

## LIFE BEFORE MATTER, POSSIBLE SIGNIFICATION BEFORE TANGIBLE SIGNS: TOWARD A MEDIATING VIEW

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**ABSTRACT:** Life is a creative response to creative nature. This notion heeds Norm Hirst's call, by way of Robert Rosen, that life as creativity follows a 'logic' that is radically distinct from classical logical principles. This alternate 'logic' of creative life follows differentiating Identity and Included-Middle Principles. Charles S. Peirce's process philosophy and his concept of the sign, offer a sense of the nonlinear, nonmechanistic, creative emergence of signs and life through possibly possible signification and living forms as illustrated by means of amorphous topological variability.

**KEYWORDS:** Included-Middle, Interdependence, Interaction, Interrelatedness, Incompleteness, Inconsistency, Overdetermination, Possibility, Process, Underdetermination.

[W]e can see parallels between chaos and emergent properties. Both involve unpredictability, though arising from different sources. With chaos, it is sensitivity to initial conditions that makes the dynamics unpredictable. With emergent properties, it is the general inability of observer to predict the behavior of nonlinear systems from an understanding of their parts and interactions.

Ricard Solé and Brian Goodwin (2000: 20)

### INTO THE SEMIOSIC SEA FROM WHENCE EVENTUALLY ORGANISMS EMERGED

Nobel laureate Phillip Anderson published a paper in 1972 with the title: 'More is Different'. He writes that physics has had astounding success in classifying and describing the fundamental particles, in quantifying and qualifying their behavior and interactions. But toss a few trillion atoms together, and it's an entirely different story.

That's why it is becoming increasingly acceptable for chemistry and biology and psychology and the rest of the social sciences to go their own ways. They are no longer inextricably tied to the queen of sciences, physics, which bears, in reductionistic terms, the less exact sciences. In recent years this idea has become especially prevalent among

those who probe the mysteries of the human mind and the brain. They constantly run up against the unexpected, leading them to believe that the brain is ‘wetter’ than mere computer-like hard-wired circuitry; that it is less reliable than mere chemical reactions; and that it is less predictable than psychology and cognitive explanatory principles have had it. Investigators the likes of Oliver Sacks (1995), V. S. Ramachandran, Sandra Blakeslee (1998), and Antonio Damasio (1994, 1999) have made us painfully aware of this. Interaction among human and human, and human and nonhuman biological organisms, interaction between specialized organs within relatively complex organisms, and interaction regarding molecules within living organisms, cannot simply be reduced to organic chemistry. For, from organic chemistry to physical chemistry to physics, there is a gap that apparently cannot be effectively closed. It has taken science a few hundred years to come to terms with this irreducibility.

Robert Rosen tells us that to the question ‘What is life?’, the tired response, which has been ‘It is a machine’, should now be defunct. But it isn’t. For, generations of success has entrenched the machine metaphor in the minds of scientists and laypeople alike such that to question it became well-nigh unthinkable. Norm Hirst refuses to buy into the metaphor, however, quoting Rosen’s suggestion that the ‘machine metaphor is not just a little bit wrong; it is entirely wrong and must be discarded’. (1991:23). As a more appropriate response, Hirst (2008: 8) calls for ‘new philosophy’ that revives that other side of the Western tradition, ‘organicism philosophy’ as a counterpart to the perennially dominant philosophy, ‘substance philosophy’. This ‘new philosophy’ will be a ‘philosophy of organisms’, and it will entail ‘a new logic’.

The initial premises underlying his project are: (1) the cosmos is a *living organism*, (2) life is *creativity*, (3) life *precedes*, and it is the *energy* providing for the *possibility* of, matter, (4) life itself is a question of *uncertainty*, of the *unexpected*, (5) life is the ability for *self-organization*, that is, *self-creation*, and (6) creativity is based on *value*—which, I suppose, is before the creative act unspecifiable.

#### *At the core of the problem*

The hoary dream of Pierre Simon de Laplace, nineteenth-century French mathematician, had it that the entire universe could be reduced to interaction between fundamental particles—as they were conceived in the classical Newtonian sense, of course. In today’s terms this means that, first, the position and momentum of each and every atom and molecule must be specified and programmed into a sufficiently powerful computer, and then, by the classical laws of physics, the computer will be able to specify the state of those atoms and molecules at this instant, back into the receding past, and into the infinitely receding horizon.

Atoms and molecules are in this regard nothing more than blindly moving about according to cause and effect principles. And if this is the case at the atomic and molecular levels, so also it is the case of all levels up to and including living organisms and collections of living organisms. However, more atoms and molecules is by no means

simply more of the same. Indeed, as Anderson puts it: ‘More is different’. Which is to say that increasingly complex levels abide by their own principles, have their own modes of behavior, and interact in exceedingly different ways following different rules and strategies. Taking ‘more’ into consideration creates, in the words of Gregory Bateson (1972), *difference*, and *differences* that make a *difference*. *Difference*, according to Bateson, gives rise to *meaning*, and *meaning* isn’t possible if there is no more than ‘more of the same’, redundantly speaking. ‘More’ must imply *spontaneous emergence*, *novelty*, *creation*, and ultimately, *life*, differentially speaking.

Proliferation of differences that make differences is another way of saying *process*, I would suggest. It is another way of saying that process is the incessant *becoming* of *being* but that *being* is never *being* as a final *product*, for its *beingness* is always in the *process* of *becoming*. It is to say that everything *is* always becoming something other than what it *was* becoming. This flies against what usually—though not always—goes as logic and mathematics, in today’s parlance. Hirst, in this vein, writes that: ‘Logic, as known today, is thoroughly extensional. It is shocking to realize extensional means form, syntax, but without meaning. Likewise, mathematics is extensional. Life requires logic with meaning, i.e., intentional logic’ (2008: 10).

Hirst goes on to suggest that life evolves along circuitous nonlinear, historical paths. It cannot do otherwise, for life is process, not product; it is always *becoming*, it never *is*. In contrast, logicians and mathematicians up to, and in many cases beyond the first few decades of the twentieth century, followed the sugar-plum dream of *consistency* and *completeness*, and the *grand unified theory* (GUT), the *theory of everything* (TOE).

*Our limitations should by now be obvious*

Kurt Gödel’s proof published in 1931, among other ‘limitative theorems’ (DeLong 1970), should have convinced mathematicians and logicians, and physicists and other scientists as well, that we might as well forget about attaining consistency *and* completeness once and for all. And, if I’m not mistaken, it seems that an increasing number of physical scientists have been conceding that GUT and TOE are impossible dreams.

This is to say that absolute, timeless Truth is out of bounds, for the game of life, like any and all other games—including Wittgenstein’s (1953) languages games—is never fixed, but rather, novel strategies are always emerging, and rules are periodically changed in order to accommodate them to their respective games. Indeed, this would seem to call for something other than the classical logical Principles of *Identity*, *Non-Contradiction*, and *Excluded-Middle*. Nothing is permanently identical to itself if it *is* always becoming something other than that which it *was* becoming. If it is always becoming, then its very becoming renders it other than, and contradictory with respect to, what it *was*. And if it is always becoming, from whence can this becoming begin its becoming? By means of discarding the Excluded-Middle, no doubt. This would seem to imply a ‘logic’ of *Differentiating Identity* within what we might call the *Included-Middle*, since being is always becoming regarding the becomingness of being, such that what was becoming

is always merging with what is becoming.

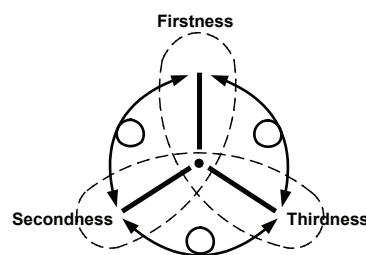
With this in mind, I wish to suggest that if the *possibility of life* is before *matter*, and if—as I have argued elsewhere (merrell 2008)—*possibly possible signification* is before *actual signs*, then there is more than we would like to think regarding the issue of both *matter* and our *signs*. I take *signs* into due consideration, for solely by means of our signs: (1) can we (think we) know our signs in actual everyday practices, (2) can we (think we) know matter, which makes up our world as we (think we) know it, and (3) can we (think we) know the world of our imaginary musings, which is the source of our creative use of signs. From this perspective, I will attempt further to qualify, and elucidate, Hirst’s project by: (1) attending to the notions of the *possibility of life* and *possibly possible signification*, and (2) implementing the thrust of Hirst’s call for a renewed sense of ‘philosophy’ and ‘logic’ that is more in tune with life and process in the creation of (3) a concept, and a ‘logic’, of ‘*pre-matter*’ and ‘*pre-signification*’, and the role they play in *life*, and the *life* of our signs.

In doing so, I take up Charles Sanders Peirce’s triadic concept of the sign for the purpose of illustrating how signs emerging and life emerging are complementary, which is to say that: (1) there cannot be the one without the other, (2) they are *interdependent*, *interactive*, and *interrelated*, and (3) together, the two processes are co-participatory.

#### PEIRCE’S TRIADOMANIA

Before there are signs, there is *pure possibility*; that is, the range of all *possible possibilities*. Then signs begin emerging, according to Peirce’s three categories of signs, and of imagination, thought, and the physical world, namely: Firstness, Secondness and Thirdness.

Briefly, Firstness—comparable to *iconicity*, as we shall note shortly—is what it *is*, without any relationship whatsoever with any other. It is self-contained, self-reflexive, and self-sufficient; it is a feeling, before there is conscious awareness of what the feeling is a feeling of—some *other*.<sup>1</sup> Secondness—in the manner of *indexicality*—is what it *is*, insofar as it enters into interrelationship with some *other*, the *other* of the feeling. Secondness entails interaction with the *other* in the sense of something here and something else there, the first something possibly acting as a sign and the second something acting as the object of the sign. Thirdness—basically of the nature of *symbolicity*—is what it *is*, in the respect that it brings Firstness and Secondness together by *mediating* them, and at the same time it brings itself into interaction with them in the



The categories modeled

**Figure 1**

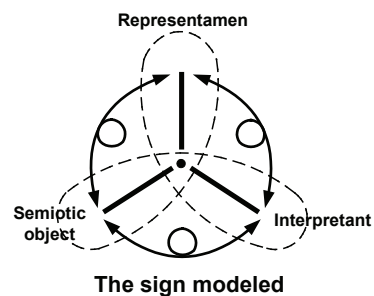
1. Sandra Rosenthal (2001) considers Firstness ‘the most neglected of his categories’ due to the fact that it is elusive, vague, considered relatively unimportant with respect to the other categories, and also because of its characterization as ‘inherently inconsistent’. As I suggest below, while Firstness is ‘inconsistent’ through and through, that is no problem from within the sphere of Firstness, since ‘inconsistency’ is of the very nature of Firstness as self-contained, self-reflexive and self-sufficient.

same way they are brought into interaction with each other (*CP* 2.227-390).

We have the categories depicting their *interdependent, interactive interrelatedness* in Figure 1.<sup>2</sup> Notice how they are ‘democratic’, since each one is interrelated with the other two in the same way they are interrelated with each other. Notice that the model is not ‘triangular’, but rather, there are three lines meeting at a point in the form of a ‘tripod’ such that there cannot be merely a binary relation between one category and another, for the interrelations between any two categories are possible solely by means of interrelations between all three categories. Notice also that the swirling lines illustrating the processual character of these interrelations essentially make up a ‘Borromean knot’ (the dotted lines). The Borromean knot exercises a move, from the two-dimensional sheet toward three-dimensionality, with the overlapping lines. This is significant, I would submit. For, the three lines making up the categorical interrelations are not simply two-dimensional. They are more properly conceived as a ‘tripod’ as seen from either above or below, that, as a result of the swiveling lines of the Borromean knot, oscillates forward and backward as the lines swirl and gyrate. Thus the three-dimensionality of ‘semiotic space’, which, along with a temporal dimension, makes up a nonlinear timespace manifold (merrell 2005).

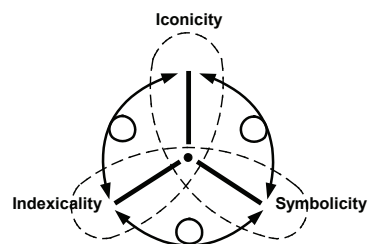
If we place Peirce’s tripartite components making up the sign in their appropriate diagrammatical form, we will have a ‘tripod’ as depicted in Figure 2. The *representamen*—otherwise dubbed a ‘sign’ in common parlance—is self-contained unless and until it comes into *interdependent interaction* and *interrelation* with its respective *semiotic object*—the object with which it interacts. And the *interpretant*—a composite of the sign’s ‘interpretation’ and ‘meaning’ developed through *interdependent, interrelated interaction* between that sign and some interpreter—mediates the *representamen* and *semiotic object* in the same way that it mediates between itself and them.

Moreover, if we qualify Peirce’s basic trio of sign types—*icons*, *indices* and *symbols*—according to their proper place in the ‘tripod’, we will have the same ‘tripod’, as depicted in Figure 3. *Icons*, *indices* and *symbols* make up Peirce’s most basic sign types. *Icons*, in their purest form, are what they are, without having yet come into interrelation with anything else. *Indices* are what they are in the sense that they have come into



The sign modeled

Figure 2



Basic sign types modeled

Figure 3

2. I use the italicized terms ‘interdependent’, ‘interactive’, and ‘interrelated’, though they are not exactly Peircean in origin. Nevertheless, as I have argued in detail elsewhere, citing derivation of these terms in Buddhist philosophy and quantum theory, I believe they effectively portray the spirit of Peirce regarding his general concept of *semiosis* (see merrell 2000, 2002, 2003).

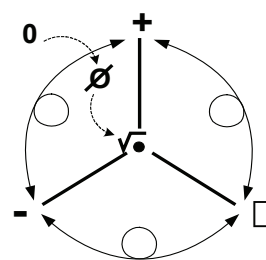
interrelation with some *other Symbols* are what they are as a result of mediating and bringing icons and indices into interrelation with each other in the same way they, those selfsame symbols, bring themselves into interrelation with those icons and indices.

Icons, or images, whether of sight, sound, taste, touch, smell, or kinesthetic or somatic feelings and sensations, are the flesh of linguistic signs. And indices are the bones that give substance to those linguistic signs. They link images to their respective others by means of natural connections of similarity, contiguity, part-whole, container-contained, and cause-effect interrelations, which provide the necessary association between signs of mind or the world and mental images and physical world images (in this regard, see the work of George Lakoff and Mark Johnson 1980, 1999, Johnson 1987, Lakoff 1987).

### *Toward a sense of 'Pre-Firstness'*<sup>3</sup>

Well, thus far I haven't given as much as an inkling of a hint regarding what I promised: a 'logic' of *possibly possible signification* and the *possibility of life*. The next bend in the stream calls for Figure 4, of the same triadic, processual make up as Figures 1-3. Consider Figure 4 as 'pre-signification', or 'pre-life', if you will, in the most basic sense, the *pure possibility of possibilities*, before anything concretely and specifically of semiotic nature has emerged. In other words, it is *semiosis* in its most pristine form. If at its roots a possible icon *resembles* something or other, a positivity, and if that which indicates the icon, a possible index, *is not* what the icon *is*, a negativity, then let us provisionally call them '+' and '-' (the following discussion draws from the work of Rosenthal 1994, 2000; see also merrell 1998, 2000, 2003, 2007).

Let '+' function as *positive possible possibility*, the possibility of signs that might emerge at a given moment. Let '-' function as *negative possible possibility*, what has become at a given moment the sign's object, which implies what the vast majority of those *positive possibilities are not*. Let 'Ψ' function as *mediating possible possibility*; like a possible symbol, it mediates '+' and '-', and it mediates itself and them, which serves to keep open the possibility of other *positive possible possibilities* being selected at some other timespace juncture. These possibilities of a sign emerge out of 'emptiness', 'no-thingness', or, mathematically speaking, *zero*. In mathematics, zero is commonly construed as 'nothing'. But it does not merely imply *something* that is somehow *nothing*. Zero originally comes from India: Hindu thought and later Buddhism. 'Emptiness', as the word is used in Mahayana Buddhism, is in a paradoxical manner of speaking *absolutely empty of all emptiness*. Even to say 'emptiness is emptiness' is to say 'something', which *is not* what 'emptiness' *is*; hence to say what 'emptiness' *is*, is to say what it *is not*. 'Emptiness', like zero, is the possibility



Prefiguring the sign

**Figure 4**

3. Eugen Baer (1988) uses the term, 'Pre-Firstness', appropriately I believe, for what I have alluded to with a complementary term, 'emptiness'.

for the emergence of everything—all objects, acts, and events regarding ‘emptiness’, all integers regarding zero. As we read in the Dao, from zero or emptiness, one emerges; one subdivides into two; two becomes three; and three becomes many.<sup>4</sup>

As a sign emerges out of ‘emptiness’ or zero, it enters into the range of *concrete possibilities*, depending on the sign maker and taker and the timespace context. This is far removed from pure ‘emptiness’. It is like proceeding from zero, ‘o’, to the ‘empty set’, ‘∅’. Zero is just zero. The empty set, in contrast, is something that happens to be empty. It is the ‘noticed absence’ of something that was, could have been, or might possibly be there partially or wholly to fill the unoccupied space. So we have ‘pure emptiness’ (‘o’, or the sphere of all *possible possibilities*), the ‘noticed absence’ of somethingness (‘∅’), and the pluses and the minuses of Figure 4.

Dimensions	Closed	Open	Pre-Firstness	Categories
4-D	Hypersolid	(hole in the Klein-bottle →)	$\Psi \rightarrow \dots \rightarrow$ $\dots o$ ( <i>neither-nor</i> )	
3-D	Solid	Klein-bottle	$\pm \rightarrow \Psi$	Thirdness
2-D	Plane	Möbius-band	$\sqrt{\bullet} \rightarrow \pm$ ( <i>either/or</i> )	Secondness
1-D	Line	Figure ‘8’	$\emptyset \rightarrow \sqrt{\bullet}$	Firstness
0-D	Point	Possible possibilities	$o \rightarrow \emptyset$ ( <i>both-and</i> )	

Table 1: Topologizing the process

The central portion of Figure 4, ‘ $\sqrt{\bullet}$ ’, recalls the square root of minus one. This mathematical sign, ‘ $\sqrt{-1}$ ’, is commonly replaced in equations and proofs by ‘ $i$ ’—comparable to ‘ $\Psi$ ’ in Figure 4. Like zero, the sign has no value, either positive or negative. It just *is* what it *is*. It has no direct re-presentation in the physical world; yet it is used in equations in relativity theory, quantum mechanics, engineering problems, and computation. It was considered an embarrassment in mathematics for centuries after its discovery. Why? Because it is anomalous. Its answer is found in neither ‘+1’ nor ‘-1’. Yet, paradoxically, its answer is in *both* of them, and it is in *neither* of them. By a comparable token, the role of the interpretant, like ‘ $\Psi$ ’, as mediator and moderator, is *neither* positive *nor* negative and at the same time it is *both* positive *and* negative.

This is to say that what *is*, in the positive sense, is related to what *is not*, in the negative sense, though under other circumstances, *is not* could have been *is*, and *is* could have been *is not*. Thus positivity and the negativity enter into an undecidably oscillating ‘+/-/+/-/+/-/+/-/+/-/ ... n’, at the core of the tripod where ‘ $\sqrt{\bullet}$ ’ is found. It is *neither* positive *nor* negative and at the same time it is *both* positive *and* negative. Around the

4. For general reading along the lines of the topics alludes to in this paragraph, see Cheng 1986, Chi 1974, Dantzig 1930, Lao Tsu 1967, Rotman 1987, Seife 2000.

timeless ‘ $\sqrt{\quad}$ ’, where there is neither arrest nor movement, ‘+’, ‘-’, and ‘ $\Psi$ ’ gyrate. Thus we have the interactive ‘ $o \rightarrow \emptyset \rightarrow \sqrt{\bullet} \rightarrow + \rightarrow - \rightarrow \Psi$ ’, as the *pure possibility* of a *possible* sign, a sign that from this point can begin its emergence into the stream of *semiosis*, of signs becoming signs. Thus Figure 4 is actually antecedent to Figures 1, 2 and 3 as far as the process of a sign becoming a sign goes.

So much for ‘pre-Firstness’, that is, the possibility of a sign. Allow me now to attempt illustrating the signifying process with respect to temporality and spatiality.

### FROM A TOPOLOGICAL POINT OF VIEW

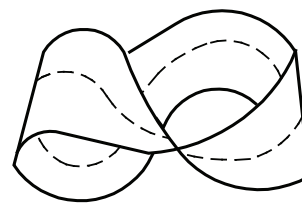
Just as a point, by multiplying itself an infinite number of times in linear succession, can become (can be generated into) a line, so also a line can become a plane, a plane a solid, and a solid a hypersolid. In other words, it is a matter of zero-dimensionality becoming one-dimensionality, one becoming two, two becoming three, and three becoming four-dimensionality. The first column of Table 1 offers the progression, from zero dimensionality—the sphere of *possible possibilities*, the progression from ‘ $o \rightarrow \emptyset$ ’, to 1-D, and up to 4-D.

This concept of dimensionalities in terms of whole integers is relatively closed, as suggested in the second column of Table 1. Fractal geometry, in contrast, creates the possibility of an infinite number of fractional dimensionalities. Another illustration of the fading in and out of whole number dimensionalities in fractal geometry is suggested in the third column. For example, if we take a point, extend it to a line, stretch the line out and fold it back such that it intersects with itself and connects its ending to its beginning we have a ‘figure 8’, or, if in the laid back position it is the symbol for infinity, ‘ $\infty$ ’. The intersection indicates the point at which the line is of double-point—yet still infinitesimal—‘thinness’, representing its very tentatively easing into the next dimension. Either that, or it tunnels its way through itself. From within a 1-D world inhabited by Linelanders, the ‘tunneling’ effect is the only way, but from a Flatlander’s 2-D world it is easy to see how the line could fold back over on top of itself.

#### *Moving to the next level*

A ‘Möbius-band’ is a 2-D rendition of the ‘figure 8’ (see Figure 5). A 2-D Flatlander on a Möbius-band could not be aware of the ‘twist’ in her world that is necessary in order to create the band, for that twist could not be made except by extension into 3-D space, which is unavailable to the Flatlander.

However, from our 3-D vantage point, it is plain to see that the Möbius-band is ‘twisted’, and that whereas previously there was a front side and a back side to the two-dimensional strip, now, since the strips has been given a 180 degree twist and it



**Möbius strip**

**Figure 5**



has connected its front end to its back end, there is no inside or outside. But we can easily impose our bivalent thinking on the Möbius-band continuum, thus mutilating it to create an ‘inside/outside’ discontinuity. This is, metaphorically speaking, part and parcel of our ordinary dualistic way of thinking.

*From the zero degree*

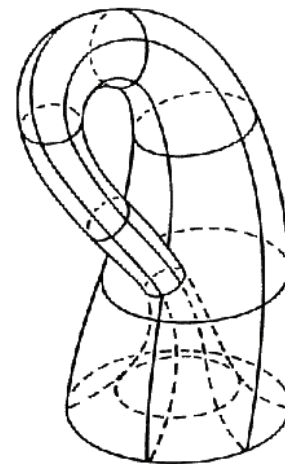
A point (0-D), or the sphere of all *possible possibilities* illustrated by ‘pre-Firstness or the fourth column of Table 1, contains anything and everything, past, present and future. From the *possible possibility* of signs, we create what we (think we) know with respect to: (1) our signs in use during our everyday coming and going, (2) our world, and (3) our creative acts themselves.

In this regard, an atom can be conceived as a minuscule solid, indivisible sphere, or made up of largely vacuous space—or something else. Space can be either Euclidean or Riemannian—or something else. Time and space, or matter and energy, can either be maintained in separation or unified. The Earth can be the center of the Universe or it can be the Sun—or something else. These are all contradictions; they are inconsistent and often mutually exclusive; yet at some time in human history, they have been seriously and soberly entertained as the way the world is. Within the sphere of all *possible possibilities*, both one view *and* another one can become taken for granted within some timespace context or other within some culture or other. Our dualistic thinking, in contrast, demands *either* one view *or* another, and there is no alternative. In other words, our dualistic thinking holds tight to the Principles of Identity, Non-Contradiction and Excluded-Middle.

However, Table 1 reveals dualism residing within 2-D space. But we inhabit 3-D space. This is ‘Klein-bottle’ space.

*And to the level of our own 3-D world*

A Klein-Bottle (Figure 6) can be made by joining two Möbius-bands, one with a left-hand twist and the other with a right-hand or mirror-image twist. Like the Möbius-band, the Klein-bottle is locally of two dimensions, a smooth, continuous contour. From a perspective limited to the surface of the bottle, every local area might appear to follow Euclidean principles of 2-D geometry, as if it existed on a Cartesian plane with 2-D figures sketched on a sheet of paper. However, appearances are deceptive, once again. Like the world of a two-dimensional being, a Flatlander on a Möbius-band, we Spherelanders inhabit the surface of the Klein-bottle, which follows curved-space Riemannian rather than Euclidean geometry.



**Klein-bottle**

**Figure 6**

A Klein-bottle might be described as a 2-D manifold, with inside and outside, and a break or cut at some point where inside becomes outside, and vice versa. However, the Klein-bottle becomes a visual paradox when viewed within 3-D space, just as the Möbius-band is a visual paradox if a Flatlander tried to view it ‘Riemannianly’ rather than ‘Euclideanly’ from within her 2-D space. For, just as the Möbius-band can only exist in 3-D space, so also the Klein-bottle can only exist in 4-D space. In other words, our ‘figure 8’ is a 1-D object twisted in 2-D space and projected on a 2-D plane, a Möbius-band is a 2-D object twisted in 3-D space and projected on a 2-D plane, and the Klein-bottle is a 3-D object with a discontinuous ‘break’ that is impossible outside 4-D space. That is, a Klein-bottle can’t be embedded in three dimensions, just as a Möbius-band can’t be embedded in two dimensions and a figure eight can’t be embedded in one dimension. Let me try to explain this better.

Compare Figure 6 to a corked bottle of wine. It has an inside and an outside, and you can’t get from one to the other except by removing the cork. Once uncorked, the bottle has an opening and a circle or a lip as what we might take to be a line of demarcation between inside and outside. Notice that the form in Figure 6 doesn’t have a circle and a line of demarcation as does the wine bottle. The Klein-bottle can’t be depicted in 3-D space without the existence of a ‘rupture’, a ‘hole’, at which point creating the transformation from ‘inside’ to ‘outside’. What is the implication of this? A Flatlander can glide along her Möbius-band world around and around, on a continuous superhighway as far as she’s concerned. If her world consisted of the wine bottle, she could do the same, passing from inside to outside and back again, as carefree as can be, all the while willing and able to bear testimony regarding the continuity of her world, a complete and consistent world of two dimensions, for how could it possibly be anything other than two dimensions? Of course the Klein-bottle in Figure 6 has a hole, as does the wine bottle. But the similarity ends there. The Klein-bottle’s ‘hole’, unlike that of the wine bottle, cannot exist in 3-D space.

Why not? Let us go back to the Möbius-band in search of an answer.

*Is it all a cosmic knot?*

Notice that a Flatlander could conveniently pass through what we see as a point of discontinuity while unaware that her world consisted of a twist, at precisely that arbitrary point, within 3-D space. Notice also that an imaginary fly buzzing around in the 3-D space of the Klein-bottle could pass through the neck and into the large portion of the bottle, and then into the neck and once again into the larger space and outside, oblivious in regard to the fact that at the extremity of the neck there is a discontinuity that mars the continuity of the 2-D surface. Like the fly, we live within 3-D space; and like the fly, if our entire world consisted of 3-D space within a Klein-bottle, we could pass through the ‘hole’ without realizing there is a ‘hole’ at all.

In other words, we are as limited to our 3-D space just as the Flatlander is limited to her 2-D space. And comparable to the Flatlander’s world within which she believes she

travels along a continuous pathway unimpeded, as far as we are concerned our travels in 3-D space are for practical purposes continuous. In other words, she is unaware of the ‘break’ in her 2-D world, and we are unaware of the ‘hole’ in our 3-D world. In both cases, moving into 3-D and 4-D respectively, the discontinuity makes itself known.

### SYNTHESIZING

‘What is the gist of all this palaver?’—you are by now surely thinking. That the third column of Table 1, implying openness, is an ongoing metaphor, a conceit if you will, of our world, beginning with *possible possibilities* and ‘opening out’ to the ongoing transitoriness available to us through the Klein-bottle ‘hole’.

This is the swiveling, swirling trajectory: ‘ $o \rightarrow \emptyset \rightarrow \sqrt{\bullet} \rightarrow \pm \rightarrow Y$ ’. But it doesn’t end there. It continues on: ‘ $Y \rightarrow \dots \rightarrow \dots o$ ’ (column 4 of Table 1). Like the ‘figure 8’, the Möbius-band, and the Klein-bottle, what goes around comes around. The ending meets the beginning. This is to say that, within the 4-D timespace manifold, nothing is absolutely in the most absolute sense *either* the one thing *or* the other, but our bivalent, dualistic thinking can usually manage to make it so. However, what we actually have in the 4-D manifold is the promise that *neither* the one sign *nor* the other, *neither* the one interpretation *nor* the other, *neither* one moment in life *nor* the other, simply *is* what it *is*. Rather, everything is always becoming something other than what it was becoming.

In this manner, at the lower level of Table 1 where *both-and* play havoc with the presumably hard-rock Principle of Non-Contradiction, *contradictions* and *inconsistencies* pervade, and without undue stress, giving rise to the enigmas and paradoxes of our world and our thought. Here, *overdetermination* allows for undeterminate possibilities to have their 15 minutes of fame as the best possible accounts of our world, our imagination, and our thought, within some timespace context or other. At the middle level, we try our level headed best to hammer our world and our thought into clear and distinct *eithers* and *ors*. This is the level of (hopeful) *determinate* knowing. At the upper level, the transitory nature of our world and our thought should become apparent, that is, if we are not helplessly and hopelessly entrenched in our mechanistic thinking. Here, novel possibilities can emerge, from the *Included-Middle* that is always there, whether we know it or not and whether we like it or not. Thus this level does a slam dunk on the hallowed Principle of Excluded-Middle. And this level cannot but remain *incomplete*, regarding our knowing our world, our imagination, and our thoughts, since we, finite and fallible as we are, like the Spherelander inhabiting the surface of the Klein-bottle, is incapable of seeing it all in one fell swoop.

However, since new knowing can always be, and usually is, in the process of emerging, *underdetermination* allows us, as individuals and as human communities in constant dialogue, to know anew, from within slightly different to radically distinct imaginary constructs, frames of reference, and perspectives, and from within perpetually differentiating timespace constructs. Whatever happens to have become our knowing, will always be able to put a few band-aids here and there, slap some appendages

somewhere else, or throw it all in the trash and begin anew. Our knowing is always in the process of undergoing ‘normal evolutionary’ change, and when that is no longer sufficient, ‘revolutionary’ transformations can occur (Kuhn 1970, Feyerabend 1982). For we, like our *signs*, like *life* itself, are always becoming something other than what we were becoming.

### *A final word*

Hirst writes that ‘life, being creative energy, is basically free. However, when and where it gets bogged down and develops habitual patterns, it is *not* free; and only then when freedom is lost, can it be understood by logical concepts, theoretical physics, mathematics, and the hard sciences’ (2008: 16).

I would suggest that Table 1, taking signs rather than life into consideration, offers the notion of creative freedom at the lower and upper levels, while the middle level gives an idea of ‘when and where’ creative freedom ‘gets bogged down and develops habitual patterns.’ Habitual patterns, however, are part of life, and they are necessary for imagination, thought, and communication; thus it would appear that signs of life share certain properties with the life of signs. And language, supreme symbolic signs, whether mathematical, logical, or natural, could not function without our living habitual patterns of distinguishing and cutting and mutilating and categorizing our world and our thought: indeed, the classical principles of Identity, Non-Contradiction, and Excluded-Middle are in this regard more of a boon than a bane. But there must be more, much more, and it is suggested by the lower and upper levels of Table 1, especially when and where they meet and merge, for that is where the fountain head of creativity lies.

In fact, I would go a step further, suggesting that, at the most primitive level, Figure 2 in conjunction with Table 1, from *possible possibilities* to the *possibility* of a concrete *sign*—or *life* as it were—offers us a notion of Hirst’s ‘characteristics of organismic functioning’ (2008: 15). That is to say, in somewhat different terms than Hirst’s, Figure 2 and Table 1 imply and include the creation of: (1) novelty, (2) variety, (3) paradox (including inconsistency), (4) collaborative, collective self-organization through interdependence, interrelationality and interaction, (5) meta-stability due to ongoing disequilibrium, (6) development and evolution, (7) oscillating, scintillating, uncertain undulating processual change, and (8) some final cause, that always remains *underdetermined* (and *incomplete*), given our finite fallible nature.

The properties of organisms, their development and health, the dynamic activities of brains and communities, the characteristic order of ecosystems, the patterns of evolutionary change, are processes in which we are directly involved. For better or for worse, we participate in them, and of course, we would wish to participate wisely rather than irresponsibly. Ricard Solé and Brian Goodwin (2000: 28)

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