy rooted in the <u>I Ching</u> for millennia. But here we find that it is part of our understanding of manifestation in the West, as we see the opening up of the windegg into the manifestation of Eros in terms of the transformability where the different hidden aspects of Aphrodite are each counted as on the inside or outside, as Yang or Yin. Full manifestation of all the aspects of Aphrodite may be seen as Yang Splendor which is also seen as the manifestation of the Furries, whereas the complete closure is closed Yin where nothing is revealed which is pure immanence.

The final way in which the pentahedron appears is as the five groups of order 20. Here the five groups may be seen as a ring of higher logical types so that major changes in regime appear as movement from a lower to a higher group, but that the levels form a closed ring with only five layers. The elements are the points that appear in the five minimal systems and are also closed. Thus, the group structure is closed in two directions like the

torus. This structure exemplifies closure and transformation at the same time. It is like the group structure of the pentagrams in that way. But here, the group structures exemplify the relation of opposites to each other more strongly. Each element has its opposite, and there is a mirroring with the identity element. Thus, the structure of the dynamics of the opposites is clearly made visible within the closed system of the fivefold ring. This exemplifies the closure of the autopoietic system as the four-d Kleinian surface exemplifies its strange openness. But this closure is Algebra-like rather than physical like the torus. It says that manifestation deals in opposites and the mirroring of opposites in the identity element. Here the five identity elements represent the five Hsing, each of which is a locus for the transformation of opposites within the 20 basic elements which are closed. The dynamic of opposites, and the change to higher logical types, gives the system a certain freedom in spite of its constraint of closure. When an impasse is reached, then move to a higher logical type and execute a different group operation. Thus, the rolling over of opposites does not need to stall and become fixed as it would if there was only one or two group structures mapping the same elements. What is an identity element in one group is just a regular opposite in another group, so there is perpetual motion within the process of opposites rolling over into each other via the two kinds of

closure.

Each of the views of the pentahedron gloss can be seen to tell us something significant about manifestation. We need to pay close attention to these lessons because they are largely forgotten in the older mythic representations of the autopoietic system. Here we have a concrete model of autopoiesis to exploit and explore. It has a mathematical realization which we can interpret from an ontological perspective and see that there is deep meaning there. We do not have to construct a society as Plato did in order to embody this model of manifestation. It is important to note, however, that the orthogonality of the different views is important, both in the tetrahedron and in the pentahedron. This orthogonality guarantees that they are direct manifestations from the essence of manifestation. The fact that they are reconciled by the larger J2 group does not disturb this important aspect of these geometric analogies. The J2 reconciliation merely allows us to see the different discrete elements of the views of the autopoietic system as a single global structure without sacrificing the independence of the different views. This can only be achieved in a group structure where the nested sub-groups remain independent groups even as they partake in larger group structures. This overall coordination of the different discrete aspects is seen even in the distinction of the

Kleinian bottle surface, since J2 is part of a larger group that contains two J2s. The overall coordination of elements tells us that manifestation is coherent in all its aspects and it is not ever incoherent. Whatever is manifesting one place is balanced by a counter manifestation somewhere else. Also, J2 gives ultra divisibility which allows all the elements to be seen as wholes, as they are parts, no matter how they are grouped. This is the aspect of manifestation that is like the *Holoid*. The Janus faces of the *Holon* appear in the relation between opposites imposed by the golden section. The cycle of 2XJ2 (1209600)is like the great year of the Hindus which appears in Plato as well. This is the manifestation of the *Epoch*. The jewel-like character of the pentahedron reminds us of the uniqueness of the *Integra*, while the fact that the autopoietic system has the structure of the emergent event reminds us of the *Novum*. The actual operations of the autopoietic system take place in space and time so these remind us of the *Eventity*, whereas the Kleinian bottle in four-d has some of the characteristics of *Essencing* forth. It is the orthogonality which reminds us of the *Ephemeron*. The autopoietic system has all the characteristics of the trigrams of Being because it is the minimal representation of transcendence, attempting to ground itself as it wraps around pure immanence in the fall toward identical and unified Conceptual Being.

Publisher:

Apeiron Press

PO Box 4402,
Garden Grove, California
92842-4402

714-638-1210
palmer@exo.com
palmer@think.net
palmer@netcom.com
Thinknet BBS 714-638-0876

This book was typeset using Framemaker
document publishing software by the author.

Keywords:

Being, Ontology, Sociological Theory, Indo-
european Mythology, Plato's Laws, Emergence,
Technology, Worldview, City Form

Electronic Edition:

Adobe Acrobat PDF

Available from http:\\server.snni.com:80/
~palmer/dialognet.html