NEW GENERAL SCHEMAS THEORY:
SYSTEMS, HOLONS, META-SYSTEMS & WORLDS

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ABSTRACT

The theory of Special Systems and the Emergent Meta-systems stands as a new extension of General Systems Theory. Briefly, Systems are defined as social gestalts that are wholes greater than the sum of their parts. Meta-systems are defined as environments which are wholes less than the sum of their parts. Special Systems Theory posits that there are a class of special systems that are exactly equal to the sum of their parts which has not been recognized before. Koestler called these special kinds of systems HOLONS, and we call the investigation of these specially balanced systems HOLONOMICS. We posit that there are exactly three special systems which are called Dissipative neg-entropic ordering (Prigogine), Autopoietic (Maturana and Varela) and Reflexive (O'Malley and Sandywell) which are mathematically based on Hyper Complex Algebras. The identification of these special systems that combine together to form an image of the environment called the Emergent Meta-system is an important development in General Systems Theory that has implications for the future development of General Systems Theory. In general, it means that there are really three kinds of theory that need to be pursued in parallel. There is General Systems Theory which needs to be augmented by a General Meta-Systems Theory which is a theory of environments, ecosystems and all other general economies as opposed to restricted economies (cf Bataille Accursed Share). Then there is the theory of Special Systems or Holonomics which studies the rare and anomalous balanced systems where the whole is exactly the sum of its parts neither more (as in the case of systems) nor less (as is the case with meta-systems). Meta-systems must be distinguished from SuperSystems which are the nesting of systems at various levels of abstraction. Meta-systems are deconstructed SuperSystems. Meta-systems tend to be invisible because they are the background on which the System gestalt is seen, i.e. they are a deeper background than the background of the figure in the gestalt. The study of these ways of looking at things in the world is posed in terms of what is called General Schemas Theory which includes other schemas as well, for example the schema of the World which serves as a context for understanding Systems, Holons and Meta-systems.

In other words, we need to be concerned with a wider theoretical framework than merely General Systems Theory. When we look at that wider framework, then we see that some interesting and anomalous systemic features arise that can only be seen when we compare Systems to Meta-systems. However, this broader framework is just as general as General Systems Theory yielding General Meta-systems Theory and General Special Systems Theory that both apply to many disciplines. But the important point is that the discovery of these new levels of generality force us to reconsider some of the basic assumptions of
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our dominant Western Philosophy of Science in such a way that makes comprehensible earlier traditional sciences and also helps us understand how a kind of science that is not alienated from the Earth may be built from the ground up on different assumptions.

How the objectives of Research Toward a General Theory of Systems Special Integration Group are met:

**Objective 1. To discover or develop a set of universal concepts and algorithms that are relevant among all the branches of science, and useful in describing all the diverse systems in nature and culture. -- Examples are: Aristotle or chaos theory.**

Special Systems Theory and Emergent Meta-Systems Theory are founded on the mathematics of Hyper Complex Algebra and Non-orientable Surfaces in Topology that gives it a mathematical rigor to be envied by other systems theories. It is interesting that these kinds of Algebra which have been known from about 1850 have not found much use within physics or other sciences. It is precisely these forms of mathematics that describe the relation between elements within the special systems and within the Emergent Meta-system.

**Objective 2. To give a rigorous definition to these notions in the physical sciences to start with; to add conceptual expansions to concepts and algorithms where necessary or appropriate in order to cover the emerging properties of more complex systems; to apply these expanded concepts systematically in the varieties of complex sciences such as cybernetics, biology, sociology and ecology.**

The hierarchy from System through the Special Systems to the Meta-system is a series of emergent stages, each with its particular properties that arise on the basis of the lower levels but contributes specific emergent new properties at each level. In the case of this systems theory, these new properties are described as the properties lost when we move from one algebra to another. Because these properties and the subsequent systems that occur when the properties are lost are mathematically defined, they are very rigorous. The algebraic model gives you a combination of additiveness and emergence together which is characteristic of holonomic systems in general.

**Objective 3. To test the validity of the unified scientific theories; to demonstrate and to verify their predictive power by practical examples in each of the branches of science; to otherwise establish criteria under which the behaviors of observed and inferred systems can be reasonably evaluated.**

Besides the mathematical definition of the various special systems and the Emergent Meta-system, there are also a series of physical examples of these rare and anomalous systems that occur in nature which have the same structural configuration predicted by the mathematical model. Special Systems are always anomalous and rare, but the
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physical examples show that they do indeed exist in the realm of physics, and they probably also exist in other disciplines as well as yet unrecognized.1

Keywords Life Ontology, Holonomics, Holon, Meta-System, Special System, World

GENERAL SCHEMAS THEORY

Instead of talking about General Systems Theory as the rubric under which we might subsume other sister disciplines, let us talk about a General Schemas Theory which subsumes all the various ways we understand the myriad phenomena studied by different disciplines. In this paper, we will consider several other potential sister disciplines to General Systems Theory and their interrelations. The first of these is the General Theory of Meta-systems which is still nascent. By meta-systems here is meant ecosystems, environments, ecologies, contexts or milieus of Systems. The second of these is the General Theory of Holons which was inaugurated by Koestler in his book Janus.2 A holon is something which is both a part and a whole at the same time. Here we will consider a variant of General Meta-systems Theory which sees Meta-systems as composed of Holons and Systems which will be called Emergent Meta-systems Theory. It is called “Emergent” because in it we study how Meta-systems arise as a schema with its own characteristics out of the combination of holons and systems. The three General Theoretical disciplines concerning these schemas: systems, holons and meta-systems form an unexpected and fascinating combination that has unprecedented explanatory power. Together they open up a new horizon of research by supplying a new way of looking at phenomena which may be applied to various disciplines. A theory is a conceptual view of phenomena. We are seeking general views that may be applied across disciplines, i.e. General Theories, giving unity to the enterprise of science. Our views of phenomena may be reduced to schemas such as System, Form, and Pattern which, along with others, give a basis for understanding phenomena by providing a template, or a set of analogies, which illuminate the relation between the various aspects of the phenomena under study. Here we propose two other schemas which, like that of the “system,” are slowly gaining favor among scientists as ways of looking at things. What will be explored in this paper is the interrelations that are emerging from the study of the relations between the schemas themselves. The cutting edge of scientific theory development is the exploration of how we might combine various schemas or foundational theoretical views into composites that offer the possibility of applying these various views in concert to better understand the phenomena under study. The most successful of these which is the basis of most Western scientific theorizing is the combination of the Formal Structural Systems which is exemplified by the work of George Klir that combines the schemas of Form, Pattern and System into a single theoretical edifice. In this essay we will construct

1 A paper on this new extension to General Systems Theory called Reflexive Autopoietic Dissipative Special Systems Theory exists at http://server.snni.com:80/~palmer/autopoiesis.html. See also the following papers presented at ISSS2000: Defining Life And The Living Ontologically And Holonomically in the What is Life and Living? SIG; and Intertwining Of Duality And Nonduality in the Duality Theory SIG. References are given in the first paper where the reference is mentioned.
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and explore another interesting combination of schemas, i.e. system, holon and meta-system, which gives us an unprecedented and powerful explanatory perspective on phenomena that has baffled Western science since its inception. Many times it is the limitations of our conceptual tools which causes us to misrepresent and misunderstand phenomena. When we take the chance on a new paradigm, sometimes we are rewarded with new insights that could not be apprehended through the old paradigm. One way to understand paradigms is in terms of combinations of schemas of understandings and fundamental assumptions that underlie our theorizing in a specific discipline. What is offered here is a new combination of conceptual schemas which might be combined with theoretical assumptions to produce new paradigms for specific disciplines. Because our focus is on General Schemas Theory and not on particular disciplines, the assumptions that would be necessary to produce a paradigm for a field of study will not be generated. Rather, we will concentrate on the interrelation between these various schemas and what we might learn from them that might be fruitfully applied at a more specific level of theorizing in a particular field to give cogent results.

THE SYSTEM SCHEMA: Gestalts and Flow Duality

We will characterize the “system” schema here in terms of a social gestalt. In other words, we will not enter into the debate as to whether systems are “out there” in the world, but instead will say that a system is something projected by a social group as a social construction or invention. This obviates the problem of whether we are imposing or discovering system schemas in relation to phenomena. The system schema gets its objective nature from the fact that it is a “social” construction or invention which is projected in concert by a group of people. This is a matter of perceptual pre-synthesis on the part of the group and can be studied by a social phenomenology which is attuned to looking at the social gestalts produced by various groups including scientists.

What the social gestalt gives us is a basis for thinking about the system which sees it as a projected schema and not as something necessarily inherent in existence. The projection of this schema in a way that cuts through the joints of phenomena as Plato has advised us is a skill to be developed and which has been perfected over the centuries by science. At one time, all of science was concentrated on Forms which derived from geometry and algebra and their combination discovered by Descartes. It has taken a long time to establish that Systems are different from Forms and just as useful in their own right as ways of comprehending relations among Forms. Forms are the Figures that appear on the backgrounds of the systemic gestalts. We talk about systems as sets of entities and their static or dynamic interrelations. We see those entities as figures on the background of all the other entities within the system. We bring out each entity one at a time to stand out on that background, and the entire system is the set of all possible foregrounding of entities on the background of the possible focal entities within a system. It takes time to go through and enumerate the entities in a system. It takes time to bring these figures into

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4 As mentioned in "Defining Life and Living Ontologically and Holonomically" by "Social Phenomenology" we really mean "Neg-entropic Living Social Hermeneutical Phenomenology" which we have called the "Primary or Archaic Situation".
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juxtaposition in order to understand their separate interrelations which, woven together, make up the web of systemic relationships. Thus, we may view a system synchronically as all the entities and their relations at one point in time, or diachronically as the evolution of the system as the entities change and their interrelations transform over time.

We must first realize that a system is really a social gestalt. That is a series of entity figures on the background of the entire system within a specified boundary. And we realize that their interrelations as projected by some social group so that any one individual’s perceptual or conceptual gestalt of the object is a reduction to a single perspective projection of the group’s multiple perspective projection. [We must recognize, along with Husserl⁵ and Gurwitsch⁶, that gestalt is always both perceptual (Husserl’s noema) and conceptual (Husserl’s noesis) but may emphasize one or the other in any particular instance.] Then we may ask ourselves what is the dual of the Gestalt way of looking at things. After years of missing this essential point, I realized that the dual of the gestalt schema is the flow schema. In a gestalt there is a figure on a background. If we take the figure and submerge it so that the background becomes the foreground, then it becomes a reference point on the basis of which we can get some idea of the flow of the foreground. A rock which sticks up from a stream is a gestalt figure to us on the background of the flowing stream. But submerge that rock slightly into the stream and it becomes quickly a reference point for our judging the swiftness and the patterning of the flowing waters above it. Thus, it is necessary to consider social flows as the duals of social gestalts and understand that flows and gestalts are almost always seen together, where one is emphasized or the other in each particular instance of perceptual or conceptual comprehension based on the system schema. Thus, when we look at a system diachronically, we are concerned mostly with flows, while when we look at it synchronically, we are concerned mostly with the various gestalts by which we pick out the entities and their interrelations.

Another important point about the systems schema is that these gestalts, as has been long recognized, are wholes greater than the sum of their parts, i.e. the whole has emergent properties that go beyond the properties of their entities and interrelations between entities. Part of that overflowing is seen in terms of the dynamic flows within the system, yet even the flows interact with each other to produce characteristics that cannot be captured by analysis. A gestalt or a flow is a pre-synthesis, what Kant calls an a priori, i.e. a projection prior to experience on the basis of which we perceive and conceive phenomena. That pre-synthesis has characteristics that are supervenient, i.e. emergent, which go beyond what can be discovered by reductionism and analysis. Those emergent or supervenient properties must be understood in terms of dialectics, trilectics, quadralectics⁷ or some other scheme which allows for the superabundance of characteristics in the system over and above the forms and their interrelations which make it up. This emergent characteristic of the system, i.e. that it is a whole greater than

the sum of its parts, has always been the keystone of the identification of gestalts over and above what formalisms can describe and explain.

The Formal Structural System is a combination of three levels of schema that is endemic within our scientific way of approaching things because it has been so successful in helping us to understand nature. Formalisms give the possibility of proofs which is particularly reassuring to our rational intellects, and we wish all things we studied lent themselves to proof. However, we have discovered in the development of science that the advances we have made in mathematics are harder to win in physics and other disciplines that attempt to understand nature. We use our formalisms, both in logic and mathematics, as a means of connecting Theory (logos) and the phenomenon of nature (physus). But many times we cannot prove in a determinate manner things we would like to about the phenomena we study in a particular discipline so we resort to explanations that are probabilistic. These explanations are usually based on the transformations of content as we move across discontinuities that present themselves in the phenomena. Thus, we create a level of understanding that deals directly with content of the forms which produces a new schema of understanding called a pattern. Patterns may be seen in terms of time or space and thus can be either structural or process oriented. Structural Patterns explain transformative changes across discontinuities in space while Process Patterns explain transformative changes across discontinuities in time. In software engineering, when we take an Object Oriented Approach to design, we combine these by encapsulating structures within the wrapper of an object and providing operations to transform these structures which no other outside object can perform. The General Systems Theory of George Klir in Architecture of Systems Problem Solving is an example of a Formal Structural-Process Systems Theory which combines both ways of thinking about patterns in a single edifice. He does this through his hierarchy of epistemological levels which splits into meta-models (processes) and meta-structures. These pattern generating models prove very powerful ways of explaining phenomena that change discontinuously across time and space. They appeal to the changes in pattern generators that operate on the content of the forms as the basis of understanding alterations in phenomena that formalisms cannot comprehend. When this level of explanation is combined with the Formal level that offers a stronger basis of comprehension, i.e. proof, then we are able to explain many things in a cogent manner that would otherwise remain baffling. However, this does not allow us to comprehend all aspects of the phenomena and so it is necessary in those cases where we cannot explain to merely describe what we find in nature. When we describe things, our tendency now is to use the schema of the system as a basis for comprehending the interrelated entities which we observe. Our observations are of conceptual and perceptual gestalts and flows that cohere into the system schema that we project by pre-synthesis to encompass the phenomena under study. Thus, the Formal Patterned System is a series of fall back strategies for comprehending phenomena in general that combines in a powerful way three distinct schemas, each based on a separate analogy. Form is based on the analogy of shape or the outlines of things that we see in terms of the mathematics of algebra and geometry on the one hand and logic on the other. Pattern is based on the analogy of the warp and weft of fabric that we see in terms of processes as discontinuities in time and

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structures as discontinuities in space. System is based on the analogy organisms that we see in terms of gestals and flows.

We should pay attention to Wittgenstein\(^9\) when he talks of language games. Both languages and games are systemic phenomena par excellence. It is through them that we can understand systems in nature because these are two ways that the systemic schema manifests itself within society, and this allows us to understand what systems are through our own intimate experience of systems in this form as social beings. Social Phenomenology discovers that we are already language speakers who learn these skills as children when we are also learning to play. So the system schema which starts with the analogy of organisms as pointed out by Rescher in Cognitive Systemization\(^10\) is augmented in other powerful socially based analogies based on our inherent understanding of games and language which comes to us out of our social experience. Form and Pattern which we see in nature also have these social expressions. Form has two aspects: Shape and Behavior. These are seen in dance and theater and other social arts as well as in rituals where costume and special actions are performed in some institutional social context. Pattern shows up mostly in terms of handicraft such as the weaving of the cloth for the costumes that the dancers and participants in the rituals wear. Pattern shows up in the embellishment of the architectural forms that hold the performance. Pattern is decorative of the forms which participate in the play of the performance. Thus, there are social roots for all these schema by which we attempt to understand nature through the reified theoretical structure of the Formal Patterned System.

THE META-SYSTEM SCHEMA

From the familiar territory of the schemas of System, Form and Pattern we now move to a new schema that is gaining in popularity but has not yet become established except in the discipline of environmental studies and ecology. This is the meta-systemic schema which has not yet received a general name of its own. If I were to name this schema, I would call it an “Archon” after the Archons who oversaw the city in Greece. An Archon was a magistrate in the historical setting of Athens after the establishment of democracy. The Archon had some functional purview over the whole city which was split out from that assumed previously by the king. The city is the perfect analogy of the meta-system in that it is an environment in which households flourish and interact. The Archons are the ones who oversee the functioning of the household environment and, for instance, regulate the markets or oversee preparation for war with other cities or administrate justice. The functions of the archon are hidden in and subsumed by the king, but when the king is deposed as in the fledgling democracy of Athens, then these functions have to be taken over and performed by others who must coordinate their efforts. The Archon is the symbol of the deconstruction of the unity of kingship and, thus, specifically points to the

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environmental aspects of the city as a place for households to develop and interact which would otherwise be hidden by the unification of kingship. The meta-system has a similar relation to the super-system. A super-system is a system made up of sub-systems which are, in turn, made up of sub-sub-systems to some degree of hierarchical nesting. Each level is seen again as a gestalt/flow whole that is greater than the sum of its parts. However, we do not often look at the dual of the super-system which I have dubbed the meta-system, i.e. the deconstructed whole which is less than the sum of its parts. That whole is the environment itself as the origin and arena of systems at some level of abstraction. It is different from a system itself because it operates as an “operating system” supporting the systems that it contains. Thus, we only see the meta-system when we deconstruct the super-system (king) and see instead the intervening intermediate level of organization within the super-system that acts as an environment for encapsulated sub-systems. The analogy of the meta-system to the system is like the relation between the universal turing machine to the turing machine. It is like the computer operating system to the application that operates within that operating system. The meta-system is broken up into archonic functions which give resources to and regulate the systems that are allowed in its environment. The environment in this sense acts as a filter because only certain systems can operate within a specific meta-system. The meta-system is inherently disunified and thus the archonic functions within it are generally orthogonal although they have to cooperate in order to produce an environment which facilitates the growth and development of the kind of systems that are allowed in its niches.

Meta-systems are inherently complementary in their organizations rather than unified. They are totalizing rather than unified in that they contain the totality of complementary opposites that provide the necessary archonic operational resources and regulation of the systems. Sartre, in *The Critique of Dialectical Reason* calls the meta-system a detotalized totality because it is never a static totality but a dynamic totalization by which the various orthogonal archons cooperate through shared complementarities to produce an optimal environment for unified systems and anti-systems that appear within it and are enveloped by it. The meta-systemic environment is composed of niches, which are holes, which make it less than the sum if its parts. These holes are exactly fitted to the kind of systems that the filter of the meta-system allows. Within the meta-systemic environment, systems within their niches are created, given resources of various kinds, and are eventually destroyed such that their constituent elements are recycled back through the meta-system to produce other systems. All interactions that a system has with its meta-systems are through complementary opposites. Thus, the attributes of the meta-system is always pairs of complementarities as seen from the point of view of the systems within it. These complementarities can be deeply nested as complementarities of complementarities of complementarities much like the nesting of the sub and sub-sub systems within the super-system. When super-systems are taken apart, they appear as meta-systems. One may think of the meta-system as a field of tendencies which dictates the order of assembly of the super-system out of the sub-systems that appear within meta-systemic milieu hidden within the super-system. For this reason, when we think about design landscapes, we are necessarily talking about meta-systemic fields.

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Culturally we have difficulty thinking about meta-systems. Today we generally reduce them to systems, or nested super-system complexes, which suppress their extremely different characteristics that are, in fact, the dual of those characteristics of systems. Systems are unified and meta-systems are detotalized totalities. Systems have their dual within the meta-system where we see anti-systems emerge, but where meta-systems are nested complementarities, systems are made up of singular parts or functions. Systems only develop complementarities in relation to and by their adaptation to their meta-systemic environment. We use the term “meta-system” because if we take the system through its series of higher logical types, we find that the meta-system is related to its rules, like the rules of a game or the grammar of language. The rules are the constraints that the meta-system places on the system while it is in its environment. The next higher meta-level of the system is the properties of the pieces in the game or the properties of the markers in language like the phonemes which are allowed within the meta-systemic environment. The next higher meta-level of the system is the constraints on the system and exceptions to the rules which determines the freedom and determinism under which the system is operating. Each of these meta-levels of the system refer to the relation of the system to the meta-system. Here the term “meta” refers to all the meta-levels of the system operating on it at once. But each schema should have its own name other than by reference to another level of organization of phenomena. That is why we have suggested the term Archon which is related to the term that Jung uses for structures in the collective unconscious which he calls “complexes” or “archetypes.” The term complex and the term archetype are suitable for use when describing meta-systems because Jung attempted to describe the Totality of Consciousness which he called the Self which was composed of the system of the Ego and the anti-system of the Shadow and various archetypes, which were higher level nested complementary formations that intervened between the level of the unity of the Ego and the totality of the Self that included both the conscious and unconscious in one whole. We can see the Self as super-system, as Nietzsche did when he posited the uberman as the impending fated arrival of what was other than human within humanity (but which never actually arrives), or we can consider consciousness as a field full of complementary complexes in which various numinous loci like that of the ego interact beyond the filter of consciousness. This model is similar to that of the region full of communities (city states) which are again full of neighborhoods which contain households which are based on marriage. All of these are meta-systemic levels of organization within society. Our culture has difficulty recognizing and dealing with these amorphous types of human organization which are rooted in the meta-systemic "field" view of nested environments. Our stewardship of these aspects of our own society is very poor; because they are amorphous, they receive little attention and are easily destroyed by highly organized systemic institutions. Meta-systemic institutions are social archetypes. You notice that each of the archetypes that Jung points out like the Anima, Animus, Wise

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12 For a more in-depth analysis of the relation of this view of systems theory to systems engineering see the author’s “Meta-systems Engineering: A New Approach to Systems Engineering based on Emergent Meta-Systems and Holonomic Special Systems Theory”, International Council of Systems Engineers (INCOSE) 2000
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Old Man, Cathonic Female\textsuperscript{13}, etc. are symbolic internalizations of some aspect of society, some type of person or some type of relationship between different types of people in society. That is why he calls it the collective unconscious. But it is the dual of the outward amorphous relations which appear as standing wave patterns in the meta-systemic field of society such as region, community, neighborhood, family, marriage which mediate between the abstract organized and systemic institutions of society and the individuals within it.

Meta-systems exist as nested complementarities. The first level complementarity with respect to the system is that the meta-systemic field is the origin and arena within which the system arises and interacts with other systems including anti-systems, i.e. complementarity images of itself. An example of system and anti-system pairing in society is the gender distinction. In fact, this is probably the most basic complementarity within our society, and it is rooted in nature based on the distinction between male and female that we discover in ourselves. However, gender ascriptions are not directly tied to these natural and physical markers but instead form a field of signifiers within society. But the next level of meta-systemic nesting of complementarities is that of the meta\textsuperscript{2}-system which includes the conjunction of origin and arena with source and boundary. The arena is bounded, and whatever has an origin within the system must also have a source. The origin is the spacetime point of entry into the meta-systemic field. The source is the endless-timespace template from which the system is patterned. In software, there is a distinction between an object and its instance. The object as a template for data structuring, and behavior is the source while the concrete instance of that object as it enters the system given memory and CPU\textsuperscript{14} cycles and initialized with specific default values in variables is the origin. In the meta\textsuperscript{2}-system, we see that the meta-system establishes the limits of its control and filtering via the boundary, and what it establishes is a priori patternning of the systems that are allowed to emerge within it, while once they appear at a specific origin, then they develop through their interaction with other systems until they are terminated by themselves, other systems or the meta-system. The meta-system is infinitely nested through a series of meta\textsuperscript{n}-system levels of environmental articulation. This is another sense of “meta” than that used when we considered the various higher logical types of the system. That series only has three levels. This sense of meta is the higher and higher level complementarities as the meta-system expands to embrace wider and wider environments which is the dual of the nesting of systems within systems of super-systems. At each level of nesting of meta-systems, there is a new conceptual level of complementarity that arises.

For instance, Origin / Arena // Source / Boundary has a dual which is Generator /Encompassing Regress // Root Singularity / Subspace Regress at the meta\textsuperscript{3}-system level. The generator is what takes the source template from the endless realm outside of timespace and produces a system at a particular origin within the spacetime boundary of the meta-systemic field. The encompassing regress is the series of encompassing fields

\textsuperscript{13} Note that these archetypal patterns in the masculine and feminine psyche are patterned on age related groups of the parents at marriageable age (Animus, Anima) and the grandparents (Wise Old Man, Cathonic Female).

\textsuperscript{14} Central Processing Unit
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beyond the boundary of the meta-system. The subspace regress is the series of
differentiations of the sources which recede infinitely differentiating in the progressive
bisection of Pascal’s triangle. This regress of sources, which is based on the Cayley-
Dickson algorithm\textsuperscript{15} for the production of Hyper Complex Algebras, produces negative
dimensionality\textsuperscript{16} which is the opposite of the positive dimensionality of the encompassing
regress. The root singularity is like the origin in spacetime and the source in the subspace
only at the next level deeper. It is the meta-source of the sources in the subspace. The root
singularity is the nexus of actualization of the sources. In software engineering terms, if
the sources are the object templates that are the basis of instantiation of actual instances
of those object templates in the spacetime of memory and CPU cycles within the
computer, then this singularity would be the root object from which all the templates are
built, i.e. the meta-template. It is singular and unique as the root of all objects that are
produced through inheritance from it. This differentiation of the meta-systems is infinite
following the form of Pascal’s triangle down into an infinite regress of subspaces giving
us more and more possible complex environmental formations based on complementary
duals. The next level has sixteen elements and is not completely understood as yet.

If we want a concrete example of this differentiation of the meta-systems into the various
levels of encompassing, we can think of a highway. Each lane is an arena for traffic
flowing in a specific direction. We produce a conjunction of the two lanes to create a
roadway because it is more efficient to have the traffic adjacent than travel different
paths. We can see that each lane has its sources (on ramps) and sinks (off ramps) as well
as the boundary of the verge of the roadway. The lanes are the arena in which the systems
of the cars operate, and each car has a particular origin and destination as it moves
through the roadway meta-system. When we go up to the next level, we have to consider
the sources of the cars which are automobile sales companies and the fuel sources, which
are gas stations. The generators of the automobiles are the factories that create them. The
end of the production line is the ultimate point of origin for the automobile which then
goes to showrooms. The showrooms are the purchasing source or place for the general
public to buy the automobiles. The encompassing regress can be seen in the fact that the
automobile transportation system is only one of many different kinds of transportation
that are knit together to give us the ability to move from place to place on the planet. The

\textsuperscript{15} Narin, Stephen. The Cayley-Dickson Process . Thesis (M.A.)--University of California, Santa Barbara,
1974.

\textsuperscript{16} Normally negative dimensionality is not recognized in geometry. It is a recent realization of the author
that negative dimensionality follows the Pascal triangle of the Cayley-Dickson process down to infinity so
that negative dimension is a subspace of sources which is the dual of the points of origin in normal positive
dimensionality. Sources are everywhere while origin points are specifically located but dimensionless.
Negative dimensionality appears in this way because the first dimension past zero is negative one which is
the singularity where the imaginaries appear. Thus the sub-space of negative dimensionality is entirely
imaginary and is a horizon of all possible sources at some level of hyper-complex algebra. In this space
there is one source at negative dimension one giving an imaginary algebra, three at negative dimension two
giving a quaternion algebra, seven at negative dimension three giving an octonion algebra, fifteen at
negative dimension four giving a sedenion algebra, etc. In other words, negative dimensionality is
imaginary and is not merely the inversion of positive dimensionality which is meaningless mathematically.
There is an important phase transition between positive and negative dimensionality at negative dimension
one which has not been recognized by geometry or algebra. Algebras form the underpinning of geometry in
the subspace of negative dimensionality.
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subspace regress shows up when we consider that all those other modes of transportation have their own generators and sources. Transportation meta-systems interlock to form a larger and deeper meta-systemic complex made up of various meta-systems. The singular root is the concept of an automobile from which many source designs spring to give us a variety of models as templates for a variety of instances. The generator takes these sources and instantiates them into different individual automobiles which participate in the meta-system. This occurs in each of the realms with various models of planes appearing from the root concept of the plane and thus leading to various sources of planes from different manufacturers. The network of various kinds of transportation is merely one kind of meta-systemic nesting within a world that has many other meta-systemic facets like government, agriculture, textiles, etc. All these meta-systems are nested at some deeper level of meta-systemic nesting that gives the world coherence.

Meta-systems were described by Bataille in the *Accursed Share* as "general economies." They are diametrically opposed to "restricted economies," and seem irrational from the viewpoint of systems. This is because they contain catastrophes, singularities, miracles and black holes. Catastrophes were described by Rene Thom as geometrical formations that show how discontinuous changes may take place in time. Singularities are the same thing with respect to space, i.e. points of anomalous discontinuous properties within the field of the meta-system. Miracles and Blackholes are two opposite sorts of positive feedback in an increasing or decreasing direction. In general, we try to avoid the meta-systemic environments like the plague because when we are in them, things are out of our control, like the stock market which seems to have chaotic behavior full of booms and busts. We want the miracles but dread the black holes. Similarly, we want to avoid the catastrophes that occur at the cusps that Rene Thom describes, but we would like to find the mother lode, i.e. that singular point in the landscape which is filled with a vein of gold.

Another important point is that, just like the system can be either seen as a gestalt or flow, so the meta-systemic archon can be seen as either proto-gestalt or proto-flow. This is understood when we realize that when we look around, we move from gestalt to gestalt so that the various gestals are like figures on the background of the proto-gestalt that is at another level of organization underlying the gestalt. Gestalt is figure-on-ground, but the gestalt as a whole appears on the background of the proto-gestalt. This proto-gestalt has what David Bohm calls *implicate order*. It is a kind of unfolding order that is implicit rather than explicit and guides our gaze as we move from gestalt to gestalt. The same is true of the flow; it is seen on the background of the proto-flow. When we look into a stream, we can see various streams in relation to other streams flowing at different rates and moving in different directions depending on the undulations of the riverbed and the stones that block the path of the water in the stream. Our gaze moves from stream to stream within the overall flow based on an implicit ordering encoded into our experience which guides what we notice and what we do not notice. Thus, we can relate the meta-systemic archon schema directly to perception and conceptual grasping just like we did.

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the system. We can also see its social origins because we have always lived with others in environments whether man-made or natural, and these environments were all organized at various extents to facilitate what goes on within them. In social phenomenology, there is a concomitant construction and invention of environments which we call architecture, city planning, and regional planning that underlies and goes hand in hand with the social construction and invention of social gestalts and flows. We project the proto-gestalts and proto-flows just as much as we project the gestalts and flows that take place in those environments.

A key point is that the system that is a whole greater than the sum of its parts is the dual of the meta-systemic archon which is a whole less that the sum of its parts. This understanding of the difference between surplus and lack is the fundamental distinction between the system and the meta-system. This distinction is necessary because the meta-system has niche holes in it just right for the systems it was made for and to fit into and vice versa. This close fitting of the systems into the meta-systems is a major problem in software called the portability and interoperability issue. The creation of the internet is based on the production of a solution to these issues based on TCP/IP protocol and other similar protocols like HTTP which operate on the top of TCP/IP. The layering of protocols allows the solution to the interoperability problems. Portability is still an issue being addressed by Java and other multi-platform languages. Much of our knowledge about meta-systems comes from this kind of work in software engineering where we discover, on the basis of trial and error what works and what will allow this new level of integration of our systems through the new medium of cyberspace. We must specifically design systems and the meta-systems in which they are embedded so that interoperability and portability can be achieved. The niches, and the things that fill those niches, need to be designed to have the right kind of reciprocity and we are learning how to make the operating systems reciprocal with each other as we go up to the next level of nesting of complementarities. If you look at protocols, you can see that they are all about reciprocal and complementary actions. Protocols are a good model about how meta-systems interoperate and allow the exchange of their systems with each other.

If form lends itself to proof, and pattern to explanation, and system to description, then what is the basis in understanding that meta-systemic archons lend us? Here we will appeal to Polanyi’s concept of Tacit Knowledge which underlies all our attempts to express knowledge discursively. What can be expressed discursively is merely the tip of the iceberg in relation to what we know tacitly from our embedding in the world. Meta-systemic knowledge is largely tacit and submerged as a substrata of our systemic descriptions. But if we make this tacit knowledge explicit then it appears as concepts like David Bohm’s concept of the Implicate Order. In other words, it appears as the consciousness of how hidden aspects of things control our comprehension of the visible

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aspects of things. The meta-system as proto-gestalt or proto-flow, is the deeper background underlying our experience of systemic gestalts or flows. Another way we understand the relation between systems and meta-systems is linguistically, in relation between count and non-count nouns, i.e. between things and stuff (See Ecological Understanding22). Our culture and language exalt countable and quantifiable things over uncountable and qualitative stuff. Meta-systems or proto-gestalts are inherently more qualitatively experienced than the countability of systemic gestalts. We allude to the meta-systems in our language. These allusions are normally amorphous and indeterminate rather than determinate and precise like the relation between countable and uncountable nouns in our language. Some languages such as Chinese have a greater emphasis on “non-count” or “mass” or “stuff,” as ways of looking at things. With mass, or non-count nouns, the individual instances are submerged and become indistinct in the overall grouping which has its own emergent characteristics. We allude to these characteristics that cannot be determinably isolated and made precise and distinct. Allusion is something we tend to deprecate in our scientific narratives which strive toward isolatability and rigor. But just because we must allude to our tacit knowledge of implicate order, does not mean that meta-systems do not have their own kind of articulation. When we are articulate about the decomposition of meta-systems, we point our their myriad complementarities which may indeed be generalized in relation to the system. Whenever the unity of the system encompasses opposites then we can easily suspect that it is interfacing with a detotalizing totality of a meta-system. But with things those that are opposite the features of the system, we get indications or allusions to the tacit complementarities of the stuff of the meta-systemic archon. From the point of view of the system these allusions resolve because of the disunity of the meta-system into so many illusions, shadows or hauntings. These arise from the multiple perspectives of the holographic meta-system within which the systemic gestalt is seen. In the hologram the parts allude to the whole but do not encompass it completely because each part is seen from a splintered set of perspectives. The holoidal meta-system encompasses these myriad viewpoints from which the systemic gestalt may be seen within the social milieu.

THE HOLONIC SCHEMA

When we look at the System Schema and the Meta-system Archonic Schema, we note that in the first the whole is greater than the sum of the parts, while in the second the whole is less than the sum of the parts. This makes sense when we think of the meta-system as a field because any field with nothing in it represents a lack, because a field is precisely a place for something to be, i.e. a holder of something, say a system. Systems, on the other hand, are gestalts which give an overall impression that is more than merely the sum of their parts with global properties that the parts by themselves do not exhibit. But this raises the question as to whether it is possible for there to be a whole which is exactly the sum if its parts. It turns out that this is possible in rare cases in which something which is a cross between a field and a system is produced anomalously. What we find is that these anomalies have a very specific structure which has an unexpected

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foundation in mathematics and the understanding of which drives us into a wholly different way of looking at phenomena different from either the systemic schema or the meta-systemic schema. This is a big leap because we are not used to thinking about things in terms of meta-systemic archons or fields. So now, to ask for an even bigger conceptual leap stretches not just our credibility, but also stretches our ability to imagine what the cross between a field of niches and systems might be like. These partial systems and partial meta-systems have been called "Special Systems." They could very well be called "Special Meta-systems instead." But the best name, the most descriptive name for the special schemas are Holons, after Koestler's usage in Janus. The study of these special systems is called Holonomics, i.e. because it looks at the Nomos (ordering) of the Holons. Holons, according to Koestler, are things like the organs in the body which are at once parts and wholes, just as the special systems are at once systems and meta-systems.

Looking carefully into the matter, we find that between the emergent level of the system (as social gestalt) and the emergent level of the meta-system (as social proto-gestalt), there is a series of hinges which are partial combinations of systems and meta-systems. There are three such emergent levels of these special systems which we will call the dissipative ordering special system which is in reference to the work of Prigogine on dissipative neg-entropic structures, and autopoietic self-organizing special system which is in reference to the work of Maturana and Varella, and the reflexive social special system and which is in reference to the work of O'Malley and Sandywell. At each level, we use an existing theoretical framework as a point of departure for coming to terms with the characteristics of that particular emergent level. However, the crux of our definition of these levels is its basis, in Hyper Complex algebras. If we consider Systems as operating with real algebras as their basis then we can think of Dissipative Special Systems as operating with the imaginary algebra which is fundamentally the same as its basis. The Autopoietic Special System has the quaternion algebra which loses the commutative property as its basis, and the Reflexive Special System has the Octonionic algebra which loses the associative property as its basis. The Meta-system can be described by the Sedenion algebra which loses the division property or higher non-division algebras as its basis. All the higher algebras beyond the Sedenion are basically the same because there are no more interesting properties to be lost as we apply the Cayley-Dickson procedure to generate the even higher algebras which follow Pascal's triangle out to infinity. Special Systems have the Hyper Complex Algebras as the basis of their ordering, and this drives the theoretical considerations concerning how they are represented rather than the specific theories by theorists who have attempted to describe phenomena similar to those found that correspond to the special systems. In effect, we use the theory of these algebras which were discovered by Hamilton and Graves toward the middle of the nineteenth century. This form of mathematics has not really found any fundamental use in physics as yet, even though Hamilton had high hopes for them when

23 Or hiatus, or lacuna, or moments, or loci
24 See http://www.innerx.net/personal/tsmith/Dixon.html
he discovered them. Nothing could be done with the special properties of quaternions that were not more simply and easily done with vectors. Thus, quaternions and octonions have fallen into an obscure part of mathematics that is not really studied very much by mathematicians because they are considered known. Some physicists have resurrected them to form an integral part of their physical theories of the universe, but these are fringe attempts for the most part which have not found wide acceptance. Quaternions are sometimes used to program the motions of robot arms, but beyond that there is little use for them even though many problems may be viewed usefully in terms of this strange kind of mathematics. Here we resurrect the mathematics of Quaternions and Octonions to be the basis of our theory of holons, and read off from that theory the strange and wonderful properties of holons which we look for in real holonomic systems. The transformation from mathematics to holonic systems theory comes from the realization that the loss of algebraic properties produces a gain in systems theoretic properties. So, for instance, when we move from the real algebra to the imaginary complex number algebra, we gain the strange property of conjunction. The little plus sign between the elements of the complex numbers does not mean they will be added but instead means that they will be conjuncted, i.e. always juxtaposed and held together. Essentially an imaginary number is just like a juxtaposition of two real numbers in a vector. But when conjuncted, these two real numbers undergo a symmetry breaking in which one becomes imaginary and the other remains real. This symmetry breaking occurs at each level of the unfolding of the hyper complex algebras. A quaternion is the conjunction of two complex numbers which undergoes a symmetry breaking so that they appear as one real and three imaginaries. An octonion is a conjunction of two quaternions or four complex numbers that go through a symmetry breaking that turns them into one real and seven imaginaries. At the level of the sedenion, which has sixteen elements, there is a conjunction of two octonions, four quaternions or eight complex numbers that undergoes a symmetry breaking to produce one real and fifteen imaginaries. Traditionally the real and complex algebras were considered the most interesting because they had the most properties. But over time, interest in the quaternions and octonions have grown, but still they are seen as deficient because the first loses the commutative property and the second loses both that and the associative property. Sedenions are considered extremely uninteresting because it


29 See Tony Smith’s theory of everything at http://www.innerx.net/personal/tsmith/TShome.html
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loses even the division property\(^{30}\). So it almost seems as if there are no properties left when the sedenion is compared to a full algebra of the reals or complex numbers. What we see from a systems theory perspective, is that when the quaternion, and thus the Autopoietic Special System, loses the commutative property, then that makes mutual action very interesting because you can no longer reverse actions with impunity. When the Octonion, and thus the Reflexive Special System, loses the associative property, then that makes the social aspects of the associations between things very interesting because you can no longer associate things with impunity, in other words, it matters who sits next to whom at the dinner table. Losses of mathematical properties are a gain in interesting systemic properties. So, for instance, when the division property is lost at the level of the Sedenion Algebra and thus the Meta-system, we find that interesting because that is what allows us to enter the field completely, i.e. it is hard to divide a field into pieces. The various special systems (or special meta-systems) are emergent steps toward this submersion into the field. We can see it as steps that the system goes through when it appears or when it vanishes. System articulation or system disintegration goes through this series of emergent stages in which the ordering fundamentally changes in very strange ways. It behooves us to understand these changes of structure because that underpins the many anomalous systems that, though rare, are very familiar. We find them everywhere on our earth: neg-entropic far from equilibria thermodynamic systems, living systems, and social systems. In the universe as a whole, they may be rare, but on our planet, there are very many of them, and so it is a good idea for us to understand these holonic forms, if only because we are an example of them ourselves.

But let us go back and think about the idea of wholes exactly equal to the sum of the parts. There is a simple analogy for this in the perfect, amicable and sociable numbers\(^{31}\). A perfect number is one whose divisors add up to the number itself, neither more nor less. An amicable number is a pair of numbers that do the same thing for each other, i.e. the divisors of one add up to the other's total and vice versa. Perfect and Amicable numbers have been known since ancient times. But recently it has been discovered that there is such a thing as Sociable numbers in which there is a set of numbers that, in a cycle, the divisors of one add up the totality of the next. What is interesting about this mathematical anomaly is that it gives us an excellent model of the dissipative, autopoietic, and reflexive special systems. A dissipative special system is like a pair of amicable numbers which together gives us an autopoietic organization in which symbiotic pairs produce a greater whole. The smallest amicable pair is 220 and 284 which was known from antiquity. Perfect numbers are a good example of the autopoietic system itself. If we iterate the finding of divisors and the adding of them, then we are continually producing the whole of the number from its parts, and the parts are exactly equal to the whole. Examples of such numbers are 6 and 28. Sociable numbers\(^{32}\) are like reflexive special systems. Many of the sets of sociable numbers come in groups of four.

\(^{30}\) See http://www.innerx.net/personal/tsmith/sedenion.html


\(^{32}\) See http://xraysgi.ims.uconn.edu:8080/sociable.txt
such as 1264460, 1547860, 1727636, 1305184\textsuperscript{33}. These four numbers each produce each other in a cycle and form a mutually constitutive cycle in which the wholes are equal to the sum of the parts. But it is not this whole; rather it is another whole in the cycle. This is similar to the amicable numbers except with more members in the set of mutually constitutive numbers. Perfect numbers are very rare, Amicable numbers are incredibly plentiful and Sociable numbers are again rare but not as rare as Perfect numbers. These kinds of numbers revealed by number theory give us a hint about the way that these special systems are organized. Only their organization is more deeply based on the hyper complex algebras which are instead more complicated than these simple number theoretic objects. We cannot here go into all the properties of these hyper complex algebras. We invite the reader to study this kind of mathematics because it is fascinating to know just how different holons are different from what we are used to in terms of mathematical ordering. Hopefully, the analogy of the Amicable, Perfect and Sociable numbers gives a kind of a hint as to the nature of what these systems are like. We advocate a building of a holonomic theory that is based closely on the mathematics of hyper complex algebras rather than the ungrounded theorizing that now exists concerning self-organizing and social systems. For instance, we find that if we study autopoietic theory as it now exists, we find that it is incommensurable with the new basis that has been discovered in hyper-complex algebras\textsuperscript{34}. On the other hand, the theories of Prigogine concerning dissipative structures and the theories of O'Malley and Sandywell are more conducive to direct interpolation in the context of the mathematical foundations of Holonomic theory.

The interesting thing about Special Systems theory is that these anomalous and rare systems are neg-entropic and because of that, they are ultra-efficacious (ultra-efficient and ultra-effective). These properties of ultra-efficaciousness come from the suppression of entropy locally (at the price of increase globally), which when compounded at the autopoietic and reflexive emergent levels, yields some very interesting systemic properties in these special systems. Ultra-efficaciousness means that these systems have an advantage over normal systems that operate in the realm of entropy, which, though probabilistic and small, over time prove to be at a large advantage. That is why when life, consciousness, and social aspects of systems appear on our small planet, they take over and proliferate. Evolution has exploited this ultra-efficacy in the production of life, consciousness and socialization in animal and human evolution, so it behooves us to study these special kinds of systems and see whether we can take advantage of any of these properties in other endeavors.

Special systems are very different from other kinds of systems because their main way of being organized is through the conjunction of elements, and this conjunction of individuals that are alike goes through a phase shift to produce an asymmetry where there is one real and n imaginaries, where n=1, 3, 7, 15 . . . and so on. The relationship between the imaginaries are what is strange about the hyper complex numbers. The imaginaries

\textsuperscript{33} There are other cycles, however. “There are 60 [known] cycles in all: 53 of length 4, 1 of length 5, 2 of length 6, 2 of length 8, 1 of length 9, and 1 of length 28.” See A LIST OF ALIQUOT CYCLES OF LENGTH GREATER THAN 2 at http://xraysgi.ims.uconn.edu:8080/sociable.txt by David Moews.

\textsuperscript{34} See “Autopoietic Meta-theory: Paradox and Supra-rationality” and “The Ontological Foundations of Autopoietic Theory” by the author at http://server.snni.com:80/~palmer/autopoiesis.html
exist as parts and wholes at the same time in relation to each other, and that is why they are a good model for holons. They give us a good model of interpenetration or what Aczel\textsuperscript{35} calls HyperSets. HyperSets allow classes to be members of themselves. Hyper Complex numbers allow mediated hypersets where elements can be members of themselves through the mediation of another imaginary in the series. The mediated hyperset is an image of the kind of interpenetration of everything with everything. The is the kind of interpenetration that we find in Buddhist metaphysics which is called the Jeweled Net of Indra\textsuperscript{36}. In this image, all the jewels in the network are reflecting all the other jewels in the network. The series of infinite reflections within reflections within reflections of different things in the set with each other forms the hyperset. Onar Aam\textsuperscript{37} noticed that it is possible to construct an analogy of the Hyper Complex Algebras by using mirrors. A single mirror reflecting the world is like the Real Algebra and the normal System. Two mirrors facing each other and reflecting the same thing in an infinite regress is a picture of the Imaginary Complex Algebra and the Dissipative Special System. Three mirrors facing each other and reflecting in a cycle infinitely is a picture of the Quaternion Hyper Complex Algebra and the Autopoietic Special System. Four mirrors facing each other in an inwardly mirrored tetrahedral orientation is a picture of the Octonion Hyper Complex Algebra and the Reflexive Special System. The Sedenion and higher Hyper Complex Algebras can be seen as a mirror house where distorted and non-flat mirrors form inwardly mirrored spaces of reflection. They are the image of the various levels of the Meta-system where the division property is lost, and thus there is complete fusion of the field into a single dynamic multi-dimensional topology.

Holonomics is a new discipline which, at the moment, is based on just a few physical examples. For instance, we can think of solitons and instantatons in physics as a model of the Dissipative Special Systems. For the autopoietic special systems, we have the model of superconductivity of Cooper pairs. For the reflexive special system, we have the macro-quantum mechanical properties of the Bose-Einstein Condensate which has been recently shown to actually exist. Each of these anomalous physical phenomenon has structures that are reminiscent of the mathematical ordering of the hyper complex algebras at one or another of the emergent levels. They are enough to show that the hyper complex algebraic orderings can exist in physical phenomena and thus ground our science of anomalous rare formations which are contrary to the norm. Science encounters these anomalies but has no general theory to attempt to understand them through. Holonomics supplies this general theory and gives us a basis for searching for similar formations in different realms of phenomena. Because of Holonomics, we no longer need to only look for systems or their environments; we can, instead, look for intermediate formations like the family, neighborhood, community, and region which only exist on the basis of conjunction and on the phase transition into imaginary spacetime partial fields. Holonomics gives a new basis for the consideration of ecology and environmental studies which perhaps, can now accept that there are formations that are not systems nor


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environments, but something halfway in between and formed though the conjunction of elements in a field like an array which undergoes a phase transition into an imaginary space. In this imaginary space, there are archons, or archetypes or architectures that arise spontaneously and give some kind of partial ordering to the elements that is somewhat intangible or fuzzy or amorphous but is precisely described by Hyper Complex algebra.

What is exciting about this notion from the point of view of the life sciences, or the psychological or social sciences, is that it gives a scientific basis that has been sought since the founding of these less exact sciences. Now there is a way to provide a mathematical underpinning though the holonomic interpretation of Hyper Complex algebras for what was seen previously as too amorphous and unquantifiable. Holonomics maps out a realm halfway between quantity and quality because each of the elements in an imaginary field has its individual character given by its place in the field. Holonomics is a natural meeting place between the so called hard sciences and soft systems characteristics that are difficult to quantify and qualify. The partial submersion in the field that occurs with holonomic systems is what makes them difficult to quantify with discrete mathematics -- instead, there is a different mathematics which describes these systems very precisely similar to the way fuzzy numbers give us a way of describing the gray areas between discrete black and white positions.

EMERGENT META-SYSTEMS THEORY

The Emergent Meta-system (EMS) is a special combination of the three kinds of special systems with the normal system which approximates the structure of the meta-system which produces it though a dynamic unfolding. It is similar to what Ben Goertzel38 calls a Self-Generating System in Chaotic Logic39. The Emergent Meta-system is a diachronic loop through the various kinds of algebras going from the real to the complex to the quaternion to the octonion to the sedenion and back to the real. It forms a very specific path which is thought of in terms of nodes and meta-operators. This emergent meta-system formation is an image of creation ex-nihilo, i.e. the arising out of the field of a system and the return to the field40. This arising and return goes through a series of four stages. We start off with seeds in a pod which through a creation operator produces monads in a swarm. Then these monads interact through a mutual action operator to produce viewpoints in a constellation. Then these viewpoints together form a gestalt pattern formation which produces candidates in a slate. These candidates annihilate with each other until only the side effect of seeds are left. This cycle can be repeated indefinitely to produce what has been named annihilation mosaics, i.e. formations of

38 ben@intelligenesis.net See http://www.intelligenesis.net/ See also http://goertzel.org/
40 See Ons -- a theory of truly elementary particles, explaining the emergence of structure from void in psychology and physics; See also Universe as Network: The Standard Model plus Gravity as a Consequence of Simple Transformation Rules on DiscreteEvent Networks, with Tony Smith, Onar Aam and Kent Palmer; See also Ons Algebra: The Foundations of Being and Time; See also Ons Algebra: The Emergence of Quaternionic Octonionic and Clifford Algebra Structure From Laws of Multiboundary Form, with Tony Smith, Onar Aam and Kent Palmer at http://goertzel.org/ben/ben_research.html
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cascades that produce side effects from the annihilations in a series of iterations. Annihilation mosaics can form cycles, and these cycles have the form of Emergent Meta-systems. The basic idea here is that Emergent Meta-systems do not assume continuity from one cycle to the next, but each cycle springs from the void spontaneously and unfolds in a series of steps until it returns to the void. This is very similar to the ideas put forth by Kauffman in The Origin of Order\(^1\) or At Home in the Universe\(^2\) where spontaneous organization is seen as the basis on which evolution occurs. The difference is that Emergent Meta-systems assumes radical discontinuity rather than continuity between cycles. It is thus an image of Existence rather than Being.

The emergent meta-system is the most fascinating aspect of Holonomics because it combines the normal systems with the special systems to produce the next major emergent level of the meta-system. In other words, the various kinds of conjunction systems unfold from each other in a series that takes us from system to meta-system and back again. This cascade is seen as a natural aspect of the void or emptiness itself beneath the projection of Being onto existence. Existence is described by the realm of pure discontinuity under the assumed continuity of Being. What is interesting is that Being itself is not unified and, in fact, is broken up into fragments that are the interfaces between the special systems.

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<thead>
<tr>
<th>Kinds of Being</th>
<th>Emergent Systemic Levels</th>
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<tbody>
<tr>
<td>Pure Being</td>
<td>System = thermodynamic-living-social gestalt</td>
</tr>
<tr>
<td>Process Being</td>
<td>Holonic Dissipative Special System = Thermodynamic</td>
</tr>
<tr>
<td>Hyper Being</td>
<td>Holonic Autopoietic Special System = Living</td>
</tr>
<tr>
<td>Wild Being</td>
<td>Holonic Reflexive Special System = Social</td>
</tr>
<tr>
<td></td>
<td>Meta-system (EMS)</td>
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Pure Being is the normal way we think about the concept of Being which has been prevalent in our philosophical tradition up until the last century. In the last century, Continental philosophy has discovered other kinds of Being. The first of these was Process Being which is dynamic and Heraclitian rather than Parmedian and static like normal undifferentiated Being. Derrida is the foremost promoter of looking at things in terms of Hyper Being which he calls Differance, i.e. differing and deferring. Merleau-Ponty calls this Hyper Being and contrasts it with Wild Being in his book The Visible and the Invisible. We will not give a further elaboration of the kinds of Being here except to note that they are the interfaces between the different kinds of systems and that this allows their properties to be very precisely defined. The Emergent Meta-system can then be seen as an unfolding through the series of the kinds of Being in a series of emergent

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steps. The kinds of Being together define Emergent phenomena within the world in
general so there is an interesting relation between these two ways of looking at this
unfolding from the system to the meta-system or vice versa. This leads us to postulate a
general theory of Worlds based on this theoretical foundation.

GENERAL WORLDS THEORY

We postulate not only these few schemas, but a whole series of schemas that describe an
ontological series of emergent levels in contrast to the ontic series we normally hear
about in systems theory. The ontic series goes from the quark up to social phenomena
through a series of emergent steps we find in the world as phenomenal discontinuities
between emergent levels which could not be reduced away by reductionist analytical
efforts. Contrasted to this, we see a series of schemas which are ontological in nature that
describe our various templates of understanding that we project on the ontic phenomena
found in the world. The ontological series of schemas is something like this:

Pluriverse = Parts with no whole
Kosmos
World
Domain
Archon (meta-system)
System
Form
Pattern
Monad
Facet = Whole with no parts

This series of ontological schemas moves from the lowest level where we find wholes
that do not seem to have any parts, like quarks, to the highest level where we have parts
but cannot see any whole, like the pluriverse of multiple simultaneous universes such as
those postulated by David Deutsch in *The Fabric of Reality*. Each of these levels are
holonomic in the sense that each is merely a conjunction of those on either side which has
particular properties that look both ways simultaneously, i.e. up the hierarchy and down
the hierarchy. This hierarchy is merely the set of schemas that we project on what
Cornelius Castoriadis calls the Magma of existence, i.e. that which oozes beneath our
categorical projections on the phenomena of the world. Each of these ontological
emergent levels has characteristics of its own, making it very different from the others yet
interrelated with them in a strange way through holonomic conjunction. What Onar Aam
has pointed out, is that the holon is made up of something that is simultaneously part and
whole, and that the ends of the series are either whole without part or part without whole,
and the holon, in each case, is both of these together. We can think about sliding the
reference end points up and down the scale so that each adjacent schema can be thought
of as a whole without parts or a part without wholeness instead of a holon. Onar Aam
points out that the opposite of the holon is the holoidal hologram formation. The

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43 Bob Cummings had this insight.
hologram is neither part nor whole because it contains partial images of all the parts and partial images of the whole from multiple perspectives without actually containing the whole or the part or both. We can think of the Holoidal formation of the hologram as the opposite of the undifferentiated magma of the ontic. Thus, we have two opposite extreme ways of looking at the ontic. We can see it as magma, always eluding our categorical projections, or we can think of it as holoidal such that it is never either part or whole and thus like a hologram that contains partial parts and partial wholes from various perspectives without resolution to something determinate. We can think of these as two different ways of looking at things by the conjunction of the aspects of Being. The holoidal is a conjunction of truth, reality, identity and presence which is opposite the ephemeron which is the counter projection of falsehood, illusion, difference and absence. All the possible combinations of the four aspects and their opposites give us a rich field of the possible facets of Being. When we note that each of these combinations may occur at various meta-levels of Being which we saw above, then we begin to get a picture of just how complex our worldview might be.

The General Theory of Worlds would embrace all of these possibilities and attempt to comprehend how the various schematic levels interrelate. We call it a theory of worlds because it would focus on how the kinds of Being and the aspects of Being would cohere into a single picture of the world out of the fragments of the various facets of Being. There are sixteen permutations of the facets and four levels of Being which gives a veritable I Ching44 of 64 possible facets of the world with respect to Being. The relation between Normal Systems and Special Systems through the Emergent Meta-system that produces Archons (meta-systems proper) is an important part of this study of the nature of the world because the ontological hierarchy itself is holonomic, i.e. ordered through conjunction and phase shifted to produce an imaginary space which is partially a field, and partially the elements within a field.

This theory must also deal with two other hierarchies which are the individual and social emergent hierarchies by which information is processed within the world:

Absolute
actualization
Existence
insight
Ontos
wisdom
Episteme
knowledge
Paradigm
information
Theory
data
Facticity
given

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Suchness

The italicized levels relate to the information processing of the individual, and the normal font relates to the information processing of the social group. There is a dialectic between the individual and the social group in the projection of the gestalt (i.e. system) or the other schemas. The social construction or invention of the world takes place in the relations between these four hierarchies. If we see our world split between physus and logos, and that there is a lower level splitting between limited and unlimited, then we see that the ontic concerns the physus and the ontological concerns the logos and that these two later hierarchies concern the relation between the limited as suchness and the unlimited as absolute.

The theory of worlds looks at the way that the schemas in general are applied to the phenomena. For instance, the ontic hierarchy must withstand the pressure of reductionism, and the emergent ontic levels stand as whatever cannot be reduced. On the other hand, the ontological hierarchy must withstand the pressure of skepticism and what survives are the schemas that do not collapse under that pressure. When we look at the Social/Individual hierarchy, we see that it must withstand the pressure of nihilism and that it is about the social and individual dialogue of the real distinctions in the world that attempt to make a non-nihilistic distinction. Out of the theory of worlds arises the set of schemas that we will attempt to apply in order to understand phenomena and to incorporate as a basis for theory building concerning natural phenomena. Some of these schemas will be combined, as we have seen that of System Form and Pattern combined, to produce the Formal Structural Systems Theory. We have suggested another combination in the Emergent Meta-system of the Archon, Holon and System as a viable set of schemas from the set of ontologically acceptable schemas in order to understand certain anomalous phenomena which augment and take to a new level what was achieved though the projection of the Formal Structural System based on Form, Pattern and System schemas by various disciplines of science.

The Theory of Worlds concentrates on the level of the schema of the world and attempts to bring together ways of looking at things via the aspects and kinds of Being with the insights afforded us by the relations between Special Systems and normal Systems to build Meta-systemic Archons via the Emergent Meta-system cycle which represents a model of Existence. Thus, the Theory of Worlds looks at the relation between existence and ontology at the level of the world schema and considers the nesting of systems in meta-systems via the holonic intermediaries. It would also consider the relation of wholes that cannot be parts and parts that cannot be wholes to holons and holoidal hologram-like formations while also considering the sliding scale by which these are applied to the various holonic ontological levels.

CONCLUSION

What has been outlined here is a new way of looking at General Systems Theory as only one out of many General Schemas that might be applied to the phenomena that we
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encounter in the world. Formal Structural Systems Theory is well developed and is the basis of science in many disciplines. We suggest here that there is a new set of schemas that we need to explore together which includes the System, Holons, and Meta-systems as well as Worlds. Together, Systems and Holons produce Meta-systems through the Emergent Meta-system cycle. This cycle points up the relation between the various emergent levels which, in turn, define the fragmented kinds of Being. The kinds of Being are defined in terms of modes of being-in-the-world so that there is this interesting connection between the differences between the special systems and the differentiation of the world. Thus, the relation between Being and Existence on the one hand, and the schema of the world on the other hand, are implicated in our understanding of the special systems and their place between systems and meta-systems. So it is necessary to posit a general Theory of Worlds which subsumes the theory of Holons and Meta-systemic Archons into a coherent and integrated picture.

If we allow the incorporation of other schemas besides the System schema in our ways of looking at the world, then our understanding of phenomena will be much richer. The problem is always the reduction to a single schema. This proved wrong when there was exclusive focus on the Form schema. It will equally be a mistake if we try to reduce everything to Systems and do not recognize the existence of other schemas like that of Holons, Meta-systems and Worlds as viable templates of understanding for projection on ontic phenomena as a basis of understanding it better.

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46 http://server.snni.com:80/~palmer/fbpath.htm
47 http://server.snni.com:80/~palmer/resume.html
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