Beyond Dynamic Ontologies to N-ontologies and the foundations of Emergence in Fundamental Ontology

The Applications of General Schemas Theory

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Static Ontology and Dynamic Ontology

Static Ontologies are being developed at a breakneck pace in order to support the sematic web. Many different methods have been developed to capture these static ontologies. In effect the static ontologies catalogue what Bunge calls the furniture of the world. These are catalogues of the various kinds of things that exist in the world from some domain point of view. But little thought has been given until recently concerning the dynamics of ontology, i.e. how processes as meta-operators transform this furniture of the world. The work of Johana Seibt is refreshing in this area as she is attempting to revive process philosophy as a basis for considering the transformations of the furniture of the world. My own approach instead depends on the work of Martin Heidegger in Being and Time and his differentiation of present-at-hand and ready-to-hand modalities of being-in-the-world or dasein. Essentially he is doing something very similar to Process Philosophy in as much as he is distinguishing between Pure Being like that of Parmenides and Process Being like that of Heraclitus in a way that distinguishes isolated unities from fields of referential totalities. In effect Heidegger is saying that the two kinds of Being he identifies are equiprimordial rather than choosing one as a fundamental basis. Thus he designates what might be called the Monolith of Being as a combination of these two kinds of Being and posits that we are continually moving back and forth between the two modalities, sometimes keeping hold of them in tandem. Merleau-Ponty rewrote Being and Time in a psychological approach and distinguished two cognitive modes that were isomorphic with the ontological modes which he called *pointing* and *grasping*. The key point is that when we are writing something with a pencil we hold onto the pencil but we project our comprehension beyond it toward what is present-at-hand while engaged in using what is ready-to-hand. It is only at breakdown, when the pencil led snaps, that we shift to looking at the pencil and it pops out of the ready-to-hand into the present-at-hand itself.

Static Ontologies are present-at-hand which means are inscribed into Pure Being. Dynamic Ontologies are ready-to-hand which means are inscribed into Process Being. Heidegger tries to make clear that we need both kinds of ontologies and we need to be able to move back and forth between them. The equivalent of the referential totality of dynamic ontologies is the possibility of transforming one ontology into another, or manipulating the ontology with ontological operators. This is to say that all the purely present aspects of the ontologies need to be seen as arising out of a dynamic ground and that this ground that creates new ontologies is a form of process Being which forms a field out of which the various functors between

ontologies are projected. In fact, we can see that what is needed is a sort of n-category theory of ontologies. Ontologies are like knowledge categories. They have their own internal transformations that could be represented in mathematical category theory as arrows. We could pull the trick of mathematical category theory of getting rid of the objects and just treating the arrows. This is like the first order category theory. The second order category theory is when we talk about functors that give the relations between ontologies on the analogy with the way that functors give the relations between various categories.

Thus the analogy between ontologies and mathematical categories calls for an equivalent to the n-category scheme that founds mathematics starting with the set theory. We might call this hierarchy of meta-levels of ontologies: n-ontologies. At the first level of 1-ontologies we have what normally counts for ontology which is specifying the furniture of the world and its relations from a certain domain viewpoint. We would pull the same stunt as Mathematical Category theory and would use arrows to represent relations between the furniture of the world and would concentration on relational operators as specifying the objects themselves. In other words various ontologies would be considered as homomorphic or even isomorphic if they had the same relational operators but different kinds of things. In other words even the first level of ontology would allow us to collapse different ontologies together based on their relational patterns being similar rather than their objects being similar. The individual ontologies have certain kinds of things and certain relations between those kinds of things. We can relate ontologies together by looking at which ones have the same kinds of things but different relational operators. Or we can relate ontologies that have different things but the same relational operators. In mathematics it was found that the second option was much more powerful because it allowed one to see similarities between very different categories. The same is true of ontologies. Ontologies with the same kinds of things allow us to construct disciplines or domains. But ontologies with different kinds of things and the same operators allow us to see across the various ontologies that are different and to find patterns that would otherwise be hidden because they are trapped within one domain and cannot be seen within another domain. The emphasis on transformational or mapping arrows gives a certain sort of dynamism to the first order ontology which is not there if we concentrate on the things rather than the relations between the things. But this dynamism is not as fundamental as that which appears at 2-ontology level, in which functors enter the scene. Because functors actually allow us to specify the relations between the relations as isomorphic or homomorphic meta-arrows. Thus at this level we can transform or map between ontologies rather than merely just recognizing similarity of operators across difference of operands or difference of operands across similarity of operators. Instead we have in place a two fold relation of similarity of similarity and difference or difference of similarity and difference across operators and operands. Meta-similarity and meta-difference brings to mind the saying of Bateson that there are distinctions that are differences that make a difference. It also brings to mind Heidegger's talk of the Same as the belonging together that is beyond identity and difference. Thus in some sense we are moving on 2-ontology into the realm of the Same and the Distinct. In other words how does something change and stay the same. Or how does something change radically against the background of sameness. These level two ontological questions have to do with the nature of processes in which Being is mixed with time. Processes institute continuity and discontinuity, and we must understand how things must be able to change yet stay the same or change discontinuously on the background of the minimal change that reinforces identity. Johanna Seibt as some interesting things to say about these sorts of processes which she calls Free Processes on now General Processes that appear at the 2-ontology level.

One way to characterize the difference between the first two levels of the n-ontologies is to use the distinction between set and mass approaches to things which is aligned in language with count and non-count nouns. Mathematical Category theory sees as its basis the set, which is a bracketing of different things placing them in the same bucket. Only one copy of each different thing can appear in a set, so it emphasizes difference. What appears in the set is particulars which are gatherings of attributes which are different from each other in order to produce the difference that the set demands. Set theory is aligned with syllogistic logic which uses the Universal in order to relate particulars to each other. A relation between particulars is set up through the medium of the universals that that the particular is part of via its attributes. In logic there are three types of syllogism, Induction, Deduction and Peirce added Abduction, which organize the three phrases of the syllogism in all the possible ways. Induction goes from particular to universal. Deduction goes from universal to particular. Abduction uses a particular case to hypothesize the universal. Hypothesis is a strange combination of induction and deduction. It is reverse deduction based on not many cases but a single anomalous case that violates the normal inductive rule.

What we notice immediately is that the Set approach which has been highly developed in our Western tradition since Aristotle is indicative of the 1-ontology. In other words in ontology we look for the different kinds of things and their different kinds of relations. From this we specify the ontology as a pattern. We can then construct domains by grouping ontologies based on kinds of things, or we can construct ontological structures by grouping things based on the kinds of relations and forgetting about the kinds of things. But our ontology looks awfully like a set as do the identified relations.

At 2-ontology level the approach should be much more mass like. Masses are made up of identical instances within the boundary of the mass. The emergent properties appear at the level of the mass and appear by the local interactions of the instances. On the other hand in Set theory the emergence appears at the level of the particular and the set level is empty of its own properties or operations. Exactly the reverse is the case in relation to the mass. Masses are more like Free or General Processes. They are based on the distinction of the boundary, and the sameness of the plenum of instances within the boundary. Masses have their own logic called pervasion logic. That logic has to do with the reasoning about whether an instance is within a boundary or not. If it is within a boundary then the instance is pervaded by the mass that encompasses it. Pervasion is an alternative to Syllogistic logic that was developed highly in India and taken over into Buddhism, and that also appears in China. Certain historians of ideas believe that the pre-Aristotelians were mass based thinkers rather than set based thinkers. Thus Plato's theory of forms is thought by some to be best understood in terms of a mass based logic. The pervasion logic has equivalent but different logical relations like the syllogism that we can call *in-vasion*, *de-vasion*, and *ab-vasion* which all turn on the relation between the instance, the mass and the boundary, in the same way that the syllogism turns on the relation between the particular, the set and the universal.

If we think of mass approaches to things to be of a higher order than set based relations between things then we need to realize that our 2-ontologies will look more mass-like and less set-like. The particulars at the 1-ontology level begin to look like instances at the 2-ontology level. And in fact the same thing can be seen as both instance and particular at the same time at the different language levels. We see this in the concatenation of the list out of the set and mass. A *list* is a set where different instances of the same thing are allowed. On the other hand a *solution* is different masses with the same boundary that mixes instances. The differences between the masses looks a lot like a set

approach, while the identical nature of the various instances of the same particular look a lot like the mass approach. What we see if we look carefully at computational structures as opposed to pure mathematical structures is that they are a mixture of mass and set approaches while pure mathematical structures are mostly based on sets as a fundamental template for a category. This is because the model of processes are the Turing machine computations. Turing machine computations need the computational structures that balance mass like and set like approaches rather than merely just using pure mathematics. This is because computation instantiates its structures and they do not merely remain ideal. Instantiation and execution are mass like phenomena, and when the computation operates correctly it produces emergent properties that would not exist otherwise. This appears in the Turing machine itself. The tape of the Turing machine is the mass of recording points for ones and zeros which the machine can back up and move forward as well as reading and writing to. The tape is infinite on one direction and this infinity summarizes the mass of instances of writeable positions which are all identical prior to writing. On the other hand a turing machine is composed also of a state machine, which is a very set like object that has a set of different states which when activated by a marker causes a transition to another state. State machines and Petrinets are inverses of each other and thus the Turing machine could be built with either depending on whether it is self-activating or whether it is passive and reactive to external inputs. The tape could provide the stimulus so it could be that the external activation comes from the tape rather than any external source or from within its own Petrinet. So right in the Turing Machine is a model of the combination of the Set and Mass approaches. This is why the monolith of Being of Heidegger with pointing and grasping is so much like the architecture of the modern CPU with its accumulators and registers which operate in relation to program and storage memory. Heidegger in a way has defined the minimal level of hardware needed to run a Turing machine as the inner nature of Dasein. This is what makes Heideggers view of the monolith of Being made up of two modes, Parmedian and Heraclitain as equiprimordial so powerful conceptually. The combination of Process Being and Pure Being allows for a Turing like definition of the Monolith of Being. Pure Being is like the static nature of the tape and Process Being is like the dynamic nature of the state machine. The two together give computation that cannot be gained by either in isolation. Heidegger realized that we do not have to choose between Parmenides and Heraclitus but by accepting both as equiprimordial then we have something that goes beyond either. He has really taken his queue from Kant who defined in his categories the difference between multiplicity, unity and plurality. Unity on multiplicity gives you Pure Being as continuity and determinateness. Totality on multiplicity gives you Process Being when we consider that totalities are achieved across time. When you combine unity and totality together you have something that points toward but does not quite grasp wholeness. Or to put it a different way it gasps at but does not quite pointedly determine wholeness. Wholeness is something that is indicated by pointing and grasping, but unity and totality but not quite achieved by both of them together. But wholeness is the guiding principle of the System view. The system is just one among many Schemas, that include pattern, form, open-scapes, domains, worlds, etc. Each type of schema has its own scale in relation to the others and each has its own organization. The discipline of General Schemas Theory studies the difference between the schemas in order to give the system its full meaning within the context of other schemas. Our point here is that ontologies need to take into account the schemas that it is operating with when it attempts to distinguish the things within its domain. Schemas come before Kinds of things and relations distinguished by the ontologies. They refer to a kind of pre-ontology which we project onto the things and relations that pre-order them. Most ontologists believe that the kinds of things and relations they see are just

out there in the world to be discovered. But this is far from the truth. There is a projection of spacetime and that spacetime is dimensionally organized, and the dimensional organization gives rise to the emergent organization of the schemas. Through the schemas we see the mirror of ourselves in the things and relations we see in the world. Instead of pursuing merely ontology we must keep in mind what Heidegger calls the pre-ontological projection that precedes our finding and interpreting things and relations that appear in the world. We only recognize this projection process when we consider the 2-ontology level because it is the level on which this projection appears. Through the schemas there appear similarities of dimensionality and organization into emergent schemas that transcend kinds. This is a way in which the 2-schema functors appear within the world. In other words, things of vastly different kinds have the same dimensionality or organization into the prior patterning of the same schema. General Schemas Theory attempts to bring this emergent pre-organization of experience pointed out by Plato and Kant to light. The level of 2-ontology leads us directly into the study of the schemas. Dimensions are masses of dimensionless points that have orthogonal relations to each other. But the schemas are set-like organizations that are different from each other that cuts across dimensions. There are two dimensions per schema and two schemas per dimension. So these are parallel interleaved structures that complement each other. One is perfectly mathematical and is based on the generation of the minimal solids of each dimension. The other is connected to logos rather than mathesis. It is in fact the logos of the physus as opposed to logic which the physus of the logos. In our tradition logic and mathesis are well developed sciences, but because schematization hides itself as a ready-to-hand effect it is not well developed. In fact, we are just starting to understand its importance even though it has been part of the tradition since Plato's Timaeus and was reemphasized by Kant as the way his categories were expressed in time.

Dynamic Ontologies are those that take into account 2-ontologies on the analogy with 2-categories in mathematics. We know from Heidegger that there is a difference between ontology, ontic and pre-ontological relations to things. The ontic are the things we project Being onto as beings. The pre-ontological is the projection process that occurs before we see the ontic as such. The ontological appears when we know that the projection has happened after the fact. Schemas are preeminently pre-ontological because they dimensionalize and organize into emergent layers in the process of the projection of spacetime. When we do ontology as it is normally understood we are really only dealing with the ontic, i.e. the kinds of things and relations that we find in the world. A deeper ontology understands that the things of the world have different ontological statues as we have said here by talking about n-ontologies on the analogy with n-category theory from Math. But even deeper than the recognition of a hierarchy of ontological levels is the recognition of the projection process in which schematization shows up. It turns out that the hierarchy of ontological meta-levels describes this projection process as well, but very differently from the schemas. The schemas describe it by bringing together the mass-like approach of orthogonal dimensions with the set-like approach of different schemas. The two together define the way spacetime is articulated in the projection process. On the other hand the meta-levels of Being describes the phenomena of emergence of new things that appears in the world. Every emergence must take on a schematic and dimensional articulation. But the emergence itself as something that happens as the emergent thing takes time to become itself, is differentiated as the passage through the meta-levels of Being. These two ways of understanding the ontic are complementary and should be recognized by ontologists. Ontologists in general catalog the furniture of the world as if it were not going to change and as if it were not embodied in spacetime. However, we live in a world where ontologies are themselves new things which are going to change the nature of the world. Those first

order ontologies need to be cognizant of the fact that things are embodied via schemas and that they are subject to emergent change. Both add irrational aspects to the work of the ontologist, but that also brings them out of the clouds into contact with real things that are embodied and that may change radically. This grounding of ontology in groundlessness cannot be bad for the discipline which is exploring the structure of the closures of the world and the barriers between them.

Higher Ontologies

Here we want to take the thinking on these issues beyond dynamic ontologies into a realm that has not really been clearly delineated previously. That is into the even higher n-ontologies based on the analogy with n-categories in mathematics. Beyond the functor is the natural transformation and beyond that are the modifications. As we step up the levels of n-ontologies we next encounter the level of Hyper Being at the 3-ontology level and Wild Being at the 4-ontology level. These correspond to the natural transformations and modifications of category theory. There are n-ontology levels but the first four have names: arrow, functor, natural transformation, and modification. Once Heidegger noted that there could be two modalities of Being then that opened Pandora's Box and there was a mad rush to attempt to discover the other different kinds of Being that might exist as modalities of being-in-the-world, or dasein. What Heidegger discovered was called ~~Being~~ (crossed out) and what Merleau-Ponty called the hyper-dialectic between Process Being and its antinomian opposite Nothingness. Merleau-Ponty hinted at its possibility at the end of The Phenomenology of Perception where he talks about the expansion of being-in-the-world as with the blindman and his cane or the guitar player with his guitar. These technological objects become part of the being-in-the-world of their owners who have mastered them. Derrida adopted Being (crossed out) as the starting point in his journey of discovery in the completely new layer of Being he called *Differance* (differing and deferring). Merleau-Ponty went on to define on the basis of the existence of Hyper Being another kind of Being called Wild Being. It is thus that the third and fourth meta-levels of Being were discovered which are the basis of the 3-ontology and the 4-ontology in our parlance. Each higher meta-level of Being founds a new ontological level that is analogous with the n-category levels. The problem is that these new ontological levels are very hard to think about. Derrida has explored the Hyper Being level and Deleuze and Guattari have explored the Wild Being level. Various other scholars have followed them. For instance, John S. Hans wrote The Play of the World which is also staged at the fourth meta-level of Being. Modern furniture ontologists do not know anything about these levels of Being, but they are crucial for understanding the nature of the world. One way to think about them is in terms of Software and Artificial Intelligence. Software is the one artifact that has the characteristics of Hyper Being. But software throws out the difficult bits of itself, like self rewriting code and neural nets, into the bin of AI. In this way the software by denying its own Hyper Being and trying to reduce itself to Turing compatibility attempts to produce rational programs that do useful things in the world. But software definitely goes beyond the level of Turing machine computability. This is seen in the fact that software as something designed is itself non-computable. As Peter Naur says software theories of operation cannot be captured in any representation not can they be computed. Software Engineers deal with a non-computable, because it is too complex, design space, from which they wrest emergence that they embody in their computations. Even if we generate the programs from genetic algorithms using fitness functions someone eventually has to look at the results and determine if the end result is suitable. In other words when we leave what is computable and the cognitive science metaphor of the brain as a computable information engine then we still have intelligence by which we attempt to see the optimal emergence producing solutions in the design space. Genetic computing does this

implicitly because the designer must have set up the genetic algorithm with all the operators that are needed to solve the problem that is sought. When we leave computability behind and enter the realm of intelligence, i.e. the projection of intelligibility on things as Being, then we find that at the level of Hyper Being there is a singularity of indecision that must be avoided which acts as an attractor. We must build a scaffolding around this attractor and maintain our distance from it else we transition from rational to irrational. On the other hand at the AI level all the AI techniques are really parodies of intelligence that are opaque to us, because they are not our own projections. These opacities are the fragments of the singularity that appears when all the AI techniques are fused together. When we interact with the fragments of opacity then we are within Wild Being, while the singularity itself is in Hyper Being. Beyond Hyper Being is the place where all the fragments of opacity come together again called Ultra Being which appears at the fifth meta-level of Being or in level 5-ontology.

Ontologists need to be aware of these higher meta-levels of Being. Otherwise when they encounter them they will find them mind boggling. They are not easy to understand like Pure Being and Process Being, but are in fact very difficult to conceptualize. This very difficulty gives rise to the difficulty of Continental Philosophy which is dedicated to the exploration of these bizarre kinds of Being. Since 1-ontology is operating in Pure Being its practitioners are blindsided when these higher levels of Being appear. They are assuming that everything is continuous and discrete. This breaks down as we move up through the meta-levels of Being. At the level of Hyper Being we move into the realm of possibilities and hover undecided before the panoramas of the possibilities. At the level of Wild Being propensities determine potentialities to be actualized that set the tone for what possibilities will become realized. But at each meta-level the cognitive space shrinks until at the level of Wild Being it is just a surface, a discontinuous surface at that like the Mandelbrot set.

The key point that needs to be made is that emergent events traverse all the kinds of Being as they trace their way into the world and transform it into a new world by reorganizing it. This is the fundamental reason that those practicing ontology need to be aware of the higher meta-levels of Being because they define the artificial kinds of emergence that can occur in the world. It is not until once arrives at the fifth meta-level of Being at which Ultra Being shows up that we find genuine emergence which is associated with the externality of the projection seen in terms of being-out-of-the-world rather than being-in. Everything revolves around whether ontology, as a discipline will be sensitive to the emergence that is occurring within the world on the background of nihilism generation that is the fundamental product of our Worldview. If we are not sensitive to this emergence then our ontological models will fall down every time a deeper change occurs within the world. Our ontologies will remain unintelligible as long as they are merely computable and do not delve into the higher reaches of intelligibility conferred by the projection of Being, part of which is the projection of spacetime differentiation as the schemas. The only way to build robust adaptable ontologies is to take into account the higher kinds of Being as we construct all the various n-ontologies. But this is a very big open problem that needs to be worked on of how we can go beyond the computable and the representable as a basis for our ontological work in various domains. Certainly we can understand that with functors we can identify those ontologies that have homomorphic or isomorphic relations. But once those various groupings are found then the natural transformations tell us what we need to do to transform from one kind of grouping around operators to another. Modifications on the other hand operate within kinds. For instance male/female is a modification of human kind.

We see it across species. How it appears across species is the natural transformation while how it appears within species is the modification. The next higher level from the 3-ontology is merely a slight shift in it brought about by the 4-ontology. The third level is an expansion of being-in-the-world while the fourth meta-level is a contraction of being-in-the-world. Levels three and four are duals of each other as are levels one and two. When we enter 3-ontology we need something like the David Lewis theory of possible worlds. But when we enter 4-ontology we are talking about propensities, inclinations, tendencies, dispositions proclivities, and pronenesses, (capacities and habitus). Natural Transformations change the kinds from the outside while Modifications change the kinds from the inside. But changing kinds comes after the projection of the schemas that occur at the lower levels. Schema projection occurs at the level of Process and Pure Being as pre-ontological. The infinity of dimensions and meta-dimensions and meta^n-dimenions is part of pure Being. On the other hand the schemas, standings, aspects, and other higher kinds of organization within the Western worldview are finite. The kinds of Being are standings that interface with the higher standings of existence, and manifestation and thatness. The aspects of Being are identity, presence, reality and truth. These existential finitizations stand against the meta^n-dimensions that are infinite. We can walk up through these finite emergent levels with their different organizations that are pre-ontologically projected by dasein. This is because they are self-organizing due to their differentiation in terms of fibered rational knots. Rational means that the knots are created by specific sets of algebraic moves. But fibered means that they are intertwined with their contexts and are not context free. Self-organization means knotted in tension against itself to form a pattern. The finite patternings of self-organization are projected against the infinitude of possible meta^n-dimensions. These self-organizations are projected pre-ontologically and we must disentangle them from the ontic phenomena as we separate logos from physus through science. If you don't know that schemas, standings and aspects and other differentiations of the worldview exist pre-ontologically as projected then one will get utterly lost not knowing whether the ontology is a description of the world or ones own projections. Are our ontologies mere hallucinations? This is an important question that can only be answered by following the n-ontologies upward as they define the different standings, that stand off from the schemas. Schematization occurs blindly at the level of pure and process being. It is only at the level of Hyper and Wild Being that when they appear within the embodiment envelopes set up by the schemas kinds are transformed.

However, the schemas themselves though they are projected along with pure and process Being have a different kind of Being called Ultra Being. We can think of Ultra Being as the projection process from the outside. We can think of it as the surface tension of the projection when encountered from the outside by the noumena prior to becoming clothed on the coverings of Being that make them ontic. Ultra-being appears at level 5-ontology which is the fifth meta-level of Being. At that level interestingly a phase transition takes place from Being to Existence. Ultra Being is an impurity of Being still left in the purity of existence. Existence itself can be considered either Emptiness or Void. We can think of Emptiness as set-like and Void as mass-like non-duals. There is a gauze of the externality of Being that separates these two Janus faces of Existence that are other words for Time and Space. That identification with the Janus faces of Existence with Time and Space makes Ultra Being the anamorph of the body that mediates between space and time beyond the chiasm of reversibility that collapsed when we left the level of Wild Being. This anamorph appears as the Pascal Point from which the Pascal Lines, Triangles, Tetrahedrons, etc that produce dimensionality unfold. We identify emptiness with even zero that appears as origin between the two Pascal limiting points that appear when the Pascal lines produce the Pascal Plane within

which the Pascal Triangle appears. We identify void with odd zero that appears between the stalactite of negative dimensionality and the stagmite of mostly positive dimensionality when two Pascal Triangles in opposite orientation almost touch. Ultra Being appears as the Pascal Point between Odd and Even Zero. In Taoism they call it the Great Ultimate just prior to the differentiation of Yin and Yang. They call the source of the negative Pascal point on the other side of odd zero the Mysterious Female from which everything arises. When the Pascal points split to form the limits of the interval then those two limits are differentiated as Yin and Yang. From their interaction unfold the myriad things. The third is the Pascal Point with its nature as Ultra Being, i.e. projection looked at from the outside, which has a surface tension that the noumena contact as they enter the projection and become emergent events. In Ultra Being the projection process freezes. It has the nature of Mecurius that Jung talks about in his Alchemical Studies. Ultra Being is truly weird. It appears in the world in ideas like sin, evil, incarnation, miracles, etc. But because it is the externality of the projection process it is ultra being that provides the ultimate ground of the schemas. Ultra Being is the schemas undifferentiated from each other. The noumena of the emergent event first touches and contacts that meniscus of surface tension, which then differentiates as the projected schemas that exist in the chiasm between Pure Being and Process Being. They are Pure to the extent they are dimensional. They are processes to the extent they are organized and emergent with respect to each other. Then after being schematized the kinds are assigned in the chiasm between Hyper and Wild Being. The interaction of these two chaisms of kinds of Being produce the individual ontic thing which can be approached either as masses or sets.

One thing that we have not spoken about is the fact that the two higher kinds of Being which are Hyper and Wild correspond to two other approaches to things and events that is in terms of fields and reserves. Reserves are related to Hyper Being and its logic is one of accounting based on conservation. Fields are related to Wild Being and its logic is transformation based on optimality. This means that there are other approaches other than sets and masses which are related to the higher kinds of Being.

We would like to note that self-organization is related to the knot, that is it is organized against itself to form a self sustaining pattern. The knot is something different from the set or mass because it combines identity and difference in a balanced way. We call such a non-dual an ipsity that is part of a conglomerate that is different than a particular that is part of a set or an instance that is part of a mass. The knot has identity in as much as it has continuity of its thread, but it exhibits self-difference at all the points of crossing. What we notice is that the field and the reserve are similar to set and mass but they are operating across a different aspect of Being. They are operating across the aspect of presence and absence. The Field is invisible everywhere but measured in potential at specific places. Thus it is a combination of presence and absence where presence equals its local measurement while absence equals its global invisibility as a force. Similarly, a reserve is something that gathers resources together for use. The tap for water stored in a tank, the electricity that is generated, the gas which flows to the heating system, all these are reserves. The reserved substance is present yet still absent until the tap is turned on that allows the resource out of the reserve. What is interesting is that there is another form of the minimal system, i.e. the mobius strip, which like the knot represents 720 degrees of angular momentum, i.e. the amount of change necessary to stay still as a spinner in spacetime. The mobius strip has local non-duality and global duality. This local to global tension is what is shared by the field and the reserve. The mobius strip is another image of ipsity which is the non-dual between field and reserve. It is interesting that there are two more images of the minimal system which are the torus and the tetrahedron. These are related to Truth and

Reality. The tetrahedron is related to truth because it is made up of regular lines that are true, i.e. straight, in Euclidian space. On the other hand the torus is the first topological surface differentiated from the sphere. This differentiation that comes from having a hole in the manifold is a measure of constraint that we can associate with reality. Of course the two types of combinations of two tetrahedrons is fusion in the octahedron and interpenetration in the cube. So fusion and interpenetration, i.e. paradoxicality and supra-rationality are seen in the relation of tetrahedral to each other in B. Fullers Synergetics. On the other hand the torus is a strange kind of conglomeration of the two independent circles that make up the hyper-sphere held orthogonally to each other. The hypersphere represents the imaginary or illusory which is opposite of reality in which the strange becomes true. On the other hand fiction or falsehood is the opposite of truth. Geometrically that is all the lines that are not straight. For instance the lines that are not straight that connect facts in the physus with statements in the logos. Conceptually the minimal system as B. Fuller says is the Tetrahedron. This is true because the system can be either three or four dimensional as a schema. Thus the tetrahedron in motion in which the lines become elastic is the image of the dynamical system. But that can also be translated as its unfolding into four dimensional space as the pentahedron which is the minimal hypercycle, i.e. the minimal control structure for the autopoietic system. The minimal solids of the third and fourth dimension are the two images of the minimal system from a schematic point of view. But we can also see the tetrahedron as a form and take it apart into its triangular sub-forms. Since we cannot see four dimensional objects unless we rotate them through our dimension we see how time enters into the dynamical system. The fact that we can construct a structure of a tetrahedron as a conceptual minimal configuration of a system without taking into account the exigencies of the real world means that it belongs on the side of logos which describes the unfolding of thought, speech and writing. But on the side of physus there are constraints that we know as physical laws. These constraints can be seen in ideal terms as appearing topologically as the different surfaces of different cardinality that can be created by gluing the torus together with spheres and Kleinian bottles etc. Topologically the sphere is the most malleable manifold. When we start introducing holes in it then we constrain that malleability and by introducing constraints we introduce the idea of the sorts of barriers that exist in physical reality. Reality does not have to be physical. There is plenty of reality in the ideal realm of mathematics, much of which is existential, just these groups or knots exist and no others. But some sorts of ideal reality appear as the constraints of an object on itself and that is what we have in the torus. The torus prevents perfect malleability of the sphere by having a hole in it. So reality and truth can be seen as embodied in these other views of the minimal system that describe the ipsity.

For ontology the realization that there is a connection between our models of the ipsity as torus, knot, tetrahedron, and Mobius Strip and that there is a further connection between these and the kinds of Being in such a way that the aspects of Being are brought into conjunction with the kinds of Being is of significance. The ipsity is the non-dual between all the various aspects and their duals. The ipsity is self-organizing based on the knots non-duality between the set and mass. The ipsity is a chiasm between the field and reserve based on the tension between local and global perspectives. The ipsity is seen in the tetrahedron which B. Fuller calls the minimal system. The dynamic system is seen in the pentahedron of four dimensional space which is a conglomeration of two mobius strips that are different in configuration from the kleinian bottle. When the tetrahedron relates to itself it gives rise to either fusion or interpenetration which are the basis for paradox and supra-rationality needed to apprehend non-duality and non-nihilistic distinctions. The ipsity is seen in the self constraint of the torus that prevents

topological malleability. The cardinality of the topological spaces are built up by combining the toruses with the spheres and kleinian bottles. The malleability of the sphere is contrasted to the strangeness of the hypersphere which has two independent circles along x,y axis and w,z axis. The hypersphere can be seen as two spheres produced by rotating those independent circles that are able to move inside and outside each other as they are rotated in four dimensional space. The two spheres have a spherical intersection which is similar to the relation of the two circles in the torus which has in the center its hole. The torus is a half way house between the sphere and the hypersphere.

The truth and reality aspects are not associated with the four kinds of Being in the same way as the set and mass are associated with identity/difference and field and reserve are associated with presence/absence. Instead what we see is that these aspects lie on either side of the other four kinds of Being. In other words when we construct an ontology at the ontic level there are the furniture of the world at 0-ontology level, the level of beings. We construct models of these using the True, which gives us formalisms. On the other hand at the level of 5-ontology we are beyond the projection system, where the surface tension is encountered by the noumena as Ultra Being. There on the side of the noumena is where reality lurks as what the ontic emergent hierarchies as they exist beyond the pale of projection of Being. That is on the side of Physus. So Truth and reality are separated by the four kinds of Being that represent the projection process from the inside. Truth is the models based on logos and Reality is the constraints that prevent perfect malleability of the phenomena beyond the noumena. Reality and Truth are separated by the avatars of identity and presence along with their opposites. But there is a form of ipsity, or the concrete emanation of non-duality associated with each one. On the side of truth there is fusion (paradox) and interpenetration (supra-rationality) while on the side of reality there is the difference between perfect malleability of the sphere and the intertransformability between spheres of the hyper sphere which the torus stands between as a non-dual marker. The aspects of Being and the Kinds of Being stand against each other is a particular configuration that needs to be understood to strike at the heart of ontology through the understanding of the meta-ontologies that are alluded to here on the analogy of the n-categories of mathematics.

Badiou and Mathematical Platonism

Many of these ideas are simulated by Alain Badiou. We just want to mention our difference from him. For one thing although he says that Being is Mathematics, he assumes that the Set is the basis of Mathematics whereas we propose four fundamental categories called the set, mass, field and reserve. He is conservative in his assumption that just because mathematicians have not moved out of pure Being and discovered the complementary categories to the set that they do not exist. Mathematics needs to be expanded and when it is we find that we have a model of the ipsity which is non-dual between the extremes of all four of the mathematical categories. Another difference with Badiou is the fact that he sees the multiple as the only alternative to oneness either as unity or totality. We on the other hand affirm non-duality which is neither one nor many as another path beyond current mathematics and logic. Badiou does not know about this path opened up in Buddhism by Nagarguna, and similarly alluded to in Taoism and Islamic Sufisim. Badiou speaks of the Event as the arbitrary insertion into the multiple that produces the set. This talk is a lot like our theory of Emergence. But he does not have the concept of the meta-levels of Being to guide his thought. For him there is only the multiple and the arbitrary insertion of an element into the empty set. He also makes the mistake of identifying the background of infinite empty sets, cf Guz, with the Void. He does not discriminate the difference between Emptiness and Void and does not realize that the

background of the gestalt is not equal to either of these interpretations of purified existence. Because he cannot see the difference between emptiness and void he cannot understand Ultra Being either as a possibility.

It is good to contrast with Badiou because he is the first philosopher to take modern mathematics serious. Once one understands the differences between this ontology and that of Badiou then it is possible to make positive progress because there is a real counterpoint from which to take our departure.

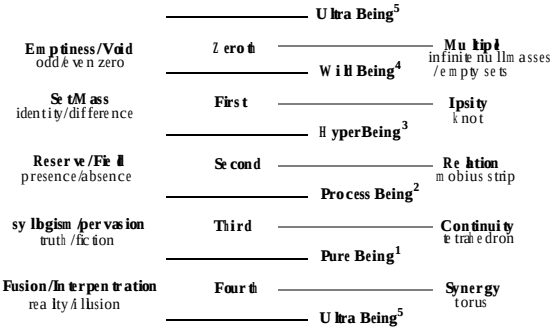
Peirce and Fullers Categories

What we need to understand as ontologists operating in the meta-levels of n-ontology theory is the categories of Peirce as augmented by Fuller. Peirce identified three categories: First, Second, and Third. First is the ipsity, i.e. the arising of content or hyle in isolation represented by the Monad schema. Second is Relation which can take many forms within the hierarchy of the Schemas as Pattern, Form, System, etc. Third is continuity by which the background is seen as the necessary complement of the gestalt figure of the relations that form the tetrahedron of the minimal system. Given a schema then we construct things organized in the way that the schema is organized. The ability to see these things as whole given the schematic organization is the continuity of the third. To this we add from Fuller the Fourth which represents Synergy. Fuller is working from Geometry and not Logic as is Peirce so he can see the synergy in the Platonic Solids. We merely take this synergy into the higher dimensions in our own work picking out the conceptual thresholds in the fourth and fifth dimensions and beyond. But we must also distinguish the Zeroth. The Zeroth is the void or emptiness. This is the "multiple" of Badiou. Infinite Empty Sets (cf Guz[1]) or Infinite Null Masses. The First is the Pascalian Point. But Pascalian points can be seen either in terms of sets or masses. When the Pascal point differentiates then we get the Pascal lines that interact to form the Pascal Triangle. That triangle can stretch into positive or negative dimensionality. The negative dimensionality represents interpenetration and the positive dimensionality represents differentiation and articulation of minimal information sets. So Void and Emptiness transforms into sets and masses based on differentiation of identity and difference aspects of Being. Firsts can be differentiated as particulars or as instances. It is only at the next categorical level that they become individuals when they are related to other Firsts. This is where 1-ontology starts when we see the arrows of relation and we forget what the elements might be. Relations are tied into the schemas. Relations are organized at each schematic level differently which are set like against the background of infinite meta^n-dimensions. Relations of patterns are different those of form and system and the others. Each type of relationship is a self-organization within the schematic organizational template of understanding. Relational operations set up closures[2] of the fundamental openness of the clearing in Being. These closures produce the material for futher closures of higher orders. These closures are the subject of 1-ontology. If we are to break down the barriers that separate different ontological closures then we must take this tact that is the same as that of mathematical category theory so as to drop the elements and concentrate on the arrows that map or transform between the elements. Schematization actually occurs at the point where the Pascal point breaks up into the generator of dimensionality that creates the space in which the schemas can articulate themselves. Ultra Being per se separates synergy of fusion/interpentration from the void/emptiness. But it is Wild Being that produces the tendency or disposition of the Pascal Point to pop up out of the void/emptiness to fill the sets with particulars and masses with instances. Then when the

[1] See http://emptysets.org

[2] See Lawson, Hillary; Closure.

seconds arise we see the unfolding of relations into the schemas. At that point showing and hiding relations can occur and the presence and absence aspects of Being become important. We see the schemas as a pre-ontological structure underpinning relations, i.e. as a projection. The next step is the unfolding of continuity so that we can relate the minimal system to its background, the open-scape (meta/infra-system). It is in the third that logic syllogistic and pervasion appears as three sorts: (in/de/ab)-duction/vasion. It is through the third that we can see the whole tetrahedron and not just its lines of relations. At the level of the third the gestalt figure appears on the background. The identification of the background with the void as does Badiou and G. Spencer-Brown in Laws of Form is disastrous. This blinds us to the interaction of the open-scape and the system as two fundamental schemas that are duals of each other. It is the meta-system that is seen in terms of fields and reserves and thus as the relation between presence and absence aspects of Being. Thus it is the meta-system that must be there prior to any identification of any relation. Individual Seconds must be shown out of the meta-system in order to be seen together and thus form a relation. As we add synergy we go right on into the higher dimensions where synergies abound and complex figures are created out of a very few elements. For instance the pentahedron gets five tetrahedral out of five points, and ten lines and ten triangles. That pentahedron is also two mobius strips intertwined. This is synergy, complex over determination of elements in patterns that interlock symbiotically. Synergy can express itself both as fusion and interpenetration. The interpretation of interpenetration and fusion can be either as emptiness or void. So we come full circle in our five categories. But these five categories have five discontinuities between them and those are related to the five kinds of Being including Ultra Being that exists between the Fourth and the Zeroth. The other four kinds of Being are laid down as follows: between Zeroth and First is Wild Being, Between First and Second is Hyper Being. Between Second and Third is Process Being. Between Third and Fourth is Pure Being. The kinds of Being are the differences between the Peircian and Fullerian Categories. The levels of n-ontology live in the space created by these categories and differentiated by these kinds of Being.



Openness and Closure of the n-ontologies

If we follow the reasoning of Hillary Lawson in Closure then we see that the fundamental openness of the clearing-in-being is closed under different configurations of closure that are socially invented and constructed. There is a hierarchy of these closures where each closure produces a material which itself has a further type of openness which can be further closed. In our world we are cataloging the furniture of these closures many of them which rest on arbitrary historical decisions. But Hillary Lawsons point is that these earlier closures can open back up and that we can in fact experience a cascade of reopenings of closures such that the fundamental closure of some segment up to encompassing of the world can open back up and then recluse in a different configuration. It is due to this phenomena that we call emergence, when new things come into existence as the world opens back up and then takes on a new pattern of closures, that makes it necessary to found the n-ontology levels. Only a deep set of ontological meta-levels can deal with the reopening and reclosure of the world. And if we think that all the furniture of the world is merely static and we expect our ontologies to last indefinitely we are sadly mistaken. We must respect change in our ontology building and in fact we must be

prepared for emergent change which Badiou calls the Event, in which the Set returns to the multiple and a new ipsity arises to produce a new insertion into the Set. The Multiple is the name Badiou gives for the fundamental openness of the clearing-in-Being. What the meta-levels of Being that define the various n-ontologies give us is a finely discriminated set of levels of change that are associated with artificial emergence that culminate at the fifth meta-level in genuine emergence that changes the world fundamentally. However these changes can happen on various levels such as the levels of suchness, facticity, theory, paradigm, episteme, ontos, existence, absolute. Genuine emergence can occur on any of these levels of social invention and construction. These levels are interleaved by the following levels that relate to the individual rather than the social: given, data, information, knowledge, wisdom, insight, actualization. Understanding how emergence can occur at each of these levels as the world opens back up and recloses in a different configuration is one of the central concerns of higher order n-ontologies. At 0-ontology we have the various things, stuff, events and times that appear within our closures of the openness. We take these and attempt to record the things, or stuff and their relations at various schematic levels at the 1-ontology level. This is the level where most of the ontological work that is being done occurs today. However, that does not take into account the 2-ontology level where there is the possibility of the emergent event, i.e. the possibility of the reopening and reclosing of some part of the world from the point of view of some discipline or domain. When the event of emergence occurs then the functors we draw between 1-ontologies are broken. But even deeper levels of emergence can occur at the 3-ontology and 4-ontology levels of Hyper Being and Wild Being which we see in terms of natural transformations between kinds and modifications within kinds. When we get emergence that is so deep that it appears at the 5-ontology level then we have a genuine emergence that repatterns the entire world, or some other schema within the hierarchy of schemas. In other words the deepest genuine emergences effect the organization of the schemas not merely the social and individual levels of organization within our culture.

As we engage in our ontological work of understanding the furniture of the world and how the different pieces are related to each other we are operating in a specific ontological bubble within a rhizome of ontological bubbles. Much of the work of ontology is about attempting to understand what is in a single bubble. But there is also work that attempts to collapse the walls between bubbles so that the domains become larger and the ontological analysis more robust. This occurs when we apply ontological operators to the ontologies themselves. Martin Fowler gives an example of this sort of work in his Pattern Analysis method[3]. By applying the Pattern Analysis method the ontologies become more simple but also more expressive. Two ontological bubbles might collapse into a single bubble. Let us consider the walls that separate ontological bubbles from each other. Those walls are normally either paradoxes or supra-rational juxtapositions where one 1-ontology differs distinctly from another 1-ontology on the other side of the barrier. It takes the event of at 2-ontology for the barrier to collapse. In other words at the level of 2-ontolgy there can be a process by which the two are seen as coming from a more fundamental level that is the same, or there is a structural explanation for the disconnect between the two 1-ontologies. A similar thing happens when two 2-ontologies are connected by an underlying 3-ontology and so on up the scale of n-ontologies. In other words emergent events can collapse the walls between the levels of ontology and reconfigure the timespace[4] within perhaps building new walls in different places, or our ontological analysis can find the transformations at the right meta-level of pattern analysis to make the walls transparent. Either way we must be prepared to explore the depths of the meta-

[3] http://www.martinfowler.com/

[4] See Heidegger Time and Being

levels of n-ontologies in order to understand the world deeply and also to be prepared for the emergent changes that can occur within our world as the closures occasionally collapse and reopen only to assume another closure configuration which would invalidate our ontologies.

An important point that we must not forget is that the Berkenstein Bound may apply to these walls between n-ontological closures. This is to say that Berkenstein has found that the result of his bound is that information within one timespace can be written on the wall of that timespace and then decoded on the other side of that wall to fill the timespace on the other side of the wall. Berkenstein discovered his bound by studying black holes and discovered that one forth of the surface of a blackhole represents its entropy. One of the corollaries of this work is that the information within a timespace can be written on the surface of that timespace. This means that we can think of the boundary of a timespace between two ontologies as an anamorph which solves the tension between the two adjacent ontologies by representing the paradox or disjunction that is necessary to minimize the information organization differential between the two timespaces. An anamorph is an object that looks different from two different perspectives but is one object. In a way the whole point of 2-ontology is to understand the walls between 1-ontologies and their anamorphic nature dictated by the various viewpoints generated by the different 1-ontology closures. The same thing can be said for 3-ontologies in relation to 2-ontologies and so on up the emergent hierarchy of ontologies. The higher we go up the hierarchy the more deeply we understand our world and that is the real goal of ontology, not merely the categorizing the furniture of the world and the configurations of that furniture. Rather we want to understand where that furniture comes from and why that furniture and not some other furniture, and so on with the rooms, buildings, landscapes, etc in which that furniture is placed. The furniture we must keep reminding ourselves is merely a certain closure of many possible closures of the openness of the being-in-the-world. At 2-ontology we can see the relations between different styles of furniture via functors. At 3-ontology we can see the transformations that allow us to generated different kinds of furniture for the world. At 4-ontology we see the possible modifications of kinds from the inside that are possible such as the difference between male/female in relation to the species. At 5-ontology there is a fundamental change in the organization schemas themselves which is deeper than the separation of kindness because it has to do with the relation of possibilities of self-organization to the dimensional articulation of spacetime. What happens at 6-ontology and beyond is unknown at this time, except there is a phase transition between Being and Existence and so there is a completely different type of organization beyond meta-level 5.

Conclusion

We have attempted to outline a new approach to ontologies that treats them much like the Mathematical categories and posits n-ontology theory as the counterpart to n-category theory. In this n-ontology theory we are seen climbing the staircase of the meta-levels of Being. This work gives us a clearer picture of the ontological foundations of emergence which is striated into various levels of artificial emergence culminating in the genuine emergence at the fifth meta-level of Being. Dynamic Ontology is seen as being a combination of 1-ontology and 2-ontology. From there we begin to explore the levels of 3-ontology to 5-ontology which is beyond the compass of current theories. It is the exploration of the higher level ontologies that takes us beyond Dynamic Ontology into the realm of deeper and deeper kinds of emergence. We briefly compared our model to that of Alain Badiou and then we presented our model in relation to the Categories of Peirce and Fuller. Finally we considered the relation between ontological timespaces and how ontological

pattern analysis might bridge those timespaces that could change if a reconfiguration of the timespaces occurred due the arising of emergent events that repatterned the ontological timespaces.