ADVANCED DOMAIN THEORY FOR DOMAIN ENGINEERS

Chapter 7 of the Anti-thesis

Kent D. Palmer, Ph.D.

P.O. Box 1632
Orange CA 92856 USA
714-633-9508
palmer@exo.com

Version 0.5; 02/11/25; sd06v05.doc

Keywords:

Form, Schema, Meta-system, System, Process, Engineering

Summary:

None yet.

Establishing Domain Theory

Domain theory is the dual of Form theory, just as pattern theory is the dual of world theory or system theory is the dual of meta-system theory. However, domain theory is not well developed and so there is no good well worked out example of such a theory that I know of. Domains are rigorous disciplines. They are like product lines in companies. They are like the departments for different subject areas in the university. Like meta-systems for some reason they are not very well developed in our tradition. So if we were to delve into it very deeply we would have to develop it ourselves.

The first question we could ask is why we think there is a domain schema above the meta-system but below the world. The major reason is that this is just too big a gap not to be filled by at least one schema. Perhaps there are more than one, but I think there must be at least one schema in this region. There is a general rule that two lower level schemas make a higher level schema. Thus we expect that two meta-systems make a domain and two domains make a world. Perhaps we can argue from this for the idea that there is just one schema between the meta-system and the world. Since a meta-system is an environment, then a domain is an environment of environments. We note that there are many subjects of study within a discipline, and so we would tend to see a discipline as made up of various meta-systems, perhaps thought of as problem areas. A discipline is meant to span many environments. Biology for instance spans all possible environments for life. Mathematics spans all possible uses of mathematics in every field. Similarly it is the set of departments that make up the university and we would take the university as the model of the world. The university studies everything under the sun divided up into departments that specialize in particular disciplines. A domain is a coherent set of viewpoints. A department is a housing of these viewpoints within the academy. Of course, this specialization is itself a problem and contributes in no small degree to nihilism, as nihilism is created by multiple viewpoints each with their own agenda which ignore the concerns of all other viewpoints. Disciplines are artificially separated viewpoints. However, at this point we are only concerned with trying to reason as to the adequacy of one threshold between the meta-system and the world. Using the discipline within the university as a model it appears that this

would be adequate.

The reason that the form and the discipline are duals is that the form needs the context of the rigorous discipline to ground it. The form is a child of rigor and discipline. It is cut off from the content and the system. For instance in the field of Logic. Logic is a discipline concerning form par excellence. Forms do not exist in a vacuum. Forms in order to be isolated need the discipline, or the domain to be specified beforehand. As in logic where the domain is argumentation in language. Logical forms such as the syllogism would not appear as highlighted if we did not specify the domain, the universe of discourse. Systems of logic appear within the domain of Logic. Notice we skip the idea of the meta-system, the context of logic which has only recently become of interest in terms of situational logics. The domain of logic is where all logical systems are studied. Logical forms themselves like the proposition, like the syllogism, etc appear as highlighted when we specify the domain of discourse.

Post[1] defines a *domain* as a domain of truth which is a face of existence and which is supported by a domain of discourse. Each domain of discourse has a vocabulary of its own and what Post calls entrenched metaphors. He believes that it is the entrenched metaphors and the singular vocabulary adopted by the discipline that isolates the disciplines from each other. We would prefer a definition that emphasizes the differences between viewpoints and the coordination of viewpoints through discipline and rigor as the hallmark of the domain. Consider the meta-system. A meta-system has a horizon which is the furthest one may see in any given environment. But we know way more about the world than what we each sea. We know a lot by mediated experience though others, what we hear, read, see on TV, hear on the news, encounter on the internet. In other words, we have an extended horizon based on the horizons of others. However, what is reported from within the horizons of others may not be reliable. That is why we need professional standards, peer review, conferences, etc to establish a discipline and rigor that we can rely upon in order to establish the basis for believing these reports of others we don't even know in many cases that see beyond our own horizons. This coordination of viewpoints with rigor and discipline is the establishment of a domain, with its concomitant discursive practices of the sort that Foucault has studied[2]. The world schema on the other hand is all viewpoints, coordinated and uncoordinated, disciplined and undisciplined, rigorous and non-rigorous. All viewpoints make up the world as we know it. The world is a meta-system of viewpoints while a domain is a system of viewpoints. Viewpoints oversee and inspect environments. So it seems that there is a nice set of reasonable steps from the environment which is overseen by one or more viewpoints, to the domain which coordinates the viewpoints into a system, to the world which contains all possible viewpoints. We talk about worldview, which is a kind of supra coordination of viewpoints, such as the Indo-European worldview for instance usually based on shared language and culture. But this is an aspect of the world as a whole. There are many worlds in a kosmos. The Kosmos is what is posited to be there beyond all the worldviews which interact with each other. In this period of our history globalization is occurring in which worldviews are merging under the dominance of the Western worldview. In fact, we might call this the era of globalization, which might be seen as the end of the worldview as such in as much as all the various worldviews seem to be producing a conglomerate on the scale of a vast shared cosmos based on the Western worldview but integrating others in

[1] Post, John F.; The Faces of Existence (Cornell UP, 1987)

[2] See The Order of Things, The Archeology of Knowledge

a multi-cultural vision. From the point of view of the worldviews this is the time of eschatology, of last things, because the worldviews through colonialization and now globalization are slowly vanishing. It is the job of Science to project the Kosmos as that which contains all possible worldviews. Worldviews are the collective logos. In a sense we are seeing here the physus/logos split projected just beyond the highest rim of our experience. The kosmos is what all the worldviews agree upon, because it is what is there as posited by a shared worldwide scientific establishment rooted in the academy. But the coordination of viewpoints into a worldview is different from their coordination into a domain. The coordination into the domain is overt, whereas the coordination into a worldview is covert. The worldview is established by series of precedences in terms of cultural history and linguistic history. While in terms of domain theory there is overt coordination and filtering of speech, texts, and interaction.

Symmetry and Traces

Leyton as we have said establishes the principle of the intertransformability of Symmetry and Traces as we move from extrinsic inference to intrinsic inference. This principle allows us to move up and down the series of thresholds of organization represented by the schemas. As we said there are two worlds in a kosmos, two domains in a world, two meta-systems in a domain, two systems in a meta-system. These two conjuncted schemas within the higher level schema establishes a symmetry. This symmetry can be converted into a trace which then allows us to move down the hierarchy, or we can take a lower level trace of a schema and by doubling it convert the trace into a symmetry and thus a higher level whole that binds time. This way of thinking of the ontological hierarchy of schemas as an autopoietic ring created out of the conjunctions of other schemas helps us attempt to fill in the gaps in the theory such as that which occurs with domain theory. Another way of thinking about this structuring though conjunction is to realize that each level in the Ontological Emergent hierarchy of schemas is a conjunction of adjacent levels. Thus the system is a conjunction of the Form as figure and the meta-system as ground. Taking this higher we can see that the meta-system is a conjunction of the system as figure and the domain as ground. The domain viewpoints are what project the systems within their environments. Systems are intersubjectively socially constructed based on the coordination of viewpoints in the domain. Similarly we can see that the domain is a conjunction of the meta-system as figure on the world as ground. In other words the world is made up of all the possible environments. The domains serve as a lens for coordinating viewpoints that define specific environments. We can also say that the world is made up of the conjunction of the kosmos and the domain where the former is the ground and the later is the figure. Thus we see that the so called objective world is the collection of all the domains of disciplined and rigors viewpoints taken together. The world acts as a gestalt that combines the kosmos background and the discipline figures that relate to the domains. When we see that each schematic level is an organization which can be viewed as a conjunction of the adjacent schemas, and an organization that can be viewed as extrinsic but which can be converted to one which is intrinsic this allows us to move up and down the hierarchy of schemas at will binding and unbinding the time in them just as we perceive as a whole the space that is bound in them through conjunction.

In general the hierarchy of schemas is a way to bind and unbind time and space by which we schematize our world as Kant said. In other words the projection of space and time prior to experience does not happen all at once, but space and time are projected as

organizationally bound in terms of schemas. That is why we find schemas everywhere when we look at the world a priori. When we look at schemas we are looking at the projection of space and time together prior to experience. We can dissect these bindings by seeing each level as the conjunction of adjacent levels in order to understand the binding of space as a gestalt, or by converting from symmetry and trace and vice versa in order to understand the binding of time as a flow.

Anomalies

Here is something strange. When we look at the Schemas we see that there is a stage associated with monads and now we see a stage, the domain associated with views. This brings up the question whether there is a relation between the Schema structure and the Emergent Meta-system. We could interpret the facet as seeds and we could interpret the pluriverse as candidates. And if we did that we would get something like an EMS in the unfolding of the Schema hierarchy.

pluriverse	**candidate**
kosmos	?
world	?
domain	**view**
meta-system	→ candidate
system	→ view
form	→ monad
pattern	→ seed
monad	**monad**

facet	**seed**

It is hard to explain how the EMS fits into the hierarchy of schemas. It is not a straight forward fit even if you interpret pattern thru meta-system as an embeddeing of the EMS within an over all EMS. There is still the gap where we see world and cosmos between domain view and pluriverse candidate. So the fit is not good, but there is still a sense in which we can see similar themes in the unfolding of the schemas that are seen in the Emergent Meta-system, i.e. the theme of monads and the theme of views centered around the domain. We could easily see the facets as seeds and the pluriverse as candidates. It is interesting that the schema hierarchy breaks off and then renews itself between pluriverse and facet and it would be interesting to see this phase of annihilation as the vanishing in a cycle of the unfolding schema.

?	**9d decatope**
pluriverse	**8d nonatope**
kosmos	**7d octatope**
world	**6d septatope**
domain	**5d sextatope**
meta-system	**4d pentatope**
system	**3d tetrahedron**
form	**2d triangle**
pattern	**1d line**

monad	**0d point**
facet	**-1d**

There is another thing which is strange which is the relation between the schemas and the minimal platonic solids. The series of schemas seems to stop with the pluriverse. It is difficult to think of a schema beyond the pluriverse yet the series of minimal platonic solids are infinite. So how does the series of schemas stop at the nonatope in the eighth dimension, rather than going on forever. In other words there is a difficulty with schemas theory in as much as it does not quite fit with the mathematical underpinnings nor with the EMS structure. These are a couple of anomalies for the theory of schemas. It is scary to think about the fact that the nonatope is on the form of an ennegram, which is a made up esoteric symbol to which we don't want to give undue significance. However, something like that is showing up here as the limit of the pluriverse. Of course there is plenty of evidence from various cultures of the magical significance of the number nine which is explained somewhat by the numerology associated with it by B. Fuller in Synergetics. But we are interested in having mathematics drive our theory and so we would hope to find some mathematical reason for the divergence toward finitude of the schemas verses the infinitude of minimal platonic solids. Also we would like to see a direct mapping to the EMS if the schemas are seen to reflect EMS like themes. However, at the moment no good answer exists for these anomalies.

Coordinated Viewpoints; An Academic Question

There is a boundary to a gestalt/system. There is a horizon to a proto-gestalt/meta-system. So what is the edge of a domain, or a world. If we follow Smith in his Origin of Objects then a world is not just what we see but also what we register which is not immediately seen. So the edge of the world is the furthest possible registration. Similarly, the edge of a domain must be the limit of our ability to coordinate viewpoints. Coordinated viewpoints allow mediated experience of things. We attempt to get to the point where if our colleagues see something then it is as good as our having seen it ourselves. This means the same concepts and methods will be used by everyone within the domain given some reasonable variation. This means establishing a modicum of trust and this is done by training. Different degrees of training and expertise means various levels of trust.

Besides the formal models such as that of Bennett and Jumarie there are also social phenomenological models of coordinated social action and observation such as those created by Alfred Schutz[3]. Also Fink[4] who worked with Husserl reconsidered intersubjectivity in the context of genetic phenomenology. Then of course there is Husserl's work[5] on intersubjectivity itself. Not to mention the work of Merleau-Ponty and other later Phenomenologists who were either close or distant followers of Husserl.

The sociological view of coordination of viewpoints leads us into a very complex literature on the sociology of knowledge and ultimately into issues of Philosophy of Science. The question becomes, is it possible to propose some minimal theory of the domain in which we can get a basic idea of the structure of the domain schema without

[3] http://www.phenomenologycenter.org/schtz100.htm, See also http://www.heartfield.demon.co.uk/schutz.htm , See also http://home.att.net/~cscavileer/Schutz.html

[4] Fink, Eugen; Sixth Cartesian meditation : the idea of a transcendental theory of method; (Indiana University Press, 1995)

[5] See Fifth Cartesian Meditation

going into the thorny issues surrounding that schema.

Let's consider one thing. The reversal of perspective between the West and China that we see in their two arts. In the West perspective lines converge. In China they traditionally diverged. So here is an example of two worldviews which diametrically opposite ways of looking at perspective. Perspective is a way of coordinating viewpoints. In the West there was a fundamental assumption that they always converged to a vanishing point, while in China the viewer is always the vanishing point and lines diverged from that. Here is a clear example of the coordination of viewpoints at the level of worldview. For us in the West it is hard to imagine how lines could be thought to diverge toward the horizon in the Chinese paintings. But there they are clearly in the paintings. Only on coming into contact with the West did the Chinese learn to make the perspective lines converge at the vanishing point in the picture. The two regimes of converging and diverging perspective lines are a coordination of viewpoints on a very large scale. We can step back from that to smaller scale coordinations of viewpoints in order to define the domain. This is normally achieved through similar training regimes. Various standards are set in university departments all over the world in a particular discipline. Different departments consider the standards set by other departments in relation to their own, and they compete for status and rankings. By testing they establish adherence to their internal standards by their students. However, a certain independence among faculty is built in due to the tenure system. The goal of intellectual excellence measured by the reputation established through publications is the ultimate basis for the ranking of the faculty members who in turn are suppose to try to foster a similar spirit in their students. In a way this competition is suppose to establish the criteria for excellence by which the various academic standards in different disciplines are judged.

Observer Mechanics

Once we recognize that the domain is about viewpoints and is in fact social then there are other models that come into play here that are interesting. For instance, there is Observer Mechanics[6] by Bennett which attempts to make rigorous the relations between observers and phenomena. There is also the relativistic information theory of Jumarie[7]. Both of these are significant models that can be appealed to in order to give a basis to domain theory. One lines up with Quantum Theory and the other with Relativistic Theory, but both also define a formal relation between the observer and the observed which attempts to standardize the meaning of a viewpoint.

Here we will concentrate on Observer Mechanics as a beginning of a formalization of the domain schema. Observer Mechanics attempts to formalize a model of perception. It is an attempt to generalize across various theories of perception. If we look at Bennett's definition of Observers we see that it is composed of six elements:

- X -- configuration space
  Possible representations of the object.
- Y -- premise space
  Possible sensory presentations
- E -- "Explanation" distinguished configurators
  Allowable representations of the object.
- S -- "Sensory" distinguished premises
  Highlighted sensory presentations
- π -- Perspective

---

[6] Observer Mechanics: A Formal Theory of Perception; Bruce M. Bennett, Donald D. Hoffman, Cheftan Prakash (Academic Press; ASIN: 0120886359; June 1989) See http://aris.ss.uci.edu/cogsci/personnel/hoffman/ompref.html

[7] Subjectivity, Information, Systems (Gordon and Breach, 1986)

Viewpoints of the observer changed by participator

- η -- conclusion kernel or interpretation kernel

Theory

- ϕ -- premise kernel or abduction kernel (added by the author)

Observer Structure:

Eη —– X < Higher Level
π < interstice or intermediate level
Sϕ —– Y < Lower Level

Of course, what we are particularly interested in is the π for *perspective*. It is the perspectives and their coordination that gives the domain its particular interesting structure. What we have to keep in mind is that Observer Mechanics applies to all perception, and that generality is good, but it applies then to all schemas and the direct observation via schemas, while the domain schematization occurs only with respect to indirect observations via coordinated domain schemas. Indirect observation begins to become the primary point here, or direct observation with others either directly present or present at a distance with whom one is communicating. The schemas starting with pattern up through the meta-system can be viewed directly. Only with the domain we begin to get schemas that are indirectly experienced. At the domain level we are getting indirection added, while at the level of the world there is the addition of registration in which there is some simulation of things that are out of sight according to Smith in The Origin of Objects.

When you consider how the schemas nest what is seen is that with the domain one hits the wall of one's own experience because the horizon of the meta-system is the limit. That horizon is a solid wall on the other side of which is another meta-system where someone else can see and environment we cannot see. When we think about the fact that there is the both gestalt and flow for both observers in their respective environments on either side of the horizon, then we see that a world is precisely the combination of both the gestalt (system) and flow (halves). In other words a world contains both the process and flow of two observers in a domain made up of two conjuncted environments. A world is what Alchemists and Jung would call a mysterium conjunctus, a marriage constitutes the minimal world. But the difference between a world and a domain is that the domain has its own plecenta, perhaps we should call it an umbra, which is the ultra-horizon of the community inhabiting the domain. Ultimately you get beyond your discipline, beyond your community and in the world various communities and various practitioners of different disciplines combine in their registration of the world. The horizon of the world is the limits of registration. When you can no longer track via simulations then you enter the kosmos. However, we should note that in each case there is a solid wall between schemas. For instance, two monads have a solid wall between them but together they make up a pattern. Going from monads to pattern we move from Peirce's first to his second. Two patterns taken together produce a form. The solid wall is between the generators of each pattern in the Grenander scheme. Two forms make a system. The solid wall is created by the gestalt which will only allow one form to be the figure at a time. Two Systems make a Meta-system. Here the solid wall is between system and anti-system. Suddenly we get opposition between forms and the possibility of contradiction also arises. Two Meta-systems make a Domain. Here the control of the wall is the limits of the perception of observers. Two Domains make a world. In this case minimally we get the difference between gestalt (system) and flow (process) and their complementarity as producing the wall. Two worlds make a Kosmos. Here the horizon is the limits of registration for some community. Many different communities with their own worlds

inhabit a common Kosmos. World history is the result of that clash of worlds on the same globe. Cosmology explains the globe and its place in the universe. When we begin to understand that the universe itself may be plural as David Deutsch suggests then we have reached the end of what we can imagine because other universes are beyond our experience completely, even other planets are at this time out of reach except within our solar system. The speed of light sets a severe limit to what we can reach of the rest of the universe as we understand it.

Once we have mentioned this series, as we have again, it might be mentioned that each schema can be either dominant or subsumed by an adjacent schema. So for instance as we noted earlier, we can have a form which contains patterns of content, or we can have a pattern of forms. In other words the series of schemas can be turned upside down. So we also need to explore what this might mean. For instance what does it mean that as well as monadic contents fitting into a pattern, there is also the possibility for patterns to be monads? Well when we look at Grenander we see that his generators are precisely monadic patterning kernels. So that level works. We can go on to ask what it means for monads to be made up by facets and for monads themselves to be faceted in relation to each other. Facets refer to the superimposition of Quantum Mechanical states. The superimposed states in quantum mechanics are facets of a monad. But monads taken together are also faceted. This is to say that they are like the jewels reflecting each other in the Jeweled Net of Indra and by that mutual reflection interpenetration of the monads is conceived. Each monad is reflecting all the other monads as a facet of existence. As such its own structure must be faceted so that it reflects the various other monads in different ways. The insight of Buddhism is that difference IS unity of the Jeweled Net, i.e. identity and difference are non-dual ultimately. There is a state that is not-different and not-identical either. This occurs through faceting of the monads at the quantum mechanical level but also in terms of the monads being facets of a whole themselves which is reflecting itself in a kind of interpenetration. Notice how when we turn the schemas upside down we get a deeper concept and a finer complementarity than we conceived when we thought that the hierarchy of the schemas only flowed in one direction. Let us skip the patterning of forms which has already been discussed and go on to think about the forming of systems which is the reverse of gathering forms into a system. Applying form to system gives us the formal system. It places it in a domain of rigor and discipline. We see this in the development of logics of various kinds as seen in Systems of Logic[8] by Norman M. Martin. These systems are subjected to a formalization. The next level up is the relation of the system to the meta-system. Normally systems inhabit a meta-system. But what happens when we systematize the meta-system. That is where we see that inside the system is another interior environment for subsystems which has the characteristics of a meta-system. The meta-system is either inside or outside the system. When we consider the interior meta-systems then we are systematizing the meta-system. Then next level up is the relation between the meta-system and the domain. Normally we think of the domain or rigorous discipline of coordinated perspectives encompassing an environment. This is what causes Nihilism according to Fandozi where specialists view the same thing in the world very differently from their specialized disciplines. Rigor excludes aspects of other views and precludes mixing except for a rare interdisciplinarity. But what is it to meta-systemize a domain. That means that each discipline creates an internal environment for its practitioners. Domains have meta-systems inside and outside, on the analogy of systems

[8] Cambridge University Press; ISBN: 0521367700; (August 1989)

having meta-systems both inside and outside. We can probably apply this on down the hierarchy so that we would say that monads have patterns inside and outside. When the patterns are inside they are algorithms that produce the patterns outside as generators. Patterns have forms inside and outside. When we look at the cellular automata the rule sets are the forms inside while the forms outside are those drawn by the elements of content that are used to produce patterns as well. Forms have systems on the inside and the outside. When systems are on the inside they have been formalized into a formal system, while when they are on the outside they contain many forms. Similarly at the level of the world and the domain we can talk about the domain having a world on the outside or on the inside. In other words the domain contains a meta-system or an environment, but it can also be thought about as containing a world when we consider the various practitioners having different other roles with respect to each other and being connected to different communities. A discipline actually encompasses a whole world because of the variety that is attributable to all the observers within that discipline and their various other affiliations. More clearly the world is make up of many domains just like the university has many different disciplines represented. When we go up to the level of the Kosmos then what we see is that not only does the kosmos contain many worlds, not just Greeks but also barbarians, but also the world contains many kosmoses. These different kosmoses are the views of the kosmos at different times by science. The switch from earth centric to sun centric, i.e. the decentering of man by Galilao is a case in point. Further decentering occurred with the advent of relativity theory and quantum mechanics. Finally there is the relation between the Kosmos and the pluriverse. The Pluriverse contains many cosmoses, but also the Kosmos contains pluriverses and the evidence of that is uncertainty at the quantum level according to David Deutsch. The quantum level indeterminacy is the interference of different kosmoses with each other. Thus we loop the loop and we see that the pluriverse implies faceting, and so it becomes clear that this sequence is a circle not a linear hierarchy. We call it an autopoietic circle because each level is produced by a conjunction with both of the adjacent levels. So the whole thing is in some sense an illusion due to the fact that all the parts only exist because the whole circle is there to support it. Take away one part and the whole thing collapses. It is dissipative because each schema is a projection of order out onto things in themselves, i.e. the noumena, or magma. It is reflexive because at the level of domain perspectives appear and the perspectives are all looking at each other, not just at the encompassing world. It is as if the circle of schemas were a standing wave in the social world where all the myriad aberrant reflections cancel each other out leaving this structure of intersubjective phenomenology which is shared schematic projection. But it is strange that it has not been brought to our collective attention before. It is invisible because we are all projecting it together onto everything, and we only see it by comparing our descriptions, explanations, proofs, indications etc that exist in the discourse of the various disciplines. In other words you only really see it if you take an extremely interdisciplinary view of things. Then you get slight interferences between the various descriptions of phenomena that when pried into reveal the schemas and their interrelations which are dissipative ordering, autopoietic symbiotic and reflexive social. Special Systems theory makes it possible to see the real nature of the schemas that in turn make Special Systems theory visible by providing a context within which to situate them. This in itself is a meta-symbiotic relation between the Special Systems and the other more normal schemas. In part it is this symbiosis that this series of working papers is meant to explore, especially when we get to the part concerning the thesis which is about the Special Systems in the context of

the Schemas. But as we see here the special systems are implicated in the very structure of the Schemas as a cycle and hierarchy at the same time.

To return to Observer Theory there is an example of it that makes it clear what Bennett et al has in mind when they talk about Chomsky's linguistics. Y is the set of all strings composed of symbols from the terminal vocabulary. S is the Language L which is a subset of those strings. X is the possible bracketing of symbols in a transformational grammar. E is the sentences in L together with their bracketings that specify constituent structure. The conclusion kernel η is the interpretation of the structures on the language that constitute the theory of the transformational grammar of the language. The perspective π takes the configuration of a string with brackets and strips away the brackets. We might like to update this from the Chomsky type grammar to the Leyton formulation of grammar discussed previously in the chapter essay on form. But for the most part this example is helpful in order to understand exactly what Observer Mechanics is referring to. The observer is dealing wholly with representations. When a representation appears $y = \pi(x)$ then we say that y lights up for the observer O where y is an element of Y. Bennett says "All O receives is y not x. O must guess x. If y is not in S, then O decides that x is in E. But O does not, in general, know precisely which point of E. Instead, O arrives at a probablity measure $\eta(s, .)$ supported on E. This measure represents O's guess as to which point of E is x."[9] Observer theory is meant to be a framework for attempting to answer questions about perception. They are seen as being more general than Turing Machines but Turing machines as symbol recognizers are a subset of Observers. The question Observer Theory gives us a framework for asking is "What are the observers of relevance to human or , more generally, biological perception?"[10] You can see how this might be of use for Schemas Theory which are something that is projected as an ontological assumption in the process of perception. In other words, Observers Theory gives us a framework for thinking about where Schemas fit into our perception of things. And what it particularly manifests of interest for Domain theory is the concept of the perspective. However, because Observer Theory is a framework for understanding where schemas fit it is not the same as the schema domain. It is in fact an example or a formalization of another hierarchy that is very significant which I call the individual/social hierarchies which exist along the spectrum between logos/physus which are finite on the one hand and the absolute which is infinite on the other hand. This hierarchy has the following form:

- absolute
- Actualization
- existence
- Insight
- ontos
- Wisdom
- episteme
- Knowledge
- paradigm
- Information
- theory
- Data
- fact
- Given

Observer Theory is poised at the levels of theory and fact. And we notice that between these are the level of data which corresponds to the idea that observers channel data during their active time. But we can consider the observer framework as a template that fits over all the successive layers of this dual hierarchy. In other words, the conclusion kernel η could be any of the terms in the social hierarchy except the given. And then

[9] Bennett, et al; Observer Mechanics, page 22, 2-2

[10] ibid p.25

the next adjacent layer down would be the lighted up Sensory premises that appear in the premise space Y for Explanations that appear in the configuration space X. We believe that Bennett should have identified a counterpart to the conclusion kernel η, ϕ which would signify what the lower adjacent social threshold means. In that case $S\phi$ world parallel $E\eta$. We would call ϕ an abduction following Peirce. And in fact it is in the abduction that we would place the schema. In other words schemas intervene within the lighting up of the sensation itself modifying it. Bennett wanted to produce a theory that was neutral from bias to which bias was added. But what he did not think about was that bias can be added both apriori and aposteriori. Bias in η is aposteriori, while bias in ϕ is apriori. Observer theory as a formalism does not consider apriori bias. But that is exactly what a schema is. Observer theory produces a framework that can be applied to any of the levels of the social/individual hierarchies. It represents the social levels by $S\phi$ in Y and $E\eta$ in X and the interstitial individual levels by π. By working out how Observer theory applies to this social/individual hierarchy we are not in a position to appreciate its generality. Bennett wants to create a very general framework which can model perception in general by a hierarchy of observers. But the clever thing the authors do is making it non-dual in the sense that the very first thing they do is have observers observing each other not things in the world. It is a reflexive framework. In general they post an environment which is called a scenario. A scenario is a measurable space whose elements are states of affairs, R which is a countable totally ordered set called active time, and $\{Zt\}_{t \text{ element of } R}$ which is a sequence of measurable functions, defined on some fixed probability space and taking values in C x Y. Bennett says "In other words, a scenario is a stochastic process with state space C x Y and indexed by R."[11] Now this definition is created such that it can be seen as relativistic and ignores the existence of a physical world beyond perception. Thus in a sense Observer theory is phenomenological. They say it is scientifically regressive to cling to a fixed "physical world" as the ultimate repository for states of affairs.[12] Bennett goes on to posit objects of perception B which then he defines as other observers. In this way a completely reflexive framework is produced in which either observers are observing themselves or other observers and observations of anything else is measured as distortions from this fundamental reflexive situation. Observer theory goes on to posit participators which are ways of transforming perspectives. By using participators Observers can change positions seeing what the other Observer sees. But then it is not assumed that the observer remains unchanged by perspectival transformations. Participatorial transformations transform observers into other observers. Thus Hume would be satisfied with this formulation which does not assume the existence of persistence in the observers when they change perspectives. This formulation is very close to that would Nietzsche would have endorsed that sees the self broken up into fragments which are in constant becoming. Bennett and his co-authors did this to get in sync with relativity theory and quantum mechanics. But we can appreciate it from another perspective as a fundamentally reflexive theory made up of partial or virtual objects what Deleuze calls *desiring machines*. We have extended Deleuze's idea to dissipative machines or practices to include desiring, disseminating, absorbing, and avoiding. We can see here that the absorbing is related to observation, and the avoiding is related to the participation, and the disseminating is related to the fact that observers can be observed themselves. Desiring is the element that is different from what Bennett has envisaged. But that

[11] ibid page 67

[12] ibid page 68

desiring comes from projection and thus it is the schematization that shows the desire. We have added this element in the abduction of ϕ. Bennett et al add spacetime, the primary schematization according to Kant in the existence of the scenario, which is made up of states of affairs in active time that modify the sensate aspect of the observer highlighting y. When observers observe each other they produce scenarios for themselves or others in the spacetime of the scenarios. The disseminating dissipative practices of observers produce these scenarios for themselves and other observers. But what Bennett in his formalism forgets is that the observers have an erotic desire which drives their interaction. It is this erotic desire with its instinctual basis that was recognized by Nietzsche and thus Freud as *trieb*. *Trieb* means much more than instinct. We might say higher drives as well as lower drives. Nietzsche would say *will to power*. Deleuze says in Difference and Repetition that the desiring machines are virtual objects, what M. Kline called *partial objects* and they are always halves with one half present and the other half absent. Notice how they are articulated around an aspect of Being and that this articulation produces a couple which when conjuncted produces an autopoietic symbiotic pair. This pair is the reflexive observers locked together in pairs observing each other, i.e. participating with each other in a cycle of mutual interaction. This is the first level of stability in an observer hierarchy. Greater levels of conglomeration of observers may occur but this mutual participation by pairs of observers makes the most primitive level of stabilization possible. Observers by themselves with nothing to observe are clearly incomplete. Narcissism is the next possibility, i.e. self observation. And then comes mutual observation where each observer is disseminating the scenario for the other observer and observing the other's scenario prepared for it. It is a desire for something to observe that drives the observers together. They absorb each others disseminations. Avoidance of other observers is what locks them together. The next higher stable formation is the reflexive pair of pairs. In this formation the participation of the observes will allow couples to trade places and still remain interlocked with each other. In other words, if two trade places with another two they can maintain their interlocked configuration while at the same time participating with each other and others beyond their pair. Also in the reflexive foursome there are virtual unrealized paths produced, as there are six relations between four things. They in effect create a minimal system of observers. The virtualization of these other paths creates a cognitive surplus beyond mere observation. This is like a synthesis that overflows from the four observers giving something greater than the four by themselves, i.e. a certain synergy. So you notice we only have to change Observer theory slightly adding the abduction kernel ϕ to make it serve as a good model of the interaction of dissipative practices. This addition shows us where the bias of the schemas are added, i.e. in sensation itself, not in the interpretation. That is why the schemas are so insidious. They are added at the same time as spacetime. They are the further structural articulation of spacetime itself as a phenomenological infrastructure. However, in as much as it adds a perspective by which the sensory premise space is connected to the explanation conclusion space it also allows us to understand something of the Domain which is a transformation of perspectives under which they are coordinated with rigor and discipline. This becomes particularly important when you cannot go past your own horizon. Coordination of perspectives of others beyond your horizon is something that is very difficult to accomplish but is vitally necessary in order to gain a wider perspective, say on what is happening across the globe. The domain is the wall that can only be breached by social coordination with others by symbolic communication. We see how this symbolic communication, called symbolic interactionism by G.H. Mead, plays an important role at the domain level. It leads

to the creation and dissemination of knowledge which when borne out by experience becomes a kind of wisdom and may lead to fundamental insights which eventually may be actualized. But this understanding at the individual level is based on the formulation of theories based on facts that are grounded in paradigms and epsitemes and ontologies. Emergent change as a social phenomena can occur at any of these social levels of comprehension. But it occurs through the social dance of perspectives of different people in the scientific process which we project into the people themselves when we break them up into observers and participators ultimately agreeing that the unconscious plays a significant role and agreeing with Nietzsche that *it thinks* rather than I think. There is something ultimately incomprehensible about oneself. As Plato says we can observe the city much better than the soul. That is why Plato's representations of cities are so important. It was ultimately the study of his Cities that led to the insight concerning the nature of special systems. Plato was the first systems thinker, writing the first system book which was The Laws. It was a very strange system, and I guess no one wondered about its strangeness before. When you collect the various representations of cities in Plato's works you see that he represented the various kinds of special systems. Megara of The Laws is the autopoietic city. The city of the Republic and the old Athens is Dissipative, it is the city of the gods that no man could live in. Atlantis is the Reflexive city. Plato took this understanding of the special systems from the Egyptians who had written it into the structure of their cosmic gods (Ntr). The three kinds of special systems come together of apiece, when we get one we get them all together as separate thresholds of organization that are mutually interrelated. They are correlated with the levels in Deleuze of desiring machine, individual and socius. In terms of observer theory these are the observers that are dissipative ordering, mutually participating observers in pairs that are autopoietic, mutually participating observers in foursomes that are reflexive. We have noted that observers are a wider class than Turing Machines. We speculate that just as their are Universal Turing machines there are also Universal Observers which are environment or the meta-system of all observers and scenarios. Bennett does not talk about the ultimate environment for all the observers and their scenarios. But it is probable that the operating system for observers as applications would be a general economy in the sense posited by Bataille. Notice that the physical environment is excluded. We might think of this as the restricted economy that is the mutual projection of the reflexive observer community. A large part of that projection is the schematization of sensations that produces the shared phenomenological apprehension and understanding of the physical environment. The physical environment is the projected illusion which is the side effect of the reflexive dance of the participating observers as a community. It is a restricted economy within the general economy of the observers. Note also that the operating system might store observers on tape and then bring them back out at other times just like the Universal Turing machine does to specific Turing machines. When the observers are stored to tape then they become observations or memories. This implies that what is stored is not the data from the observation or the conclusion but the observer mechanism itself. I think the relation between the observer and the Turing machine where the observer is a more general structure than a Turing machine is informative in as much as it can be connected to the thresholds of General and Restricted Economy and then the dissipative, autopoietic and reflexive economies that exist between these related to the special systems.

One of the assumptions of Observer Theory is that by participation observers can change perspectives to see the same thing as another observer in the participation space. But just

as observation effects events, so does participation so that there is a distortion introduced by the movement of changing places. It is this distortion that the rigor and discipline of the domain theory attempts to resolve by producing standards and methods by which observations and participations can be judged. Action research[13] is a discipline that recognizes these changes that occur when we attempt to observe and participate and which seeks to do research in spite of this fact. Action research attempts to change things and observe things knowing that will change the thing observed in order to see what happens. Action research grapples with the distortions that are set up by observation and participation, i.e. even the most bland and passive of interactions by ignoring them and in fact going beyond passivity and becoming active. In other words it gives up the false ideal of objectivity. Part of this disturbance is the introduction of the bias of schemas into the mix. We study schemas because unlike logic and math these have not been sufficiently studied, that is why there is no General Schemas theory. They were first identified as a possibility by Kant. And since then they have been slowly isolated by various theorists but never considered as an overall discipline in itself, which is unfortunate. However, it does give me something to write about and which by doing so might help to advance science. What has not been recognized before is that the schemas have a form that is dictated by the Special Systems and that together they display some unusual properties that you would not expect if you just looked at them by themselves.

Observer Theory helps us define the social/individual hierarchy that serves as a framework for the projection of schemas. It also introduces the crucial concept of the perspective by which observers take each others places. The brilliance of G.H. Mead is that he noted that spoken language is unique in that it allows the speaker and listeners to hear the same sound without exchanging places. In other words, symbolic communication and interaction is based on a medium that does not need participation to change one perspective into another. Other media are secondary to this synthesizng medium of the spoken word. In other words all other representations make it necessary to change places by participation in order to see the same thing, feel the same thing. Thus there is a medium difference that is not taken into account by observer theory and it may be this difference that produces cogitators rather than observers of the sort that Minsky talks about in his swarm theory of mind. Of course, perspective means something different at each level of the social emergent hierarchy. We generalize from the perceptual meaning of perspective to broader meanings of perspective at the level of knowledge, wisdom, insight etc. But the social and individual hierarchy does not help us define the realm of domains as such. For that we need to turn to Kinds Theory.

Kinds Theory

It is difficult to find a good domain theory example. So I feel lucky to have happened upon one by accident in an internet search. This is what is called **Kinds Theory** which is presented in a dissertation by Joseph R. Kiniry at the California Institute of Technology. A domain is seen as made up of kinds of things you might want to reuse in a software engineering sense. But Kiniry produces a more general theory that might serve for a general theory of domains. What is interesting is that the theory is structured in a way that is similar to the Emergent Meta-system formation. It envisages a univese filled with domains and kinds which are brought within a context and specified as kinds and then interpreted by an agent who then makes judgments, queries and thinks about the logical structure of the kinds and then based on this might create new kinds to

[13] http://www.scu.edu.au/schools/gcm/ar/arhome.html

add to the universe[14]. So the Universe is the source of the seeds of this cycle which is composed of domains and kinds that exist. A set of kinds is created by their inclusion in a context where they are then monads recognized by the agent as significant. Within the context the kinds particpate in a mutual actions and the Agent then views them and interprets them producing a schematization. Based on operations on the schamtization then there is produced candidate new kinds which some of which are produced and the rest of the candidate possibilities are annihilated. Kinds have properties and interrelations with other kinds which are interpreted by Agents in this cycle of reusablity appreciation. Then Kiniry defines some core behaviors in relation to the kinds in the domains which are inheritance, inclusion, equivalence, composition, realization (producing particulars of kinds), and interpretation. He applies to these kinds and their relations a three valued logic which includes the truth state unknown. Then based on these definitions he goes on to work out the logical structure of the domain. Now what we notice here is that the agents act like observers, but that the kinds exist in relation to the domain within the universe and context, i.e. within the schematization structure. So the EMS is operating between the individual/social hierarchy and the schematization hierarchy. We could easily substitute the term world for universe and see that there is a hierarchy of world (universe), domain, and meta-system (context). Kinds are then objects within a domain. They are defined in a countable rather than a mass like way, and thus we could envisage an extension of kinds theory called stuff theory. For instance compiled code is stuff in the computing arena. Source code can become stuff. In fact, since it is reuse he is after the definition of kinds is suppose to get over the problem that source code is stuff by giving us something countable and representable to deal with. Notice how kinds theory brings to bear logic as a means of dealing with the interpretations of the agents. Kinds theory also assumes that kinds may have relations to each other and thus mathematical structure is possible between kinds. The behavior of composability addresses the mathematical nature of these structures. So see how Kinds Theory brings together logic, math and schemas into a close relationship as well as opposing the schema to the social/individual hierarchy that the agents as observers and participators as well as actors inhabit. What Kinds theory does not bring out as well as Observer theory is the existence of perspectives. In Kinds Theory it is as if the agents have been logically collapsed together even though the possibility of mulitple agents is always there. The emphasis is on the logical manipulation of kinds as possible reuse artifacts. Most of the dissertation deals with that logical manipulation of the constructs of kinds within the domain. Kinds are like the figure on the background of the domain considered as a gestalt like structure. But if we consider that there is also mass like stuff then we can consider that Kinds and Stuff Theory is about categorization of things so that rigor and discipline via logic, math can be applied to them. The different interpretations of the agents may in part be motivated by their differing perspectives, perhaps thought of in terms of role differences. So observer theory gives us perspectives and kind theory gives us the schema differentiation viewed by the differences of perspective by participating agent observers. Really you need both Theories to cover all the aspects of Domain theory. But the Kind Theory addresses domains as such and their logical and mathematical interrelations as seen by idealized agents that make claims about the kind or stuff artifacts. Kind theory also contains a reflexive model, but in this case it is a definition of kinds theory in terms of kinds, i.e. self-bootstraping kinds out of itself from a definitional point of view. This reflexive theory is something like a minimal ISEM like model for describing and

[14] Kiniry, J. Kind Theory, page 26 figure 2.1

manipulating descriptions of Kinds. Thus there can be a different kind of reflexivity within the domain itself, rather than the reflexivity of the observers observing each other.

When we look at both Kind Theory and Observer Theory together and consider the nature of the domain then what we observe is that it is an arena for the coordination of different perspectives. What a perspective means is different depending at what level we are at in the social/individual emergent hierarchy. But in general a perspective means a partial way of viewing things. Objectivity assumes pure presence of things, i.e. total availability of all aspects of things simultaneously. Perspectivism assumes that this is a false view, actually an illusion, and that things are not all available at once. Rather we must make different aspects available though a process of moving from one perspective to another to view different aspects of things. This involves us in Process Being and it fragments the object into various aspects. A domain will coordinate perspectives to look at one kind of thing or one sort of stuff. One must have a perspective to look at a gestalt. The gestalt is the entire field taken in when focusing on a figure. As the perspective as gaze moves from thing to thing without moving one gets the proto-gestalt, i.e. the trace of the gaze as it passes from figure to figure. The next thing is for the agent to move, which moves the horizon, by moving the agent explores the meta-system or environment. But no matter how far the agent moves he takes his horizon with him. Thus it is the domain that transcends that horizon by the coordination of the perspectives of different agents. By that coordination though symbolic interaction and communication the agents manage to set up methods and standards to allow other agents to indirectly view what is beyond their horizon through the reports of other agents. When we look at a domain we are considering kinds of things or sorts of stuff that belong together. The agent takes the kinds or sorts from the world and wraps this artificial boundary around them called a domain with respect to which rigor and discipline are exercised. The agents place the domains and the kinds or sorts in a context, i.e. a meta-system, and interpret them thus creating a system within which things appear as figures or concepts. The agent manipulates the things or stuff in the system and produces other domains and kinds or sorts within domains that go back out into the world perhaps for use by other agents. Thus we get the scenario of reuse within product lines which is the holy grail for industrialization of software. But this can be seen to occur in any discipline in academia. Domains are a restriction of perspectives, a filter that allows some views and does not allow other views. Allowed views are strictly or not so strictly coordinated in such a way to allow cross horizon access to things or stuff outside ones own perview. You can count on results presented in peer reviewed journals. Or so the theory goes because you have reason to believe that standards and known methods have been applied. We can think of kinds or sorts as packaging for the use of others who are not present of items that are present to us, and we do that because we need others to do that in places we are not present. We rely on their packaging and we rely on their packages based on contracts and standards that are mutually agreed to by those within the discipline.

Our General Schemas Theory Methodology

So let us talk about our own methodology here in these studies. What we are doing is taking up the formalisms of others in order to get minimal definitions of various schema. If general Schema theory is going to be a domain itself then it needs to get its own methods and standards straight. General Schemas theory is the meta-theory beyond Pattern Theory, Form Theory, Systems Theory, Meta-systems Theory, Domain Theory, World Theory etc. General Schemas theory tries to find packaging of schemas that can be reused by other disciplines, i.e. that is generally fairly free of discipline specific content. Observer theory is an excellent example of this. Kinds Theory is also a good example but could be made more generic and more useful if it were changed somewhat. However, we find when we place these partial schema representations in a more general setting that there are some things we would like to change, such as adding abduction to the observer or by generating the dual of kinds theory which might be some sort of stuff theory that is mass oriented rather than count oriented. So we make these generalizing tweaks to the partial schemas and we compare the partial schemas to see if they help us isolate the nature of the more general schema that we are after. Then we consider the relation of this general schema to other general schemas as we have been doing. There is still quite a way to go before we have a good definition of the domain schema. At this level we suddenly need a social theory to support our understanding because not just a psychological theory will do any more because domains reach beyond horizons. We could appeal to Alfred Schutz for the social phenomenology to make such a scheme work without assuming objective social structures. We have already appealed to the work in Symbolic Interactionism of G.H. Mead. But there are of course many different social theorists that could be appealed to. We could also appeal to the discourse theory of Foucault as a way of understanding how domains are socially constructed and maintained. But this work is a grounding. What we are more interested in here is the way that theorists have come close to giving us a view of the domain schema itself. In this case it involves understanding the social/individual hierarchy in relation to the schema hierarchy and ultimately the ontic hierarchies discovered in the things in themselves to the extent that our schemas do not capture their in-itself nature, i.e. their nature as noumena which we learn by trail and error or experiment.

But here is an interesting idea, that occurred to me while I was reading the Observer Theory book. That is the fact that the social/individual hierarchies can be conflated with the schema hierarchy so that we can see monads as observers. In that case the various schemas would be made out of observers observing observers. So a pattern would be on the one hand something observed but on the other hand a configuration of observers, not just generators. Observers are in some sense the obverse of generators. Generators are how the observer that creates a pattern for other observers wants to be perceived in order to produce a pattern. Now the monadic contents or qualia from another view is the observer that receives that qualia. As Nietzsche said subjects are objects turned inside out. Now the same contents that define patterns may be used to define forms in two dimensional representations. So we can start to see forms as another higher level hierarchy of observers as well. We might think of forms as occurring however when observers start participating and changing their perspectives thus they would see the three dimensional forms as shapes, outlines that are then represented two dimensionally in perspectival drawings. Interesting from this view perspective comes into play when we are looking at forms. Forms are made up of content still whether in a two or three dimensional configuration. Thus forms can be thought of as observers but in this case the observers have a topological arrangement. When we move from form into systems we see the observers of one form in

relation to those of other forms. Observers are Turing observer recognizers. The forms could be thought of as the symbols that the Turing machine recognizes. In this case the Turing machine and all the symbols it recognizes is the system. The obverse of this system is the universal Turing machine or the universal observer context. Thus we get the operating system of the observer system which represents to itself various forms by taking up certain topological relations to each other. Then we get to the domain level by understanding that there is not just one universal Turing machine but a whole world of them. Every computer in the world is a universal Turing machine and thus the greater context of computers, i.e. the internet or other local networks allow the interface between computers. That is why we have domain names for the various computer groupings into sub-networks within the greater network. The domain name system allows computers to be grouped in the larger environment of the internet. And all the computers on the internet with associated users and maintainers including network administrators give us the world. We said at one point that the schemas were like a standing wave formation within the social milieu that was the shared basis for social invention, construction and maintenance of things in the world. It is the implicit basis of our design and engineering of artifacts we add to the world. But it is interesting to see this standing wave with its various levels of harmonic and organization as a mandala and that mandala is projected by what Desan calls planetary man. But it is interesting to see that mandala as composed of observers in the sense developed by Bennett and his colleagues. In other words as a conflation of the social/individual hierarchy and the schema or ontological hierarchy. It would be interesting to contemplate the idea that the magma of the physus could be seen as observers as well so that there was a kind of unification of the four hierarchies under a single rubric rather than thinking that they were different kinds of things. Bennett enunciates the principle that interacting things are congruent. So we might follow his lead and think of the various hierarchies that exist as the delineation of the structure of the world as being congruent as well. I think this is really an amazing vision if it could be carried out. It says that at the basis of all four hierarchies are a single observer class that is differentiated differently in the various hierarchies. So in the social/individual hierarchies these observers become cogitators and knowledge agents. In the schemas they are seen themselves as something external to itself. In the magma they are seen as the anomalies that shatter our projections of the schema to reveal what nature is like beyond our projections. These anomalies need observers who interpret the experiments as breaking some theory. But perhaps the anomalies themselves are observers seen from the outside as a scenario departing from the regular patterning of other observers that are the projection of the schema. Suddenly we are inside an interesting world of observer mechanics which is the understanding, the projection of regularities, and the departure form those regularities as a reflexive observer network interacting dynamically by projecting and through the breaking of projections by experiment that realizes anomalies that lead to new theories which then produces other projections. In this way perhaps these hierarchies form a EMS structure themselves. Here the anomalies from out of the magma are the seeds which create information or knowledge in the individual hierarchy that undergo mutual action within to generate theories or paradigms in the social hierarchy that produces a specific view of the information or knowledge. Then schematization occurs in the ontological hierarchy as this is projected back on the world. This projection is one out of myriad candidates and the actual world annihilates those candidates to leave the outcome that either confirms or refutes the abduction (hypothesis). This annihilation produces a seed of a new theory which may be an anomaly. Thus we can see this

observer hierarchy as a complex EMS that operates by the braiding of the various hierarchies together. In Tibetan Buddhism there are two basic mandalas. One is the mandala that moves out form the center in rings becoming ever more complex. The other is the one with the nine squares. The schemas are like the round mandala that becomes ever more complex moving from monad to kosmos. The other mandala represents different realms of the Buddha nature. It is like the different strands of the various hierarchies (social, individual, ontic, ontological) that work together in the form of an Emergent Meta-system to produce the world of our experience within which we pragmatically exercise a scientific abductive method. By saying that everything in the hierarchies are observers we employ the insight of Bennett's non-duality, and by creating a single ontic entity, which has been previously called an ***on*** in work with Ben Goertzel then we found a way to relate the different things happening in the various regions of the world hierarchies and realize that it is perhaps an Emergent Meta-system writ large as the fundamental dynamic of our cognition and perception of the things in the world by Planetary Man.