ADVANCED SCHEMAS THEORY FOR SCHEMAS ENGINEERS

Chapter 3 of the Anti-thesis

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Version 0.02; 02/10/08; sd02v02.doc

Keywords:

Schema, Meta-system, System, Process, Engineering

Summary:

None yet.

Schema Theory

We have discussed four different schemas. Three are well grounded in the tradition. They are Form, Pattern, and System which each have their own value in terms of understanding, i.e. Proof, Explanation, and Description. To these we added the Meta-system whose value in terms of understanding is more vague and is tied to indication. Meta-systems are difficult to deal with because there is not general term for this schema that is well accepted in the tradition. It is in fact alone in this lack of determination in the tradition. Other schemas that we will discuss now have a determinate name and characteristics if they are identified at all. We have laid special emphasis on the Meta-system. It is the key to understanding Special Systems and the Emergent Meta-system. But we should also talk about the other schemas so we have a general context for understanding the relation of the system and the meta-system to each other. In other words, Schema Theory is the necessary background for understanding the relation of the System and Meta-system schemas to each other. They have a special relation that is not repeated in the other schema, but for completeness sake we will try to describe schemas in general.

Here we will present a tentative hierarchy of nested schemas. This hierarchy should not be considered the final word on the schemas. Rather it is a challenge to future researchers to isolate the schemas from the literature and to build a general theory of each kind of schema as a basis for schema theory in general that should cover all schemas, i.e. projected ordering templates used in Science or the Humanities. Our hypothesis is that the following hierarchy is the extent of existent schemas in our tradition.

- Pluriverse
- Kosmos
- World
- Domain
- Meta-system **
- System *
- Form *
- Pattern *
- Monad
- Facet

The schemas that appear in the formal structural system are marked with one asterix

and the one we have introduced that is the dual of the system, i.e. the meta-system is marked with a double asterix. The others are new to our discussion, but for the most part they appear already in our tradition in one form or another. There are a lot of interesting relations between these schema, but the major one that we will discuss right now is the fact that they all nest. In other words each schema is an emergent level of organization of understanding projected on the world. Each template nests into those adjacent to it. So it is possible to climb this stair way of understanding step by step. However, you cannot reduce one to another. Form cannot be reduced to pattern content that covers the shape of the form. Content is something completely different from Form, but they fit together, content appears upon the topological surface of the form, or within the volume of the form, all depending on the dimensionality being used. Content may be patterned independently of the shaping of the form. Different algorithms are used to shape forms as opposed to patterning content. Yet there is a superimposition of content onto the topological surface of form, or into the volume of the form, etc. on up to higher dimensional representations. However, when we consider the content itself, as the smallest determinable element, then we are forced to consider monads. Monads were described by Leibniz. We do not necessarily subscribe to the metaphysical implications of Leibniz ascription of characteristic to monads, but monads exist as the smallest determinable element of our ontology. That may be the form, or the pattern, or the atom, or the particle, or the quark, or the string/brane, etc. What ever is the smallest discriminated element that is what we are considering is a monad. Beyond the monad is the facet, i.e. facets are non-isolateable, like the quark, A facet must be a facet of a monad. We cannot see into the glass darkly further than the facet of the monad. Facets arise from the indeterminate nature of the monad. To the extent that monads are indeterminate they are faceted. In quantum mechanics this becomes superimposition, or uncertainty. In terms of relativity theory this becomes different spacetime allocations based on inertial frames, or it becomes the way local flat spacetime relate to Rinmann curves in spacetime. Faceting is the limit of our understanding of the world at the low end. Faceting is the internal structure of the monad which cannot be reduced or isolated.

Going the other way up from the meta-system the next layer is the Domain. Meta-systems establish horizons and domains are coherent sets of horizons. The domain is like the discipline within the university. It normally is associated with a regime of rigor that defines the discipline. As disciplines fit together into the university so domains fit together to define a world. The world is the schema that Heidegger concentrates on in Being and Time. The world is the highest level schema that the human being experiences. Husserl calls that direct experience of the world the lifeworld. We do not experience the Kosmos or the Pluriverse directly, but we build models of it indirectly. The same is true of the pattern, it is the smallest scale schema that we experience. Monads and Facets are not directly experienced. Rather we use instruments to attempt to get a handle on them. This is similar with the Kosmos and the Pluriverse. They are only investigated via instruments. The kosmos was introduced by Anaximander at the beginning of the Metaphysical era as a way of relating to everything that is. He also introduced a map of the world and an astronomical calendar. These are all ways of relating to the kosmos. Generally the komos is the way we try to understand what is beyond the human scale in the macro direction. What we cannot see that we know is beyond the kosmos is seen as the pluriverse. For instance, David Deutsch's Fabric of Reality talks about the Pluriverse as the multiple physical worlds that interfere with each other to create quantum phenomena. This is an excellent example of the pluriverse. One thing we should note is

that the various schemas are paired in the following manner:

Pluriverse - Facet (beyond direct experience)
Kosmos - Monad (beyond direct experience)
World - Pattern
Domain - Form
Meta-system - System

Of these the first two are beyond direct experience while the last three are experienced directly. These paired schemas form duals of with each other. In this way the seeming macro to micro duality is changed into a difference of scope between the pairs.

Besides this duality, there is also the fact that the various higher schema pairs are in a way a repetition at a different emergent level of the system-meta-system pair. In other words the system-and meta-system are the baseline for the type of relation that are established between the pairs, except as we move up the series a greater extent is covered in each case. Domains and Forms are further apart than Meta-systems and Systems yet the kind of relation they have to each other are still on the order of the type of relation that exists between the System and the Meta-system. Another point of importance is that the set of schemas form an autopoietic ring. In other words the facet fits into the pluriverse in a way that allows us to continue around the ring of the set of schemas. As an autopoietic ring each layer is generated by the conjunction of the two adjacent layers in the series. The characteristics of each layer actually is determined by the conjunction of the two layers above and below it. All of these odd interrelations of the various schemas, their nesting, their pairing, their circularity, and their production by adjacency are very peculiar characteristics of the series that all contribute to their being defined as dissipative special systems that form autopoietic and reflexive configurations. So the schemas are themselves an example of the special systems which are used to locate the special systems. So there is a sort of interesting non-well-founded relation, or circular definition at work here.

The schemas are for the most part just picked out of the scientific literature as assumed templates of understanding that are sometimes named and other times only indicated. They are assumptions that the scientists make concerning what is understandable. They are templates of understanding generalized from a reading of a broad cross section of the scientific and philosophical literature, as well as the humanistic literature. This generalization was motivated in order to clarify discussions of various phenomena. If two people are using different schema to describe a phenomena then they will never understand each other unless they recognize the various templates that are being assumed by the other partner is conversation. Any schema can be projected on any level of phenomena. Two different schemas will see different things in the phenomena in question. They are different lenses of understanding and they are useful for different purposes. They are neutral in the sense that one is not necessarily better than the other for a given purpose, but they have different advantages and disadvantages in different circumstances. We should not be arguing about schemas projected by others on phenomena, but merely recognize the difference and understand the relations between the schema. In principle one may project any of the schema on any ontic emergent level of phenomena. I will not reify a specific ontic emergent hierarchy but will merely mention one example of such a hierarchy:

- Gaia?
- Social
- Organism
- Organ
- Cell
- Macro-molecule
- Molecule
- Atom

- Particle
- Quark
- String?

The key point is not what these ontic emergent levels of the physus are but that they should not be confused with the schema. The schemas are projections of Being from the logos onto the physus. By the discrepancies and anomalies that occur in these projections when tested we discern the nature of the emergent layers of the ontic and disentangle them from the ontological projections. Science is focused on this process of disentanglement. But science uses projected schemas in its work. Without them it would not be able to see anything nor explain what it saw to others. But it sees through a glass darkly as the schemas distort what is schematized. So science plays close attention to the discrepancies, and thus both refines the schemas and also the ontic levels of phenomena in the physus over time. Schematization goes though a social construction cycle of projection, reification and objectivization, and discrepancy tracking that causes emergent changes in the theories concerning phenomena. It is not like the description of Closure by Lawson which is monolithic. Rather there is a give and take between logos and physus, between ontic and ontological, between the various emergent layers of the ontic and emergent layers of the ontological that is worked through in order to develop the best possible view of the phenomena through the distorted lens of the projected schemas. However, it is useful to be able to describe this process in terms of Closure of Openness producing material and texture as Lawson does. But Lawson does not describe how a particular form of matter with texture gets produced, and that is though the dialectic between physus and logos, between ontic and ontological, between various emergent levels on each side. There is not neat tidy relation between the schemas and the emergent levels of phenomena. Rather there is a ragged edge that is variously projected upon and compared to other projections, new levels of phenomena may be identified, new schemas may be created in the process. Our list of either is only tentative and experimental. But the actual production of new emergent layers on each side is a big deal and will change the entire configuration. We are constantly on the outlook for these emergent events. On the one side it means that the physical universe has changed fundamentally in our understanding and on the other side it means our apparatus of understanding has fundamentally changed. Both types of emergent change on either side are extremely significant. It is not just a matter of switching to another configuration of closure, as G.H. Mead says emergent events have a profound effect on the entire edifice of closure and also effect how we conceive of the openness. This difference with the concept of Closure of Openness presented by Lawson is very instructive. It is not that our concept is dualistic and his is monolithic. But ours strives toward a non-dual model, but we must start out considering both the monism and dualism in order to recognize the possibility of the non-dual alternative.

So we begin by saying that between the ontological and ontic there are the strata of the kinds of Being differentiating between the two. In other words we do not just passively define the difference between the ontic and ontological as the difference between being and Being, but go further and say that the kinds of Being inform and differentiate this difference. In this way the ontic is seen as the thing in itself at an extreme where it is identified with existence, as the existent thing. We successively move through the kinds of Being as we span this difference. In fact, as said in my dissertation The Structure of Theoretical Systems in relation to Emergence (LSE 1982) it is necessary for an emergent event to traverse all four kinds of Being to be genuine. If it does not complete this arc then it is an artificial emergence, i.e. does not come up to the standard set by G.H.

Mead which defines radical change that effects everything within the realm of schematization. Artificial emergence has only localized effects and its changes are isolated rather than pervasive. For instance, the type of change that Koestler talks about in the Act of Creation are artificial. The type of combinatorial exploration that X talks about is artificial. In fact the sort of changes Lawson (or for that matter Kauffman in his Investigations) talks about that moves from one configuration of closure to another is still artificial. He does not think deeply enough about the relation between Openness and Closure. There is no pure openness nor pure closure. Openness can be seen as a style or mood of disclosure within the world. This style or mood changes depending on how closure is socially constructed. Openness is not a pure plenum, it is not pure Being as Lawson perhaps suggests. Rather Openness is striated into the kinds and aspects of Being which are crossed with each other according to Russell's logical type theory. Through this striation various possible closures arise some of which are actualized. We might move from one actualized closure to another. Doing so will change the style or mood of disclosure, i.e. openness. But if we breach all the striations between openness and closure then Openness will be radically transformed as will the total configuration of Closure. The relation between Openness and Closure may be transformed radically by an emergent event. What is missing in nearly all these models of schematization in relation to the things-in-themselves is the fact that emergence event set the standard for all changes in the relam of the interaction between schemas and the things-in-themsevles. The emergent event is the most radical change because it is the one what changes everything in relation to everything else. All other changes are degenerations from that most radical change. Most theories start with incremental changes and build toward the emergent but never quite reaching that level of radicality. Rather we need to start by understanding the emergent event as the standard by which all other lesser changes are comprehended. The way this is done is by dropping out one by one the various kinds of Being. When we do that the difference between ontic and ontological becomes simpler and simpler. The most complex description is that of the kinds of Being because it encompasses all the possible radical discontinuous changes that are possible between ontic and ontological. When we get to just accepting the ontic and ontological as having Pure Being then we have erased the difference between being and Beings, which has been the traditional tendency up to the turn of the last century. Adding in each kind of Being between the ontic and the ontological complexifies that difference more and more until we reach the threshold of existence. At that point the difference becomes more than a difference of kind, it becomes a difference of utter alienation. And this happens at just the fourth meta-level of Being, which is strangely close at hand, but there is an exponential decrease in our ability to think the higher meta-levels of Being until when we reach Ultra Being (which equals existence) the ability to think at that level is eliminated without switching from Being to the basis of Existence that can be comprehended either as emptiness (Buddhist Sunyata) or void (Taoist wu [?]). Confronting this radical difference tells us a lot about our worldview. It is the threshold at which the changes become incomprehensible to thought, and thus something different from change, something radically emergent. I call that the novum, because it is like an exploding star when it occurs, even more it is perhaps like a gamma ray burst. It is utterly discontinuous change that is unheard of, not foreseen, incomprehensible. When it occurs all previous closures are off within the realm where it happens. Openness is radically reinterpreted. It is a possible utter freedom that completely determines us, because we don't know when it might occur, nor can we predict its extent before hand. It is the most radical and unpredictable and deeply

transforming event that we know about. It is the kind of event that occurred when we switched from the mythopoietic to the metaphysical worldview. We didn't decide to utterly transform everything, but it happened starting with Thales and Anaximander and the physicalist presocratic philosophers. That is the deepest transformation of our worldview that we know of occurring. It was an emergent event that utterly transformed everything. It can happen any time. In fact many say that it has either already happened again or is long over due. But no one knows where it will begin or who will trigger the next change of eras. It may take some time for us to understand the change when it occurs because we are still looking at things through the old worldview. But when it occurs it will be utterly profound. Heidegger, in his Contributions to Philosophy (from Ereignis) says that it occurred when Nietzsche said "God is Dead!". We are still waiting for the radial discontinuous change in our understanding to catch up with us if it has already occurred. Until then we will continue working with metaphysical era tools. However, we have suggested that perhaps the next era should be called the Global, and it might be eschatological rather than calling it as Heidegger does historicizing and relating it to his philosophy of the Folk.

What are schemas?

Another point that should be made is that the schemas are related to the kinds of Being:

Pluriverse - Facet - Wild Being
Kosmos - Monad - Hyper Being
World - Pattern - Process Being
Domain - Form - Pure Being
Meta-system - System - Ultra Being

Looking at this correspondence we can see why Heidegger took the World as the schema to concentrate on in Being and Time as he was introducing Process Being as an additional mode to Pure Being to form the monolith of Being. It also explains the difference between those schemas that are within experience and those outside of experience. It is Hyper Being and Wild Being that are outside experience, they are the upper reaches of the kinds of Being as the complementary dual of Pure and Process Being. All the kinds of Being together form the Multilith. The Multilith is the underlying substrata for the schemas. Systems and Meta-systems have a special relation to the other kinds of Being because they are founded in Ultra-Being which is existence rather than any of the kinds of Being. Thus there is a significant difference between the System and Meta-system schemas and the other schemas. This difference is emphasized by the fact that from between the System and Meta-system schemas unfold the Special Systems which the other schemas do not appear to support. The relation between the Schemas and the Kinds of Being is such that as we move down through the schemas we are moving through the kinds of Being. There is a formula that says that an Idea equals form plus sign plus trace plus propensity. In other words the substrate of the idea are the various levels of Being. An idea is an illusory continuity. It is therefore empty or void and thus can be described in terms of Ultra-Being. The schemas take this formula and work out its implications in terms of the overall structure of the schemas. So we have that the Systems equals Form plus Pattern plus Monad plus Facet. And we have Meta-System equals Domain plus World plus Kosmos plus Pluriverse. In both cases there is a hierarchy of logical types that move off to infinity but are practically limited at four levels. Each of these levels of schematization are related to different kinds of Being going in each direction.

Now that we have some idea of the structuring of the schemas overall it behooves us to try to place them more broadly in relation to mathesis and language. Schemas are very peculiar matters. They exist below the level of language but above

the level of math. Metaphysically they are below the level of categories but above the level of individual concepts of things. They occupy a middle ground that for some reason is ignored in our tradition, because we do not like to admit that the things we see in the world are mostly projections. Here we will try to comprehend where the schemas lie in the broader scheme of things. We have noted that the schemas lie between math and language. In math we have mathematical categories, like set and mass for instance which are the simplest categories and make up the point where logic and math coincide. Topos theory is another version of this interface, but we will for now follow the tradition and see Sets with functions as the simplest mathematical Category. What math does not recognize as yet is that the anti-category of the Set is not the only reciprocal category type and that we must consider the non-set of Mass as well, which is not considered by Mathematics. The Set/Mass as a connecting category between math and logic is augmented by a discipline called Model Theory, which considers the application of first order logic to categories. Model theory applies logic to the categories in order to deal mathematically with the possible interpretations of categories. So if we are interested in this interface between math and language then we must consider model theory. Schemas however are more than mathematical categories in as much as they are templates of understanding. Language as we understand it adumbrates our understandings of things, i.e. elaborates on them. So language as such must go beyond the schemas yet be based on them. Any one language itself is a system, and all languages form a meta-system. The other major example of the system is the game, and all possible games are the meta-system of gaming. Wittgenstein talks about language-games which combine these two rich metaphors for the system/meta-system relationship. Schemas appear as the basis of language games. They give more information about the things projected upon than Math, yet less that what appears in the language game. We can consider the schema as the non-dual between Mathesis and Language-games. We consider any one mathematical category as a system, and all possible categories as a meta-system. When we look at the set of mathematical categories we see that they have a strange structure which is not understood in terms of why it is structured the way it is. However, the categories are all non-duals of order between logos and physus. Logic on the other hand is the core of Logos. So we might consider schemas as the core of physus. Yet schemas are known to be projections of order as templates of understandings on things. So schemas come from the logos and are projected on the physus. They obscure yet reveal the physus. Logic on the other hand might be said to offer a constraint to language that is internal to it. But in that constraint it is acting like something physical rather than as pure logos. So we might think of logic is the internal physus of language offering a constraint to the free play of language. Thus we can see if we consider the relation between the logophysical and the physiological that Schemas are a constraint of logos on physus, and Logic is a constraint of physus on logos. Between these are the non-duals of order which appear as the categories of mathematics. For some reason we develop logic and math rigorously but we have ignored the schemas that are there counterpart in the physiological. This imbalance I think is due to our idealism. We do not want to admit that we project the core of things we see outside us in the physus out of the logos. We are ready to admit that the logos has constraints from the physus in the form of logic. We are ready to admit the non-dual of the mathematical categories. But we are not ready to admit that the things are at their core projections by us that give structure to the physus from out of the logos. Schemas should be developed with the same rigor as mathematics and logic. But they remain a backwater that is not developed by our tradition. Therefore it is left to us to

attempt to develop this essential feature of our tradition and worldview here as well as we can given the limitations. General Schema Theory should be a rigorous discipline of the possible projections of things that ecstatically appear in our projections of understandable things beyond ourselves. The structure of this projection is different from the structure of the things themselves. We discover those differences painfully and slowly though science which looks for the discrepancies between experiment and theory. The Mathematical Categories are used as the basis of the Theory and also we find that they are exemplified within the physical phenomena. Thus the non-dual of order shows up in both the physical phenomena and in the theory as the bridge between them. But we control the theory though logic which is a physical constraint inherent in language itself. And on the other hand we control the physical phenomena though our templates of understanding which are the schemas. This control is too great in most cases and it covers over the true nature of the physical phenomena which we only find out from discrepancies in our experiments. By listening to the physical phenomena carefully beyond our projection of schemas we discover the nature of the world itself. But the schemas are very important because for the most part when we interact with things beyond ourselves we are actually interacting with our projections rather than the things themselves. We only encounter the things themselves to the degree that they violate our expectations as captured in our projections. And most importantly when we design artifacts by craft or engineering we use the schemas as the foundation of our designs. So by producing an artificial environment we make real those projections that come from the schemas. The schemas then become the core of our designed and built environments and are thus of particular interest to engineering. Plato talked about three modes of presencing. There is the presencing of the natural phenomena, then the presencing of artificial human produced artifacts, then the presencing of artistic creations. Plato denigrates art and says that it is a poor and distorting representation and that we should concentrate on craft or natural objects. In fact, throughout the dialogues the examples are almost always drawn from craft. In craft new things not present in nature appear. Engineering is merely the later scientifically based elaboration of craft. Nietzsche turns Plato upside down by raising Art above nature and craft. He also emphasizes reality over truth, presence, and identity. Schemas appear in all three realms of presencing. Schemas are the means of organizing the phenomena by templates of understanding. They pervade all the modes of presencing and whether you take Nietzsche or Plato's side in the metaphysical warfare schemas are what allow us to relate natural things, to human created artifacts that are useful in the world, to works of art that are merely representational. So schemas are universal across all the realms of presencing of Being and regardless of what aspects of Being you emphasize. Mathematical Categories, mediate between logic and the schemas. When we build a schemas theory we are merely making these relations explicit. Systems theory is merely one of many sub-disciplines of schemas theory. Systems theory comes from relating the schema "system" to the mathematical categories and logic. In as much as it subsumes mathematical categories and logic it also subsumes Model Theory. Schemas Theory subsumes all the schemas we have mentioned and what ever others may be found in the tradition, as templates of understanding for organizing the experience of phenomena, and relates them to the mathematical categories and the logic including both classical and deviant logics. This is a very broad extension of General Systems Theory, to first General Meta-systems theory, and then on to cover all the other schemas and their relations to the mathematical categories and logics. What we must understand is that this new discipline is embedded in our metaphysical worldview that sees the logos/physus dualism and

understands the inner connection between these duals through the non-dual of order. But we also recognize that each of the duals has within it its opposite. So in the interval between the logophysical and the physiological there is a moment in which logic appears as the constraint of physus within the logos, and another moment in which the schemas appear as the constraint of the logos within the physus. These two moments of the dialectic between physus and logos are the key to our understanding of the relations between physus and logos. Our tradition ignores the schemas, has a blindspot in this respect, but emphasizes both logic and mathematical categories to a greater degree. Our task is to balance out this situation as much as possible by developing the atrophied schemas theory so that it can be seen as a balance for logic and mathematics and take its rightful place as the basis for the design of artifacts in craft and engineering. Notice Craft and Engineering are the halfway house between Art and Natural Objects. It is in craft and engineering that the schemas are most promenately applied as the core of designs of useful things. In craft we strike a middle ground between needing to follow the laws of nature and the production of emergent properties. Art can free itself from the laws of nature and produce images that are not constrained in that way. Nature itself is less creative than either craft or art in as much as it follows its own evolutionary imperative. Craft is the middle ground between the two extremes of nature and art. Craft and Engineering is where the schemas that guide design are most readily apparent as the basis of creative new things with emergent properties that are useful within the world, and thus expand our worlds, not just our imaginations.

We should note that the physus in the logos is Logic while the logos in the physus is the schema and both of these are arrayed against the non-dual of the mathematical categories. If we are to ask what the relation between logic and math is we must say that it is established via model theory. If we were to ask what the relation between logic and the schema is then we would have to answer through the philosophical categories like part-whole relations or causality. If we were to ask what the relation between schemas and math are then we would have to answer something like representational theory, i.e. the representation of the schemas via mathematical categories. In model theory there are three levels, models, theories and speculations. Corresponding to these we might place representations, simulations, and virtualizations. In other words when we are talking about the mathematical categories in terms of logic we construct models that are perfected into theories which are then extended into speculations. A similar thing happens when we are talking about the relation between schemas and mathematical categories. We start off with representations where we undergird the schemas with mathematical descriptions. But these are then extended into simulations in which the mathematical descriptions of schemas interact with each other dynamically and these may be extended into virtuality. These are ranged against the philosophical categories which are dialectically structured. We take the example of the part/whole categories in which plurality moves toward unity or totality and these come back together in the synthsis of wholeness. The stage from pre-thesis plurality to the differentiation of thesis and anti-thesis as unity and totality, to the stage of dialectical synthesis in wholeness are ranged against these other three stages in model theory and representation theory.

Model theory (logos & math)	Dialectics (logos and schema)	Representation Theory (schema and math)
model	Plurality as prethesis	representation

theory	Unity and Totality as Thesis and Anti-thesis	simulation
speculation	Wholeness as Synthesis	virtuality

The theory of representations has been developed mostly in computer science in terms of software engineering. In that theory there are minimal universal representations that combine data structures and algorithm structures to produce program structures in various program languages. Higher level design methods have been developed such as Integral Software Engineering Method as seen in the author's Wild Software Meta-systems.

Philosophical Categories and the other mediations between logic, schema and mathesis

We have characterized the relation between schemas and logic in terms of Philosophical Categories which are diametrically opposed to the Mathematical Categories that represent mathesis as such. It is unfortunate that the word Category is used in both cases. So we will attempt to specify which we mean in each case if it is not fairly obvious from the context. By philosophical Categories we mean along with Aristotle the kinds of sentences that may occur at the most general level. Kant refines this list which is further elaborated by Hegel. The only other theorist to improve upon the work of Kant and Hegel is Igvar Johansson who wrote Ontological Investigations and proposed a radically different category scheme from the traditional one. Up to this point we have only been considering the Part/Whole category in relation to the aspects and kinds of Being. Aspects are aligned with logic and kinds are aligned with schemas. Ultimately it would be nice to consider the other Kantian Categories and their dialectical extension as well. But here we would merely like to see how Quality and Quantity, Causation, Association, and Part/Whole relations are implicated in the relation between logic and schemas. Kant has attempted to boil down Aristotle's categories to those that are absolutely necessary. The categories are the fist differentiation of Being, if Being is the highest concept then the categories are the next highest. There is no agreement on what this first level of differentiation of concepts should be, only some guesses by Aristotle and Kant. But it is useful to understand that whatever this first differentiation might be it effects the relation between logic and the schemas. It should also be noted that it is in the Categories that dialectics becomes apparent. Kant used a dialectical form for relating the categories to each other. Hegel capitalized on this in his reformulation of the categories as dialectical unfolding of spirit. We also extend the Kantian Dialectic by adding the synthesis that gives us an approach to wholeness out of unity and totality considered as thesis and anti-thesis. Thus dialectics can be seen as the opposite of the mathematical categories that stand opposite it in the triangle between logic, schema and mathesis. The schema stands opposite model theory and logic stands opposite representation theory. These oppositions are important. They are direct verses mediate relations between the three elements logic, schema, and mathesis.

What has been missing up to this point in Systems Theory is some understanding of the relation between this schema and the other possible schemas, and how this schema relates to logic and math. It relates to logic in terms of the categories, it relates to math in terms of representations. Logic and Math relate to each other in terms of Model Theory. It is necessary to get this broader context straight before we can attempt to understand systems theory itself, or any other schemas theory for that matter. The system,

or meta-system functions inside of the dualities set up by the worldview, such as logos and physus. It relies on the bridge between them established by mathesis. It also relies on the categorial, model and representational mediations between the different elements of the worldview. All of these take place in the context of Being with its aspects and kinds. For us the first split in Being is between Aspects and Kinds as we apply the theory of Higher Logical Types in order to deal with the paradoxicality of Being. The second split is that between the categories that really is a symmetry breaking that occurs after the split between the kinds and aspects. Thirdly there is the duality between logos and physus within the worldview which is mediated by the non-dual of order. Finally these relations between physus and logos give rise internally to logos and schemas and these in turn are related to each other via models and representations. So there is an unfolding which the schema is part of and which must be taken into account if we are to understand the place of the schemas in a broader context. Schemas don't exist alone but participate in a broader context of the constitution of the structure of the worldview.

Singularity

I have described my vision of the major split in the Western worldview along the fault line between Logos and Physus, and how this split leaves some physus within the logos and some logos in the physus which have been identified with the logic and schemas. I have shown how these two are related to mathesis through model theory and representation theory and to each other via philosophical categories. Of course the mathesis is related to mathematical category theory. But what has not been discussed is the singularity that exists in the midst of these three theories. That singularity is very important, and will become the focus of this study. From the point of view of mathesis this singularity exists at negative one and gives rise to the hyper imaginary algebras as well as other peculiar deformities in other categories, like non-orientable surfaces in topology. But the singularity also shows up in terms of model and representation theory as well. In model theory it shows up as Godelian sentences that cannot be decided in terms of their belonging to the system or the meta-system. In representation theory it shows up as what is non-computable with respect to Turing Machines. Each area has a fundamental limitation with respect to the singularity that I am discussing and part of our work in these essays will be to show how these limitations are interrelated. What we are talking about is a single source for multiple limitations with different types of expression in various foundational theoretical realms. One of the reasons Schema theory is important is that it unifies the investigation of these inherent limits that appear in the core of the worldview, specifically at the center of the threefold relation between partitions of the logos//non-dual//physus phase space. Opening up the horizon of the singularity has been a fundamental advance in Math, Logic and also in Science during the last century. We say Science here because all science studies phenomena based on schemas that are projected on phenomena. When we seek to generalize these schemas we confront the way that the singularity appears in the midst of representations, particularly software algorithmic representations associated with Turing Machines. Each type of Schema has a computational representation as well as the more familiar static representations that we normally think about. For instance, Forms are seen in *Objects* of Object-Oriented design. Systems are seen in all sorts of software and hardware systems that are created by Systems Engineers, and even in software systems on generic hardware platforms created by software engineers alone. So the story that is told about the relations between logic, schemas and mathesis has as its goal the elucidation of the singularity at the heart of physus/logos phase

space. In Wild Software Meta-systems I discuss how this singularity appears in the heart of the minimal methods for software and system design. But here we are looking at a more general presentation of the same thing. It is necessary to attempt to understand the nature of this singularity and why it makes the building of constructions based on schemas, mathesis, and logic difficult if not impossible in some instances. To the extent that we delve into these problems ours can be seen as a corrective to the normal unfounded technological enthusiasm which says we can overcome any obstacle in the advance of technology. There are some fundamental limitations discovered in the last century that we need to come to terms with to schema design and development. A mature theory will take these limitations into account and attempt to explain them as best we can. So that will be one of the goals of this study.