The Methodology of Semiotic Morphology: An Introduction

Edwina Taborsky
taborsky@primus.ca

Abstract

This paper is continuing my exploration of reality as a complex network of continuous adaptive morphological formation. Physical reality exists only within morphological forms, and equally, conceptual reality, functions only within morphological forms. The paper (The Nature of the Sign as a *wff*) in *SEED 2004, No.3* outlines the basic analytic methodology for this assertion, and I will repeat the major axioms in Section A of this paper before continuing in Section B with a more precise definition and analysis of the methodology of semiotic morphology.

Section A: Major Axioms of Semiotic Morphology

1. The Sign as a Morpheme and the Seven Dimensions of Reality

I am examining reality as a complex network of continuous adaptive morphological formation. Physical reality exists only within morphological forms, and equally, conceptual reality, whether experienced as individual information or as shared knowledge, functions only within morphological forms. I refer to the process of morphological generation as semiosis. The morphological form in itself, material and conceptual, is termed a Sign or a morpheme. The sign develops as a coherent spatiotemporal reality within a triadic set of relations, which are encoded spatial and temporal measurements and which operate as a function, i.e., a mediated mapping of input to output.

2. The Analytic Model of Space and Time

The analytic model used to examine this transformative morphological process is a 2-dimensional Cartesian coordinate quadrant (Figure 1). The model enables an analysis that acknowledges differential spatial and temporal parameters of topological measurement.

The ontological and epistemological 'cuts' which are modeled respectively as the vertical Y and horizontal X axes (Atmanspacher 1994, 1999, Primas 1993), establish measurement parameters for *six spatiotemporal topological intervals* which I term 'relations'. A relation is a dyadic string, a primitive morphology of interaction, where two nodes functioning as horizons of influence connect to provide within that range a measured configuration of data, information or knowledge functioning within time and space – and mode. These six relations function as semiosic or informational measurements; and when set up as a mapping triad, which is to say, as a function f(x)=y, this triad operates as a morphological reality, a sign. The triadic functions can be understood as input/mediation/output, with 'f' understood as the mediational act of transformation from input sensate data to output interpretation. Whether this morphological unit is open or closed, is fuzzy or crisp, is an atom, a cell, a word – it is a sign.

2.1 The vertical ontological Y cut, a result of temperature differentiation, demarcates spatial experience into internal and external spatial values. The morphologies of these two zones are asymmetrical, internal space provides a non-reducible completeness of data and external space provides a reducible disconnectedness of data.

2.2 The horizontal epistemological X cut differentiates between the local (individual) spatial values and the global (communal) spatial values. This is an important differentiation, for a basic property of a robust morpheme is its ability to enable two modes of reality within the same morphology, the finite individual as well as the continuous typology. This requires an informational interaction between local non-distributed data and communal distributed data. With this cut, which acts also as the introduction of the temporal parameters of present, perfect and progressive time (Matsuno 1998, 1999), we now have an analytic scheme of four quadrants, I, II, III and IV (Figure 1). I add two further relations to the quadrant, namely, the aspatial and atemporal universal function, and the interface function located at the coordinate origin, which brings the relational acts to six in total (Table 1).

3. Seven Measurements

The morphological architecture comprises seven basic measurements: internal and external space; local and global space; and present, perfect and progressive time.

3.1. Spatial Measurements

Internal spatial measurements develop informational morphologies without a boundary; that is; the function cannot 'see' or react to spatial parameters. The type of information in such a spatial zone is high energy, rapidly expansive and rapidly dissipative. [1] *External* spatial measurements designate the morphological boundary as definitive of the information content. *Local* spatial functions establish discrete morphological forms that are contextual and non-distributed. *Global* spatial measurements set up general morphological patterns with distributed non-local informational values.

3.2. Temporal Measurements

Time is not a universal abstract measurement (Newtonian/Galilean linear time) but is a restricted measurement functioning as a compositional property of the morphological reality. There are three different temporal measurements which produce three different morphological realities (Matsuno 1998, 1999).

Present time measures a reality that functions within 'now' time without links or references, without past or future. The information provided by the morphological measurement of present time operates only in internal and local or isolate space. An example is a 'feeling of heat' or the first thermodynamic law of universal energy. *Perfect time* molds experience within distinct asymmetrical linear parameters, i.e., as 'this' instantiation differentiated from 'that' instantiation. It enables individual comparisons and operates in external and local or closed space. These two temporal measurements, the *present* and the *perfect*, which we semantically refer to as 'subjective' and 'objective' are the key parameters of our common temporal experience. However, the vital and foremost – and usually overlooked temporal measurement – is that of *progressive time* which establishes values within generalized continuity; it has no capacity to describe an individual state whether in present or perfect time but can only deal with commonalities operating as a continuous general morphological *pattern*; that is, it is past-oriented and future-oriented and can provide *models* of past states and also, of future-states. [2] It operates within global or open space and both internally and externally.

These seven measurements operate within the dynamics of asymmetry and symmetry. Local space and present and perfect time contribute to asymmetry, i.e., to differentiation

[1] As isolate, there is no input of additional energy to use.
[2] This temporal measurement and its functions have usually been re-defined to a singularity and denigrated to operate as a teleological omnipresent force. By rejecting this relation, we are actually rejecting an underlying logic to the phenomenological present.

of form and unique relations; global space and progressive time contribute to symmetry, i.e., to communal cohesion and continuity. The seven measurements function as relations. There are six relations, defined by Peircean codes and differing according to spatial and temporal measurements, which establish operational modes and functions (Table 1).

4. The Modes

We can understand a mode as the *qualitative* force of the quantitative measurement. Within the Peircean semiosis of relations "different modes of relation are different modes of connexion" (Peirce 3.464). A mode refers to a relational connection whose information content can be used in any of three ways: potential, actual or necessary.

A spatiotemporal measurement that produces information operating in a mode of Firstness, symbolized as (1), will provide information that functions as 'potential' rather than actual; this inserts flexibility in the interpretation of that information. Information operating in a mode of Firstness is produced within measurements that are internal and local. A spatiotemporal measurement that produces information operating in a mode of Secondness (2) enables individual actualities with clear differentiations of form. It is an external and local measurement. Thirdness (3) is defined as the mode of generality, a mode that establishes normative behavior by means of general laws and rules. Information in this mode exists as knowledge, understood as a substratum of normative conventions. It is developed by measurements that are non-local (global) and functions within both the internal and external zones.

5. The Relations

A relational dyad does not exist on its own. The morpheme, the Sign, exists as a transformation of the informational content of three relations, set up in a triadic interaction of input/mediation/output (see Figure 2). These three terms can also be examined within the Peircean terminology as Object, Representamen and Interpretant. The sign operates as a transformational process with the Interpretant relation presenting itself as an iconic, indexical or symbolic representation of its Object relation. This interpretation requires a reference to a logical continuity of experience, the mediate relation, the Representamen. The triadic morpheme emerges as a spatiotemporal reality by a selection of three of the six possible relations. The selection will determine the nature of the information carried by that sign and the nature of the possible interactions that information can have on other signs.

5.1. Relation 1-1

The most basic and primitive relation is found in quadrant II. This relation operates as an isolate state of energy/matter in internal local space and present time. The unformed material/conceptual content within this relation allows a number of degrees of freedom of interpretation and is thus is a basic driving force in promoting the emergence of novel signs. An example would be a sensation of 'heat' which can be transformed into the specifics of either a malfunctioning furnace or a fever. It could be a provision of a chemical while the cell is still developing the meditative means to use this chemical; the provision might promote the development of specific tactics in the cell to use that chemical. This measurement acknowledges only that there is an input availability of unexamined data located internally in local space and present time.

This data can be transformed from its modal quality of 'potential' into discrete usable 'actual' information by the semiosic act, that triadic function, which must measure and stabilize that content by linking it to two other relations; otherwise, its data content will thermodynamically rapidly dissipate due to the absence of horizons.

It is an important relation, confirming the viability of chance and freedom in this universe. The relation is coded, using Peircean terminology, as 1-1 or Firstness as Firstness which acknowledges its modality as potentiality. Topologically, one can define its information content as ontologically real and epistemologically imaginary.

5.2. Relation 2-2

The second relation is found in quadrant I. This relation uses that input energy from Quadrant II and molds individual forms functioning within external and local space and perfect time. The form in this quadrant has achieved differentiation; it is closed and establishes a factual or 'reasonably' crisp identity in local space and perfect time. Any discrete entity, from a rock to a word, can be considered an example of this 'definitive definitiveness' and it is the basis of most of our daily experiences; it is facticity, it is information. Modernism, nominalism and mechanism have all focused on the morphologies within this relation. The relation is 2-2, or Secondness as Secondness, which acknowledges its modality as 'actual'. Note, however, that this relation measures a form that exists only in local space and current or perfect time. There is no measurement that provides for continuity; therefore, like the open energy of Quadrant II, the forms provided by this relation would dissipate rapidly, in this case due to kinetic friction.

How is this problem of dissipation dealt with? By the provision of relations that measure time and space within symmetrical or continuity-promoting values.

5.3. The Global or Collective Relations

The two quadrants produced by the horizontal epistemological cut, the X cut, introduce non-local or global space and temporal continuity; in particular, this cut permits open — as differentiated from isolate and closed — systems and a progressive and continuous time measurement. What we now have is a bileveled architecture, permitting both asymmetrical and symmetrical interactions, enabling both metabolic individual processes in quadrants I and II, and reproductive or generic processes in quadrants III and IV. The measurements in quadrants III and IV provide distributed values that ensure temporal continuity and the development of a future-oriented causality produced within the long term properties of communal habits, general laws, regularities of morphological patterns. These properties act as symmetry-inducing constraints to guide and inhibit the emergent local, individual instantiations developing in the local level (quadrants I and II) in perfect or present time. Our world cannot function within only the top level quadrants of undifferentiated isolate energy and discrete closed instances, for this would reduce reality to randomness. There must be a function that enables symmetry and reproductive continuity. The X-cut provides these functions by adding two relations and ensures an open, symmetry-inducing and therefore complex system.

5.3.1. Relation of 3-2.

Quadrant III functions in internal and global space and progressive time. It operates as a 'virtual memory processor'. As a global relation, its measurements and therefore its information are distributed in space; it cancels spatial distances; as internal, these measurements and the information they carry are inclusive rather than exclusionary; as progressive, the relation links past to future morphologies and provides not only continuity but also evolutionary and adaptively innovative capacities. If we use an example of this relation, the internet search engine, we find that "search engines entertain a model of the Internet that *evolves with the Internet*" and "continuously reconstruct the past by updating their indices" (Wouters, Helsten and Leydesdorff 2004, emphasis added). Mathematically, we can refer to the virtual mode as a genetic algorithm or Bayesian probability. It is a complex negotiator of information, in that it includes both real propensities or real numbers, which we can understand as actual memories, and imaginary propensities or imaginary numbers, which we can understand as the relational propensities with other

morphologies both unformed and formed. This relation is a major influence in the development of complex morphologies, for it uses imaginary, i.e., hypothetical models of measurements both ontologically and epistemologically. It acts as an open non-linear non-historical catalogue of solution concepts, and can be understood as a networked evolving 'search engine' of any and all links within the past and present, direct and indirect, experience of the community. These links might not develop into stable common rules of morphological formation (i.e., functioning in quadrant IV); however, their virtual existentiality remains extant, in both weak and strong form, and they are available for potential selection by an emerging instantiation. Additionally, this relation is functionally 'in tune' with the realities of the immediate environment for "the past in the Internet is constantly overwritten by the search engines" [and] "the present, from where the data is collected, affects search results considerably" (Wouters, Helsten and Leydesdorff 2004). This measurement enables a system to reason about input signals based on information that is both present in the local environment and information that was received in the past or is accessible indirectly via other networked links. The time required for this 'reasoning' can be examined within Benjamin Libet's 'temporal factor' in cognition of 0.50 second (2004). This ergodic inclusiveness of unformed and non-habitualized propensities permits an emergent instantiation to bring with itself multiple alternative models of itself as a measurement proposal to the development of a new instantiation. This relation is essential in providing hypothetical morphologies that can introduce robust adaptive values and is an overlooked and vital mode of measurement. The relation is 3-2 or Thirdness as Secondness, which acknowledges its mode as both necessary (i.e., providing communal continuity) and indexical (i.e., operating by connections).

This relation functions as an act of future-oriented 'strong anticipation' defined as such "because the anticipatory fact is computed from and by the system itself" (Dubois 2002, 16). This enables a morphological process which computes its next state not by referring to a currently-existent dominant model as in the external 3-1 normalizing process, but by referring to its self-generated plethora of optional hypothetical references. These include the system's own possibilities as defined by its access to free energy (relation 1-1); the system's current state of actuality (as defined by relation 2-2 and the model of this actuality, 3-1) and then, the system's own past states (relation 3-2), and also include informational references to existing environmental states (i.e., other sites of compressed knowledge) and future states – the informational content of those sites will also link up with the energy-availability found in the 1-1 relation. This wealth of information enables

the development of a pragmatically functional model of a not-yet-existent future-state and therefore, enables an immediately adaptive and robust evolution.

5.3.2. Relation of 3-1

Quadrant IV functions in external and global space and progressive time. It is, like 3-2, a communal measurement but, functioning in external or actualized space, it lacks the exploratory capacities provided by the imaginary propensities of the internal mode. It functions as a bell curve statistical average, basing its measurement value on a symmetry-inducing model of the statistical average of the already-actualized individual morphological forms. It acts as 'weak anticipation, "because the anticipation is computed from a model of the system" (Dubois 2002, 16) derived from the statistical average of actual instances and acts to constrain the nature of emerging forms by the pressures of its current majority identity. As Kauffman said, "in sufficiently complex systems, selection cannot avoid the order exhibited by most members of the ensemble" (1993). This referential model functions as a kind of 'attractor-glue' (Paton and Matsuno 1998) to which the emerging nascent instantiations are attracted, and which they then take as their guide for development. This relation operates as a 'computational cycle' whose values will change according to the cycle of values of dominant members of the collective (Burke 2005). As such, this relation ensures a current-value normative model that strengthens the stabilities of local information processing. The relation is 3-1 or Thirdness as Firstness, which operates as an abstract model of the record of instantiated local actualities and functions within a necessary modality (i.e., a communal constraint).

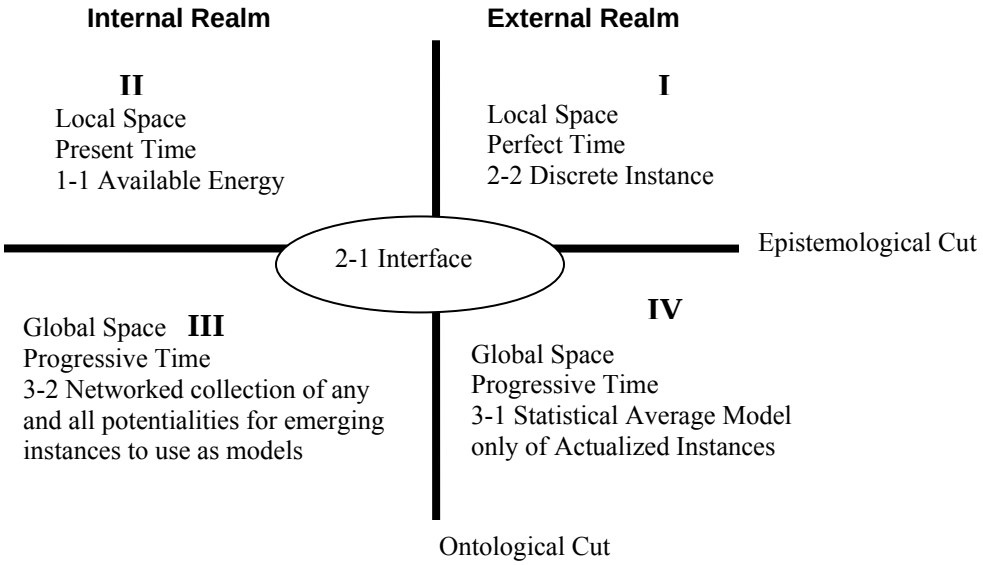

Figure 1 - The Cartesian Quadrant

6. There are two relations 'outside' of this quadrant.

6.1. Relation of 3-3

The full imagination can be understood as the universal rationality of pure mind, affirming that the universe, while not intentionally designed or in any way *a priori* does organize energy within evolving logical and complex networks. This relation is aspatial and atemporal – and therefore cannot be outlined on the two-dimensional Cartesian quadrant. The relation is 3-3 or Thirdness as Thirdness.

The aspatial and atemporal relation of 3-3 provides the basic *modus operandi* of our universe – the tendency to develop logical argumentation. Evidence of this is basic, from the structure of atomic particles that permits the formation of complex chemical compounds to the networked nature of the biological world.

6.2. Relation of 2-1

The other relation is the Interface, a borderline relation, which functions as an initial condition (origin) at the point of intersection of the Y and X cuts of morphological differentiation. It acts as an intervening agent, a 'connector-constructor' to promote the coupling of relations and their informational content; if it does not accomplish these links its information and energy content will dissipate. Within Peircean terms, it can be understood as an act of 'prescission', which "is always accomplished by imagining ourselves in situations in which certain elements of fact cannot be ascertained" (CP 2:428). It is a highly charged anticipatory relation that focuses "attention to one element and neglect of the other" (CP 1.549). Its two different modes of codification (Secondness and Firstness) are continuously entwined in their attempt to link relations; therefore, external actuality is always exploring the new informational potentialities within internal vagueness and vice versa, and symmetry is always exploring asymmetry and vice versa.

The relation is 2-1 or Secondness as Firstness, operating in local space – both isolate and closed – and both present and perfect time. There are six interface typologies characterized by the dyadic bonding of the interface relation with another relation. We will not go into any depth at this time in examining these typologies and will only point out the crucial importance of this relation and the necessity for further exploration of its nature within all realms – the physical, biological and social. The Interface can function alone (see 6.2.1) or will be linked with any of the other five relations.

6.2.1 The chaotic or strange attractor is the relation of 2-1 alone. It acts as an initial condition of differentiation in a state of high excitation. It is highly volatile and expansive (its internal spatial and present temporal nature) and 'confrontational' (its disconnected external spatial and perfect temporal nature). If it does not find/attract symmetry inducing measurements its informational content will dissipate. It can be understood as a relation of expansive exploratory freedom and is most frequent in complex systems.

Table 1: The Six Relations: defined by code/space/time/function

1-1 Firstness as Firstness	Internal Local	Present Time	Possible Information
2-2 Secondness as Secondness	External Local	Perfect Time	Discrete Actual Information
2-1 Secondness as Firstness	Borderline Interface	Perfect-Present Time	Attractor Phase
3-1 Thirdness as Firstness	External Global	Progressive-present Time	Statistical Average
3-2 Thirdness as Secondness	Internal Global	Progressive-perfect Time	Future Propensity
3-3 Thirdness as Thirdness	Aspatial	Atemporal	Imaginary Hypotheses

These six relations enable a complex and dynamic information generation in all realms of reality. First, this architecture permits a continuous flexibility of morphological formation, for the continuous input and the unique nature (open and vague) of the internal data functioning in the relation within the second quadrant (1-1) supplies an important element of freedom of interpretation. The Interface relation (2-1) with its capacity to pick up this input information, define it as origin (i.e., without the constraints of memory) and link it to any of the other relations, provides the system with an immense evolutionary adaptability and a capacity to promote novel individual instantiations. A morphological instance can emerge that is strictly local and without memory (2-2); this random novel information can be picked up by another measurement with extant global properties (3-2) and incorporated into its memory base (3-1) to guide future instantiations.

Importantly, a morphological semiosis using the six relations has the capacity for, not one, but three types of memory and symmetric continuity. There is the historical memory of accumulated values of the successfully articulated collective (3-1, the statistical average); an example is natural selection. There is the memory of virtual propensity (3-2), which permits tacit links which may never be articulated but which remain available for future morphological attempts at formation. Finally, there is the memory of rationality (3-3), which lies, I maintain, at the basis of life, and is understood as the increasingly complex yet pragmatic logical ordering of energy/matter.

This morphological architecture, made up of six relations integrating seven different values of space and time and a triadic process integrating symmetry and asymmetry, pro-

vides our universe with a system that permits contextual uniqueness, while enabling the instantiation to promote the robust capacities of a continuity of type. These properties enable a typological symmetry of control over the environment, as well as providing the freedom to develop new knowledge, new forms and new interactions with the environment.

B. Methodology of Semiosic Morphology

7. Morphological Formation

We now examine the semiosic process of morphological formation. The morphological architecture is triadic in the shape of a non-linear windmill. This triad is irreducible, each 'leg' of the triad operates within the limitations of a precise task.

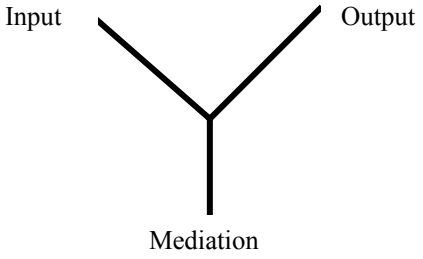

Figure 2 – The Semiosic Sign

The triad acts as a mediated and coordinated function or 'argument' of three roles: f(x)=y. The three roles are Input, Mediation, and Output.[3] The Input relation can be understood as a signal, as data, as a minor premiss. The Mediation relation can be understood as knowledge, memory, universal or major premiss. The Output can be understood as information, conclusion, interpretation. This triadic Argument is not a metaphoric substitution of one term for another term as in semantics and semiology – a secondary process. It is a logical process – the whole triad functions as a cohesive Argument that emerges in spatiotemporal dimensions as a morphological reality.

7.1 Dependent on the nature of the measurements involved, the triadic sign can be graphed in different forms, as a point, as a linear line, as a nonlinear parabola, and, induced by additional informational input from indexical connections, as even and odd-degree non-linear polynomials. The measured values of the three relations may differ from each other or the triad may use three similar relations; e.g., three relations in the mode of Firstness as Firstness (1-1) will produce an expansive explosion of unfocused

[3] Peircean terminology is Object-Relation, Representamen-Relation and Interpretant-Relation.

data, e.g. the Big Bang. Another point of interest for further exploration is that these relations can function in parallel modes; that is, an output relation can function also as an input relation within another morphology – and the informational content can be transformed to operate within different spatiotemporal measurements (and therefore informational content) in that other morphology.

8. The infrastructure of Information as Morphological Generation

8.1. The Triad

A sign as a triadic function is

$$(1) \qquad f(x) = y$$

which simply says that the sign is a mapping or transformation of input data to output interpretation via a referential mediation. All morphemes exist as this configuration within temporal and spatial values and all morphemes are defined as information.

I am rejecting the communication view (Shannon 1949, Dretske 1981, Barwise and Seligman 1997) that information is only the novel or 'improbable'. Whether its emergence as this morpheme is probable or improbable, i.e. recursively anticipated or not, is not relevant. Morphological semiosic generation permits and indeed requires situations where the input and output are not only identical but also predictable. This uniformity induces a symmetry of morphology, which enables both continuity of type and an expansion of networked coordination.

I am equally rejecting the conceptualist view (e.g. Bateson 1979) that 'information is a difference that makes a difference'. Bateson's conceptualism rejects an objective spatiotemporal observer-interpreter, for he says that 'difference is not located in time and space' (1979:98-99). That is, Bateson's 'difference' requires an 'intelligent observer', an information-processing entity, who acknowledges these differences. Without the observer, there is no 'entity', no information; the stimuli is a 'non-being' (1979: 68-69).

I am taking an objective view that sees information as matter formed within evolving logical patterns into spatiotemporal morphemes. The function of these morphemes is the maintenance of energy in this universe; whether observed or not is not relevant, and whether novel or not, is not relevant. What is relevant is the intricate development of

complex networks[4] that continuously process, produce and connect these spatiotemporally finite morphemes. This network and its logical processes can be called Mind and the morphemes it produces can be called Information.

8.2. Dynamics of Operation: The operations of symmetry and asymmetry

The existence of four spatial and three temporal measurements in morphological formation permits information operations that induce actions that promote both symmetry and asymmetry.

Symmetry seeks to homogenize and stabilize informational content by constraining morphological instantiations within regulatory universals. A universal is understood as a value that is common or distributed within individual instantiations; as such, its iconicity correlates them into a 'generic type'. Symmetry regulators censor input data and mediate transformations to inhibit variation and decrease output diversity. This induces generic morphologies with the capacity to develop populations with robust and efficiently integrated activities. This makes predictive stability and reproductive continuity achievable.

Asymmetry initiates diverse morphologies with undistributed variations generated by their open sensitivity to changes in their local environment and their rapid and often unique responses to this input of local data.

These opposite functions of symmetry and asymmetry develop informational networks with morphologies that can operate as unified and stable types by virtue of their shared attributes and yet can compete for resources by their capacity for unique and rapid short-term responses to changing circumstances. To maintain these differences, morphological generation must separate these two functions – asymmetry and symmetry. Spatiotemporally, symmetry operates within the attributes of non-local or global space, and progressive time. Asymmetry operates within local space and present/perfect time. [5]

---

[4] The relational links established by these networks can be considered 'acts of observation' and the logical process within which these networks function can be considered 'intelligence'. However, this analysis is not the same as the 'humanistic' analysis of Bateson.

[5] These spatiotemporal properties are expressed in codal formats. Universal values of symmetry are encoded in digital format; local values of asymmetry are encoded in analog format. Algebraically, symmetry is encoded exponentially; asymmetry is without exponents. This paper cannot explore such codification, but it is a vital area for future analysis.

9. The morpheme/sign as an algebraic format

Analyzing a sign as an algebraic formula, will enable us to understand the morpheme as this robust-tenuous logical argument. Graphing this argument will enable us to understand the informational processes within the sign and enable us to manipulate those relations to strengthen the operations of this morphology as well as its networked affiliations. The sign can be understood as an argument, or function where f(x)=y, which means that the sign is a transformative process of mapping x input to y output. Algebraically, the robust sign is a polynomial term, operating in itself as a three valued monomial

$$(2) \qquad axy \text{ or } ax^2y$$

understanding x or x^2 as mediation, y as output and a as input. That is, the sign is acknowledging that it exists, morphologically, as a result of three relations each with a different role in the whole functional argument.

However, the sign can be analyzed more profoundly within its functions/relations, where it operates as a polynomial of two and more terms, within either both linear and non-linear formats, operating as binomial and trinomial and importantly, with exponential powers as a quadratic, cubic, quartic, quintic. We will examine morphological generation within both linear and non-linear functions and also, consider a few 'aberrations' of morphological actions.

9.1. Linear: First Degree

A morpheme can exist within values that are only local or asymmetrical and do not make use of compressed symmetry inducing values. For example, a linear function in the first degree, without exponential values, such as x^2, can be

$$(3) \qquad ax + bx + c = 0$$

This polynomial can be understood as a direct linear connection between *ax, bx,* and *c*. The term of '*x*' is the interface or mediating connection between the input *c* and the output *bx*, but only local values of *c* have been added to the output; no general values have been added. The mediation functions in the first degree without the added information of an exponential power that provides collective or non-local and future-oriented knowledge. With the exponent in the first degree in all terms, the only morphologies possible are those that operate in local space and present/perfect time. Causality is linear and proximate rather than non-linear and complex. An example of a direct linear function operating in local and external space and perfect time would be a weather vane, where the input of the wind kinetically blows against the mediation of the wooden weather vane,

pointing it to a certain direction, the output. Another example would be a spontaneous cry after hitting one's hand with a hammer.

9.2. Non-linear: Second Degree

Once you move into connections with an exponent in the 2nd degree, you are able to form morphologies with information that is operative in non-local space and progressive (i.e., continuous) time.

A relation in the second degree means that this relation's informational content is non-local, which is to say, it is compressed and generalized with properties that operate beyond the local perimeters – beyond the spatial and temporal confines of that particular morphology. The properties of the genre are distributed over all individual incidents that emerge within that genre.

This information can be further compressed, i.e., moved into more indirect access,[6] by indexical linking, which is symbolized by moving the mediative term into a 3rd, 4th or even 5th degree. These degrees reveal the extent of the indirect connections, but I suspect that all compression even in these additional links functions at the 2nd degree level. Indirect rather than direct access of information enables a system to increase the breadth and depth of its knowledge base without this information harming its immediate morphology. For example, if one begins with an informational base compressed within a^n, then adding information via a^{nnn} has increased the informational stock by three links, if we understand that these powers are indexically linked with each other.

A system can establish networked links and access this compressed information base and thus expand its immediately accessible stock of knowledge and thus evolve in an intelligent, i.e., successful manner by accessing both future state values (from x^2 which, as progressive time, does not differentiate between past and future) and by accessing other knowledge base values via those indexical links with other knowledge bases. Let us examine a function that uses the second degree.

$$(4) \qquad ax^2 + bx + c = 0$$

understanding ax^2 as the transformational mapping process from domain to range, from input to output image. In this argument, the term ax^2 acts as mediation, bx acts as output

[6] There are probably threshold levels to the amount of information that may be stored within a particular site or level. A prokaryote has less informational content than a eukaryote because of the latter's evolving a separate nuclear site of storage; the literate method of information storage can stockpile more information than the oral method and the digital computer can store more information than the literate.

(you can see that *a* is changed to *b* because it has been affected by the operations of both the input *c* and the mediation x^2, and *c* is understood as the raw input.

More specifically, consider *a* to outline the architectural format of the carrying capacity and complexity of the morpheme; a high coefficient requires a compressed carrying capacity of the morpheme; a low coefficient 'spreads' rather than compresses the carrying capacity of the morpheme. This observation would be of interest to explore in analyzing population density and social complexity. [7]

The term *bx* as output indicates whether the morpheme's location and operations are within the right or left side of the quadrant. A plus sign moves the location to the left; a minus sign moves the location to the right. This will define its ontological identity – is the morpheme functioning within the realm of the internal or possible (the left quadrant) or within the realm of the external or actual (the right quadrant)? The third term will define its epistemological capacities, with a plus term indicating an upper location where the morpheme functions primarily as locally relevant information, a minus sign indicating a lower location where the morpheme will function with access to non-local information. This will define whether the morpheme's informational capacities are operating in the local or global realms, i.e. within the individual's perspective or that of the collective.

10. Social Morphologies

The social realm has added several formats the above basic morphologies.

10.1. One and two valued morphemes

Can a morpheme exist within only one relation; i.e., not as a polynomial? That is, if we see an integer of '3', can we accept it as a morphological reality? The answer is 'yes' but, we must understand that this single value exists only because it is connected to the other two relations which may be tactic and implicit rather than explicit. On its own, the integer as a partial output or input will dissipate unless we connect it to a mediative relation that grounds the data. An example would be a document with symbols we are unable to translate or, a flash of light in the sky. We cannot, on our own, interpret this flash of light as an alien spaceship without empirical and logical evidence of the other two relations of input and mediation. Equally, we may view the symptoms of a disease, but our output

[7] For example, a highly compressed carrying capacity of a society would require an efficient memory device, such as literacy, while a 'spread' or low carrying capacity knowledge base could be handled within oral tactics.

interpretations are specious until we know the input causality and the infrastructure that enables this disease to exist.

Can a morpheme exist within only two relations? Again, the answer is the same; the third relation must exist and it is usually implicit, our lack of information is 'ignorance'. Therefore, we can understand that x→y but we have no understanding of the common infrastructure of (x,y) that enables such a linear connection. For example, we may be aware that input x of a particular environment leads to y diseases but we are unaware of the fact that the environment enables a particular parasite to flourish that leads to that y-disease.

10.2. Aberration I: Y is constant

An interesting morpheme is one where the output y is kept constant, despite a variety of different inputs. That is, where X has several values and yet is directly mapped to Y, setting up this sign process as a constant, order-preserving. If we have

$$(5) \qquad ax^2 + (c - d) = kx \qquad \text{Or } f{:}a \rightarrow b$$

with ax^2 as the mediation acting on the input c, and d as dissipation of rejected information. The value a is understood as a directional agent, x^2 is understood as the symmetry measurement, c is input, $-d$ is dissipated information, leaving you with a constant 'k' controlled by x. This leads to kx as the interpretation, acting as a current-time spatiotemporal clone of the mediative morphology.

No matter what A says, B will always interpret it in the same manner. Whether it is a disease or a hurricane or a falling apple, the interpretation will remain that 'god did it'. This is order-preserving. Essentially what you have is a situation where the mediation measurement is so strong that it prevents any but one interpretation; it has set up a one-to-one connection that is dominant and all subsequent connections must copy this.

The relation between c, input of information and d, dissipation of information, is also interesting. It is, at lower values, one to two, that is, at least half of the input is dissipated to maintain that constant interpretation. At higher input values, more must be dissipated, up to 70% and higher. This suggests that to maintain a steady-state morphology when input is high, requires an enormous expenditure of energy to dissipate this input to maintain the constant interpretation.

For example, if we just use '2' as the directional agent '*a'*; '3' as *x*. If we suggest 10 for *c*, then we must come up with a dissipation requirement of 7 for *d* in order to maintain the constant *kx* of 7.3. So, the *c*-*d* interaction is 10-7 or a 70% dissipation requirement.

(6) $2(9) + (10-7) = 7.3$ or 21

If we lower the input *c* to 9, we have 9-6 or a 66.6% dissipation requirement. 6-3 would give a 50% dissipation requirement. And 15-12 would require an 80% dissipation requirement.

Essentially, the constant function rejects any argumentation. In a system that is self-organizing, i.e., a biological and social system, this rejection of the knowledge-producing property of the relation in Quadrant III of 3-2, which functions as a genetic algorithm and enables innovative interpretations, will result in a tremendous loss of adaptive capacity. What kinds of systems will move into this mode of operation? The only ones would be social systems, which move into fundamental collectivism where the ideology or memory zone becomes closed and acts as a singular model rather than a hypothetical argument; and morphologies in current time and space are viewed as degenerate versions. Popper's 'Closed Society' (1971) is an example. A society that moves into such fundamentalism has lost its adaptive capacity – and, it must be noted, such a society requires an enormous expenditure of energy to maintain that frozen ideology.

10.3. Aberration II: X produces multiple Y interpretations

Another interesting morpheme is the opposite, expressed within the realm of postmodernism and relativism, where one and the same X input connects to a great variety of output Ys. The input is the same but it leads to multiple and unrelated interpretations. What has happened in this situation is the complete loss of contact with the symmetry inducing compressed value found within the non-linear 2^{nd} degree model (the x^2 mediation which provides normative values from 3-2 and 3-1 relations), and as well, the loss of contact with direct causality (from the 2-2 relation) found within the linear 1^{st} degree model.

This interaction is therefore neither a function nor a relation and as such, the morphemic signs that are produced within a postmodern statement are not Arguments. This is randomness, there is no capacity to preserve order. Communal causality disappears, for there is no memory, which is to say, there is no exponential capacity to compress and generalize a generic type of information. Therefore, there is no capacity to transform in-

put data as referenced to a symmetry-inducing collective ground. [8] Equally, direct causality disappears, for linear relation between input and output becomes random.

Grouping, which is to say, the formation of collectives, is a natural property of spatiotemporal reality. This collectiveness does not mean that the group will have a generative capacity to reproduce as a type, for without a compressed knowledge base, such continuity is impossible. What will happen in a society is that these spontaneous reactions without argumentation can coalesce, by virtue of the attraction of iconity, into groups. These groups will then develop an externally produced, not self-generated, symmetry operating within the group as a 3-1 relation – the statistical average. This relation, functioning as iconic and insisting on a holistic similarity of its members, is extremely powerful in preventing deviations. The 3-2 relation is not found in this group; the 3-2 relation is an exploratory process of knowledge gathering that is innovative, flexible and searching for both commonalities and new ways of forming particulars. The 3-1 relation is inhibitory, focusing on coalescing the values of an already-articulated group and solidifying this group by rejecting deviation. This is the tactic of mob pressure and it is the only collectivism found within postmodern relativism.

Therefore, you have

(7) $a = b$ or c, or d or e, then, you have $(a,b,c,d) = A^2$,

Understanding A^2 as a symmetry-inducing constraint, the statistical average, the relation 3-1, which acts to censor particular morphologies. This behavior can be found within many examples of 'group-think'.

10.4. Abberation III: Linking the aspatial and atemporal 3-3 directly to the spatial and temporal relations.

Another socially derived morpheme is where the system rejects the symmetry induction relations of 3-2 and 3-1, which are derived or mixed spatiotemporal relations and moves instead to link local individual reality with the pure symmetry of the aspatial and atemporal relation of 3-3. How can an aspatial and atemporal measurement interact with and affect spatiotemporal reality? Physically, it can't. The interaction becomes a 'miracle'. The tactic usually taken is to set up the Relation of 3-3 as an external omnipotent causality, a

[8] This rejection of a collective symmetry-inducing force can be found in Lyotard's rejection of the 'metanarrative' (1984) and postmodernism's rejection of 'structure'. These analyses, incorrectly defining the mediate relation as an external agent rather than a function within a triad reveal a complete misunderstanding of the role of symmetry within reality and have moved postmodernism into a focus on an a priori essentialism to replace that mediation (e.g., Derrida's mystic 'Writing').

unilinear, one directional, and non-argumentative supreme intentionality, which operates as a holistic authoritarian force rather than an argument,[9] and governs all local instantiations.

11. Conclusion

The theories in this paper are being put forward to explore semiosic morphology as the basic process of reality in our universe, understanding this process as 'informational networking' within different measurements of space and time. There is a great deal more work required.

[9] An argument is a syllogistic debate, moving from a local or individual input to a local output, via the mediating grounds of a universal template. i.e., a progressive transformation.

References

Atmanspacher, H. (1994) Objectification as an Endo-Exo Transition. Atmanspacher, H. and G. Dalenoort (Eds.). *Inside Versus Outside*. Berlin: Springer-Verlag, pp. 15-32.

Atmanspacher, H. (1999) Cartesian Cut, Heisenberg Cut, and the Concept of Complexity.*The Quest for a Unified Theory of Information*. W. Hofkirchner (Ed.). Amsterdam: Gordon /Breach, pp. 125-147.

Barwise, J. and Jerry Seligman. 1997. *Information Flow : The Logic of Distributed Systems.* New York: Cambridge University Press.

Bateson, G. 1979. *Mind and Nature*. Wildwood House.

Burke, M. 2005. 'Avoiding Extinction in a Managed Single Species Population Model by means of Anticipative Control'. Paper presented at CASYS' 05, Liege, Belgium.

Dretske, F. I. (1981). *Knowledge and the Flow of Information*. MIT Press, Cambridge, Massachusetts

Dubois, D. 2002. 'theory of computing anticipatory systems based on differential delayed-advance difference equations'. Computing Anticipatory Systems: CASYS 2001. Melville, NY.: AIP Conference Procedings. Vol 627. 3-16

Kauffman, S. (1993) The Origins of Order. New York: Oxford UP

Libet, B. (2004) *Mind Time: the temporal factor in consciousness*. Harvard UP.

Lyotard, J-E. 1984. *The Postmodern Condition*. Minneapolis. University of Minnesota Press.

Matsuno, K. (1999) The clock and its triadic relationship. *Semiotica*. 127:1/4:433-452.

Matsuno, K. (1998) Dynamics of time and information in dynamic time. BioSystems 46: 57-71.

Paton, R. and K. Matsuno. (1998) 'Verbs, glue and categories in the cellular economy.' Holcombe, M. Paton, R. (Eds.) *Information Processing in Cells and Tissues*. New York: Plenum Press, pp. 253-260.

Peirce, Ch. S. (1931-35) *Collected Papers.* Eds. Hartshorne, C. Weiss, P. and A. Burks. Cambridge, MA.: Harvard University Press. Citations are by CP plus volume and paragraph number**.**

Popper, K. 1971. *The Open Society and Its Enemies*. Princeton, NJ: Princeton University Press.

Primas, H. (1993) 'The Cartesian Cut, the Heisenberg cut, and disentangled observers'. *Symposia on the Foundation of Modern Physics: W. Pauli as a Philosopher*. K. Laurikainen and C. Montonen (Eds.). Singapore: World Scientific, pp. 245-269.

W. Weaver and C. E. Shannon, *The Mathematical Theory of Communication,* Urbana, Illinois: University of Illinois Press, 1949, republished in paperback 1963.

Wouters, Paul, Iina Helsen and Loet Leydesdorff. (2004). 'Internet time and the reliability of search engines.' *First Monday*. Vol. 9, No. 10. October.