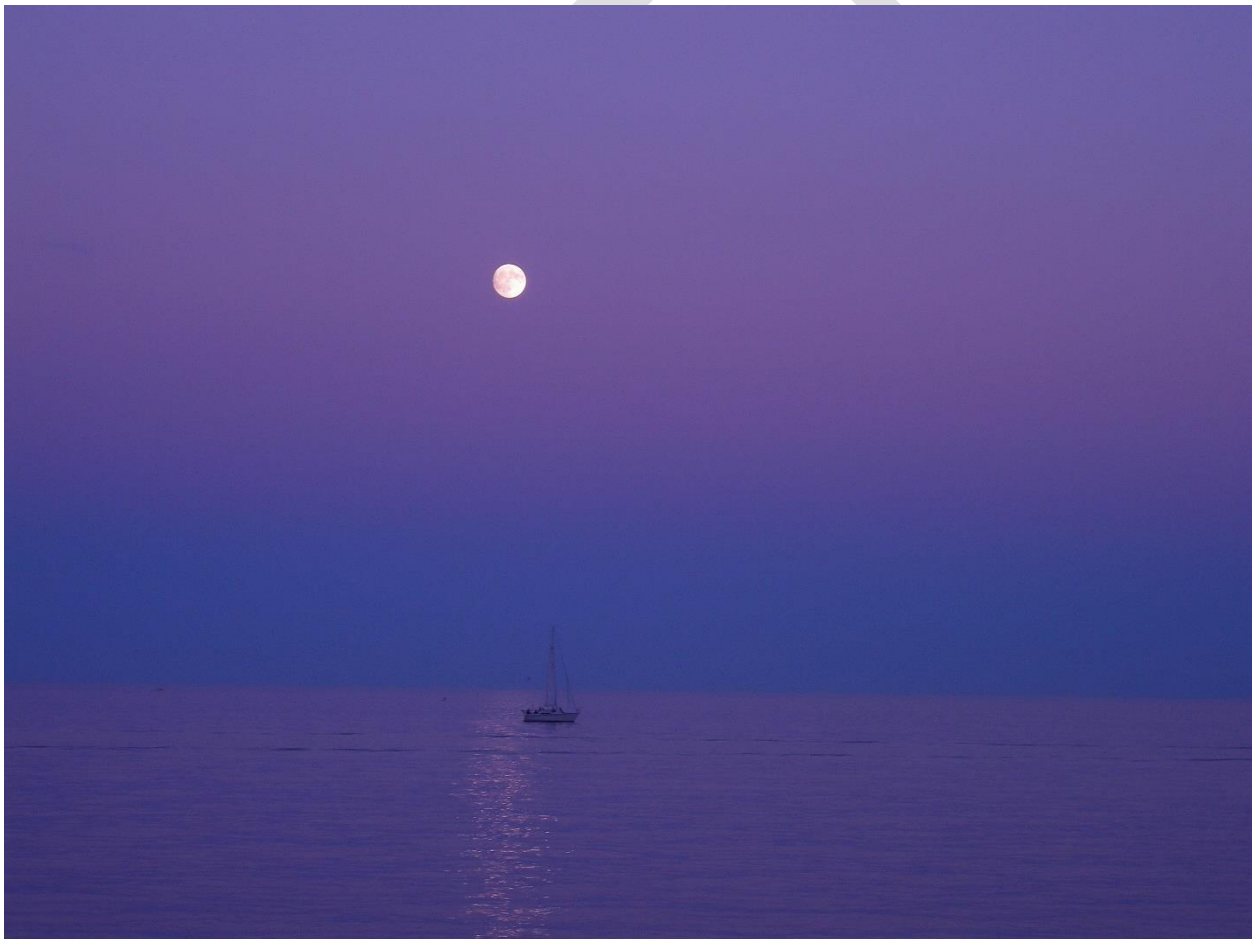


Études in Light and Harmony

An interdisciplinary workbook for creative
dialogue and discovery



Timothy Rogers
Trinity College, University of Toronto, 2021
timothy.rogers@mail.utoronto.ca

Foreword

Like musical scores, this suite of études is intended to provide a collection of “performative texts” for communal dialogue and discovery. The texts themselves should be seen as windows into meaning. Yet the meaning itself would come through a process of exploration that seeks to bring unifying forms and themes into relations that cross multiple academic disciplines, including: foundations of physics, metaphysics, theoretical biology, semiotics, cognitive science, linguistics, phenomenology, information theory, logic & mathematics, poetry and theology.

It is hoped that the études might function as practical studies to cultivate “deep listening”. Each étude probes limits, horizons and boundaries by implicitly bring into relation foundational issues that characterize different academic disciplines or systems of meaning formation. The intention of deep listening is neither to subsume one system or discipline within another, nor to completely distinguish and differentiate them. Rather the intention is to hold in creative tension the similarities and differences while seeking a pathway towards unity.

The études are experimental. They do not propose to relate disciplines explicitly nor by way of surface forms and images. Rather, the intention is that each étude might probe deeply into more than one discipline or system of meaning formation in a way that allows for sustained relationships of mutual learning and collaborative growth. Each participant in this process would bring a depth of knowledge of their own discipline and an openness to the *otherness* of the depth of knowledge of other participants. The exploration should occur in the creative gaps between them and hopefully lead to new beginnings that might bring to life ancient wisdom.

This suite of études comes from my own personal exploration of foundational questions in physics that has been situated within my Judeo-Christian heritage. During that journey, I discovered a wealth of understanding in other academic disciplines (and beyond) that directly relates to core issues troubling physics today. Yet these relations remain largely unknown and unexplored. More than that, however, there is a lack of recognition of why and how these relations might be significant and so there is no obvious “entrance” into new ways of thinking. As a consequence, physics seem stuck in patterns of thinking that have lost their original inspiration. I also discovered others who struggle with similar problems in biology and the philosophy of science. Embedded in that context, the études are an attempt to transcend and transform habits of thinking that are deeply engrained and scarcely visible.

Some formal techniques are deployed in the études. Most notable is the use of the “logic of three” to overcome falsely totalizing images and inexorable dualities. This technique involves a particular kind of attunement to the “betweenness” of mediation that is not common in modern science. The attunement draws on the formal and precise movements of analysis in concert with the metaphoric and singular movements of synthesis.

Les études

Light, Life, Word

1. [Three reflections on return: convergence of form with regard to light, life, word*](#) Page 7
2. [Light signifying form: Peirce on creativity, responsiveness and emergence in quantum, biological and linguistic systems*](#) Page 18
3. [Darkening of the light: a reading of Genesis through archetypes from I Ching](#) Page 45

Encounter

4. [Danse sur glace: an experiment in language*](#) Page 55
5. [The proximity of light: a deconstruction of space*](#) Page 85
6. [Light, logic and relational ontology*](#) Page 119

Method

7. [On the relationship between the concept of text in Gadamer's theory of hermeneutics and the concept of light in Einstein's theory of relativity](#) Page 127
8. [Identity and paradox in Habermas' approach to critical reflection: metaphor as necessary other to rational discourse](#) Page 144
9. [Beyond space and time: unity and form in Augustine's Confessions](#) Page 166

Relations and Limits

10. [A practical guide to relational ontology in modern physics with an annotated bibliography](#) Page 191
11. [An introduction to the metaphysics of relation with application to the physics of quantum mechanics and relativity theory](#) Page 204
12. [On the embodiment of space and time: triadic logic, quantum indeterminacy, and the metaphysics of relativity*](#) Page 220

Embodied individuation

13. [Word, identity and the relational form of the individual in Paul's Letter to the Romans](#) Page 296
14. [Towards the case against reductionist theories of evolution](#) Page 308
15. [Theological insights into the notion of order in physics and the natural sciences*](#) Page 321

Opening

16. [A physicist's guide to \[Hegel's\] *Phenomenology of Spirit*: resonance, disambiguation, and the genesis of spatial orientation](#) Page 344
- [A cautionary note concerning Hegel's approach to absolute knowing](#) Page 365
17. [The entrainment of negation: a possible prologue for interpreting quantum mechanics through light*](#) Page 370

18. [What has Christianity to do with physics?
An exploration of the metaphysic of modern physics
in light of Maximus the Confessor and other patristic authors*](#) Page 390

Physical Formation

19. [A thought experiment with light: how the ontological form of
quantum mechanics is consequent to the principles of relativity theory](#) Page 410
20. [Is Dretske's theory of information naturalistically grounded?
How emergent communications channels reference an abstracted
ontic framework](#) Page 434
21. [Spacetime as a formal semiotic process*](#) Page 456

Light, Life, Word

DRAFT

1. Three reflections on return: convergence of form with regard to light, life, word

In this paper, I trace the three-fold essence of “return”—a generating trope of identity and difference, through which formal aspects of the theory of relativity, the movement of language and emergence in evolution might converge. The trope of return is contrasted with the more common two-fold structure of relatedness underwriting differential calculus, propositional semantics and reductionism, which privileges space over time, identity over difference, self over creation. This paper is a tentative metaphysical sketch in which word is to meaning, as light is to matter, as life is to creation.

Setting the stage

Let the term *secular space* stand for a deeply embedded metaphor of scientific thought—an absolute, passive void embedding totality, universe, being. It is the implicit theatre for reductional worldviews that I will call “classical ontology”. Classical ontology is formalized, for example, in the mathematics of Newtonian physics [Huggett, pp107-168] and deconstructed, for example, in *Otherwise than Being* [Levinas]. Secular space presumptively unites heaven and earth, while annihilating creativity, interiority, novelty. It grounds classical ontology, providing a priori conditions for analyticity, particularity and identity. It envelops an ideal, objective observer in the paradox of subjective reflection. Through secular space a universal worldview is constructed whose problems cut to the very core of what is meant by knowledge, truth and creation.

From the margins and gaps of secular space erupts the nameless—chora [Kristeva]—dynamic counterpoint to the absolute inertness of secular space. More verb than noun, chora is energies and rhythms that undermine structure to bring forth the new. Lacking identity or representation, chora presents as *différance*/difference [Derrida, Deleuze], as undercurrent frustrating, while at the same time enabling, the fragile constructs of theoretical discourse. Nothing is said to withstand chora. Chora is the excluded initiative of classical ontology. Where secular space structures analysis, chora is revealed to unground the construction. Herein lies the stalemate of postmodernism.

This project is an exploration beyond the binary extremes of secular space and chora—an attempt to provoke an engagement with the challenge that permeates the contemporary discourse on being and knowing, from the deconstruction of language, to the hermeneutics of physics, to the analytics of evolution. Here three meditations are offered—equivalent reflections on word (meaning), light (matter) and life (genesis). Through these meditations, I explore the trope of a three-fold relatedness, perhaps underlying creation, that might offer fleeting insight into immanent transcendence sustaining our world.

Word¹

Between you and I there is a gap, a rupture, an abyss. These words, these very words, are bridging that gap. As I write, I am offering these words in one place and time and, as you read, you are receiving these same words, but receiving them elsewhere. They are bringing us into proximity, into an intimacy that ruptures space-time, individuality, and context. The words themselves are the mediator, the sustainer, the bearer of this relationship. Through these words you and I are being brought into one, even as we are kept separate and autonomous.

Words summon relatedness. Through their mysterious capacity to announce and yet defer presence, words mean. And by meaning, in their very essence, they defer themselves to an Other. If you look at these words as bits of typography on a white page or as bits of immanent presence totalized under your gaze, you will not fully enter into this relatedness. Words substitute themselves for that to which they refer. Intimate. Transparent. Elusive. The words on this page substitute for an Other. They substitute for my thinking, my interiority, for example. And, in turn, they substitute for your thinking. In this opening, in this gap between offering and receiving, we commune. And in the communion there is an exquisite vulnerability.

We are not alone with these words. Words carry echoes of those not present. We draw from these words and return them again. And like a spring or a well, they overflow themselves in their saying. To dominate words, to totalize their meaning, to deny openness to the Other is illusion. These words, like all words, say more than they say. My thinking does not limit these words and your thinking cannot totalize their meaning. There is an openness that weaves a mystery, an indeterminateness to these words. Call it a gesture, a clearing, an offering ...

This is not the scientific understanding of language. The scientific reading comes from a classical worldview—the point of departure for the exploration that is this paper. The *world* is a universe, or ensemble, of things, of things-*in-themselves*—delimited, separable, located in a container we call spacetime. The container itself—the *no-thing* which grounds the world—is seen as static, inert, empty and wholly forgettable. To use words, to speak of a thing, is to speak in terms of an idea of the thing, which is well defined and which is distinguished properly from other ideas [Heidegger 1975]. In this way of speaking, both material things and ideas of things are separated and distinguishable. Classical ontology is founded upon categories that “are perfectly fixed and whose boundaries of definition are perfectly sharp” [Pythress 1995]. We conceive a world of ideas as an ensemble of “things” which can be manipulated and this

¹ John 1:1

1. Three reflections on return

manipulation of idea-things is what passes for thought, in much the same manner as we perceive our world as filled with things which are separate, extractable and available for manipulation. This implicit assumption about *world* structures thinking about things and ideas, which is to say it structures our use of language [Heidegger 1975].

Naively, within the classical worldview, the relationship between things-in-the-world and ideas-of-things is objective, informational and univocal [Poythress 1995]. Through language, the thinking subject approaches this objectivity inasmuch as the two structures match and are reflected one-in-the-other, in the duality of thinking::being [Levinas 2002]. Everything is laid bare, accessible to a totalizing gaze, and truth is conformity. The *world* is “there” for everyone to see samely, because we, like things, are grounded in a privileged, common and totalizing frame [Levinas 2002]. The *world* is pure objectivity. This objectivity is made possible through assumptions about the distinctness of things. Each thing is seen as a totality, a thing-in-itself and relatedness is derivative [Levinas 2002]. The distinctness of things, in turn, arises from deeply implicit assumptions about the structuring of an “ontological container” in which things are assumed to be situated—space, the void, *no-thing* [Levinas 2002]. And deeper still is an appropriated binary logic grounding the static, passive, inert structuring of *no-thing*.

This binary logic is captured, for example, in the law of the excluded middle, which says that for any statement A, either A or not-A must be true and the other must be false [Heidegger 1975; Levinas 2002; Frye 1990]. It underwrites, in some sense maybe even defines, the differential calculus from which the classical scientific worldview draws its vision. This logic defines what is meant by “is”, what passes for being, in the classical worldview.

The postmodernists have brilliantly deconstructed the classical worldview [Derrida 1982]. They have shown us the hubris—the belief in a privileged embodied observer who can see the mystery of creation laid bare, totalized under a single human gaze, like the workings of a clock; an observer who would say to God: “Your thoughts are my thoughts”. They have shown us the violence—the belief in the authority to force a common frame-of-reference that leads to subversion and marginalization of incommensurate voices, voices that might undermine the power structures of the privileged. They have shown us the incoherence—the assumption of an inert or indifferent grounding of reality that masks a broken symmetry, a privileging of the same at the expense of the Other, and in so doing falsifies the assumption. But inasmuch as the postmodernists have tended to relinquish the way of Truth altogether, they have been far less successful in re-constructing language(s) for our time. The danger lurking in their wake is a subjective relativism that cannot ransom itself.

Levinas [1969, 2002] has perhaps intimated a way forward through an ethics of responsibility, in which he proposes that (what I have called) *no-thing* is not the passive, inert, negation of being, but rather the Beyond. This Beyond obtains, for Levinas, in infinite responsibility for the Other. Prior to any world, the one-for-the-other is the condition for possibility. The one-for-the-other is *movement* whereby one is brought into proximity and substitutes for the Other. Levinas’ attention is on the relatedness which is, in some sense, prior to the one or the Other.

1. Three reflections on return

This “relation without relation” becomes an essentializing paradox, or ambiguity, which allows the being of beings to appear in intelligible structures or “worlds”. Beyond these structures is a restlessness which resists resting in being, but nonetheless guides the discourse of being. The movement from Beyond to (what I have called) world occurs through the introduction of a Third Party—the other of the Other, who is also an Other to me. This irreducibly threefold relatedness brings limit, subjectivity and objectivity [Levinas 2002].

Drawing from Levinas, I want to suggest that words and language might be seen as open—windowing the Beyond—through an irreducibly threefold “logos”, rather than closed—reflecting the Self—through the binary logic that characterizes the classical worldview [see also Poythress 1995]. But we need new metaphors, new language, new ways of thinking to explore this possibility. I also want to suggest that perhaps part of what many postmodernists are groping for in words and language, physicists already may have stumbled upon in action and experiment—namely, the extra-ordinary capacity of light to announce and sustain creation.

Light²

Imagine we are looking deep into the expanse of stars in the night sky. What are we seeing? We are not seeing the universe as a totality that exists “now” in the sense of at-the-same-time-as-us. Such a totality is never embodied in time. The presence we are seeing in the here-and-now is of objects as they were when the light from them first began its journey. This presence—which is unique to us, to our particular reference frame—stretches back to the earliest inklings of time as it extends to the furthest recesses of space. And our presence reflects that light back into the future where it might be received, even to the ends of space and time. At every moment we are present with the beginning and the end of creation as much as we are present with our immediate surroundings. We are at the very centre of the origin of the universe even as we are fifteen billion light-years away from that origin [Swimme 1996]. The same is true for any other embodied observer in creation. And because the presenting of light partakes of the absolute, we can say that this worldview is real.

This is not the common view of space and time. Our sense of spacetime is intimately related to our experience of the earth as a static, immobile presence—a spatially extended reference for movement and change. Take away the earth and we tend to pre-suppose the continued existence of the reference frame—space. Space as an empty container for being(s). Space as the absolute simultaneity of being(s) in an instant of time. This is the classical or Newtonian representation of spacetime. For Newton, the universe is a state—a totality or collection of

² Genesis 1:1-4

1. Three reflections on return

entities in instantaneous relationship. And space, for him, is a metaphorical rigid body, like the earth—an eternally rigid correlation, to which time is added separately. The universe is a continuous succession of states in space. The complete separation of space and time is foundational [Huggett 2002].

But physicists have shown, through dialoguing with creation, that this Newtonian or classical worldview is wrong, while new hermeneutic eludes their grasp [Bohm 1996; Maudlin 2002]. I want to explore a new path that absolves secular space in a deeper engagement with light.

There is no universe. That is to say, there is no stance in which a universe, in all its being, appears as a unified totality. For any embodied observer, there always remains a hidden aspect, an *elsewhere*, that obscures knowledge of beings, even as it draws them into an essential relatedness. This incompleteness is not a lack—of knowledge or capacity, for example. It is intrinsic to materiality and embodiment itself [Bohm 1996; Levinas 1969].

There is no underlying separateness. The Newtonian concept of space allows for complete differentiation of one from the other, for the differentiation of materiality into discrete or fundamental elements, for the differentiation of things-in-themselves. Not so in our world. Nothing in creation is totalized or whole-in-itself. There is no particle, no state, no thing-in-itself. The whole is not a totality and the part is not separable [Bohm 1996; Maudlin 2002]. Whole and part are merely the horizons of subjectivity. Like Levinas' ethics, each is for the other.

There is no void. Nothingness is neither passive, nor empty. Creation rests upon a scintillating, bubbling, almost-differentiated-but-not-quite, "sea" of virtual quasi-states. Nothingness is pregnant with reality. More verb than noun, it is a generative power, an unseen ocean of potentiality, which is neither thing nor place [Swimme 1995]. Language-theorists would call it the semiotic; physicists, the quantum vacuum; theologians, the abyss. From this potentiality, creation is brought forward at every moment.

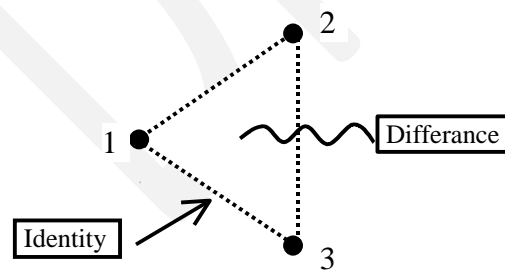
Light is a window on the absolute. It brings forth a relatedness that enables our world to exist. This relatedness is very different from Newton's passive notion of spatiality, which has dominated the classical worldview. The relatedness of light predisposes any possible ontology in a holistic interconnectivity [Bohm 1996]. Through light, objectivity is intricately bound with subjectivity and obtains inasmuch as all frames of reference are inter-related. Embodied observers perceive slices of reality which are incomplete in principle. Objectivity becomes a construct brought about through communication or synchronization between different frames of reference in which exteriority (and interiority) is made possible by virtue of the absolute nature of light [Bohm 1996]. Truth is borne by light. What "stands outside" of spacetime is not a passive void that can support an indifferent observer (the scientific image of God?), rather, it is light which is at the threshold of spacetime, beyond and yet participating in creation at each and every level of order.

1. Three reflections on return

Light is proximity. A connector, with no space or time interval, that calls forth immediate relatedness (between source and receiver, for example) even as it veils its own presence. Neither objectivity nor subjectivity, “it is an unframed window on the material world, an opening or clearing in which that world is situated” [Grandy 2001]. Light is dynamic, movement, a restlessness deeper than the passivity of space. Light is in a continual process of substitution, to use Levinas’ language. One-for-the-other. It is a relatedness outside of any system of entities, continually deferring its own presence, and in so doing, granting presence to systems, structures, entities, relationships. It brings forth a fundamentally holistic clearing that animates and maintains the presence of being(s).

I want to suggest that light supports a fundamental indeterminateness at the core of being(s)—a rupture of objectivity; an *interiority* that is open, adaptive, responsive. This interiority is an essentializing quality of matter and thought. Light frames matter. Light also frames subjectivity even as it frames objectivity in a particular system that references relatedness—a system that is both partial and false-in-itself, although true in its openness to the Other; a system through which the fullness of Being appears only inasmuch as the system itself is transcended. Light becomes the trace that supports and animates creation. Beings and entities do not have an essence-in-themselves, but only exist in relationship to the world in which they are created, the system through which they are perceived, and, most radically, the creator by whom they are sustained (as described by Griffin, for example [Griffin 1988]).

I want to further suggest that the trope of light, like word, is irreducibly threefold—three in proximity, each of which is another to the others and none of which is the same to another. It is this threefold relatedness that manifests the paradox of identity *and* difference as shown in the figure below:



In this figure, each of the three is one-for-another in a continual process of substitution. There are three distinct indices, or origins, labeled “1”, “2” and “3” in the diagram. These three indices correspond to three distinct instantiations.

1. Three reflections on return

To see the working of this trope, suppose we establish “1” as the instantiated index, the *origin*. Then “1” is in a relation of proximity with the two others (here called “2” and “3”). This relation of proximity we can call *identity*. “1” is identical to “2” and “3”, substituting itself for each. However, between “2” and “3”, there is a proximity that is inaccessible to “1” and we can call this *difference*. In the distinct instantiation of the three, there is both identity and difference.

This trope frames interiority through a process of *return*. In return, “1” substitutes for “2” which in turn substitutes for “3” which finally substitutes for “1”. In return there is a traversing of the inaccessible difference that is the proximity of “2” and “3” according to “1”. This gap becomes the gap or clearing in which creation manifests—the *synchronicity* of light and word. Moreover, because “2” and “3” can substitute one-for-the-other in the inaccessible gap, there is an indeterminateness at the core of this threefold relatedness, which is to say, there is interiority.

Within the threefold figuration of light are several important qualities of creation: identity, difference, return and interiority. Through these qualities, I want to suggest, light is able to breathe life.

Life³

Imagine we could follow the arc of cosmic evolution from the beginning to here-and-now, watching creation unfold like petals of a rosebud [O’Hara unpublished; Swimme and Berry 1992; de Chardin 1961]. In the primal singularity, there is light. Pure energy. Light allows spacetime to burst forth, and in spacetime, energy begins to condense into particulate matter—protons. Simple in form, protons coalesce into stars, in whose furnaces they are transformed into more complex forms—the elements. The stars burst, scattering their elements and the elements recombine into new stars. The stars coalesce into galaxies, like our Milky Way, and in the galaxies, stardust condenses and solidifies into planets, comets, moons and asteroids. On our planet Earth, the elements combine to form molecules, the molecules assemble into complex systems bringing forth cells. The cells develop nuclei that can coordinate inter-cellular communication, bringing forth multicellular organisms. The organisms develop complex systems of sentience and cognition, bringing forth awareness. Through awareness comes language and language awakens to the light.

This is not the dominant understanding of evolution. Embedded in a classical worldview, evolution is theorized as a struggle for existence among autonomous agents in the natural environment [Darwin 1859; Dawkins 1976; Gould 2002]. Prodded by an excluded initiative—the *drive* to survive and generate—individual agents struggle against the whole, and very hostile,

³ Proverbs 8:22-36

1. Three reflections on return

environment. And the environment, in turn, exerts a decisive force on the agents, called natural selection, such that only the fittest survive. Implicitly reductionistic, theories of evolution treat agents as elementary units-in-themselves from which the complex dynamics of life are crafted—the separation of agent (part or self) and environment (whole) is foundational.

Although recognized, what is not fully unpacked in this discourse, is the fact that the very being of agency itself is in question with evolution. The agency of evolution operates through generation. The rupture in identity that happens through reproduction—offspring are *other* than their parents—is crucial to the theory, because it is in these “gaps” that changes occur which enable hereditary lines to adapt to environmental fluctuations [Darwin 1859; Gould 2002]. What endures is not the particular agent (organism or gene), but the continuity of hereditary lines. This makes agency in evolution fundamentally relational, temporal and therefore inconsistent with a classical ontology of reductionism and separateness. What is postulated a priori in evolutionary theory is a fundamental drive to generate—intrinsic to the forming of individual, ephemeral agents—that creates, animates and sustains hereditary lines and matrices. Evolution is concerned with becoming not being. And the continuity of life is embedded in collective obligation to future generation, rather than autonomous survival of individual agents.

I want to suggest that the *same* breakdown of classical, reductionistic agency can be found at all levels of creation—from protons, to atoms, to molecules, to cells, to animate bodies. Consider classical electrodynamics as a prototypical example. In this theory, elementary particles, such as electrons, possess charges that are sources for electromagnetic fields. Electromagnetic fields, in turn, impact the dynamics of charged particles. This manner of handling particles and fields, however, is not coherent and, at best, can only be approximately valid. The difficulty arises from the fact that a moving charged particle generates a field and the field, in return, affects the motion of the particle *that created it*. This structural relation of return touches on one of the most fundamental aspects of physics—the nature of the elementary particle [Jackson 1975]. Return draws into question the a priori separation of particle and field and thrusts ontology into the arena of indeterminism and irreducibility. In quantum field theory, the (infinite) renormalization of return (more specifically “self energy”) is the formal mechanism which brings about particles as created from and annihilated into a continuous field—the essence of particle identity as separate and yet interwoven into the field from which it came. It sets limits to the degree to which elementary particles can be defined as separable and localized, thereby forging an essential connection between “self identity” (particularity) and relatedness [Teller 1988].

Likewise consider the molecular level of evolution. Perfectly replicating molecules, in and of themselves, cannot be the agency of evolution because they would eventually consume the raw materials of any finite environment at which point evolution would cease to support their further replication. In order to sustain agency, replicators must be imperfect, recycling their raw material and allowing for adaptation to environmental changes, either externally imposed or caused by their own growth—a cycle of return. However, randomness at the molecular level

1. Three reflections on return

raises significant problems for molecular stability—the replicators must be safeguarded against random events attaining so much importance that they destroy the statistical regularity of replication [Prigogine & Stengers 1984; Schrodinger 1967]. Unicellular organisms are one of the simplest cases in which the irreducible nature of return is manifested stably. Here DNA molecules are the basic replicators, which alter their immediate environment by coding for and causing the creation and maintenance of a cell. But the cell, in turn, ensures the stability of the DNA molecule in its process of replicating, while also enabling sufficient flexibility or randomness to adapt to change. The cycle of return is completed in the mutual interdependence of the DNA molecule and the cell, neither of which can be an agent of evolution on its own. Return opens up *interiority*, such that the cell, which is different from the environment, forms an organic *whole*. Multicellular organisms are another case. Here cells interact with one another through chemical messengers on their surfaces, altering the expression of DNA within each cell. As a result, an organic whole—the body—is formed in which different cell lines produce organs, tissues, and so on, all from the same DNA backbone. Once again, interiority emerges (the body) to enhance capacity for generation—the multicellular body allows a differential expression of DNA leading to a coordinated functioning of different cell lines [Cole 1996]. Within this irreducible process, “self identity” (of particles, genes, cells, organisms, etc.) is a consequence of a more fundamental dynamical relatedness. The holistic “self” is forged from return.

I want to suggest that through return—the essential ternary trope of light and word—creation unfolds in an emergent hierarchy of increasing complexity [de Chardin 1961]—atoms, molecules, cells, multicellular organisms, sentient bodies. Each level of emergence forms its own holistic “gestalt” which modifies and unifies a collective synergy of pre-existing gestalts, as for example a multicellular organism unifies a collective synergizing of the cellular gestalt. Emergence is creative. It manifests “in the fullness of time” as new levels of agency come into existence [de Chardin 1967]. The emergent agents do not replace pre-existing ones—the stars, the molecules, the unicellular organisms remain. But each emergent level unites and, in some sense, fulfills the previous one. Through emergence there is *convergence*, to use de Chardin’s language, an inward turning of agency upon itself that deepens interiority and heightens responsiveness. And at each emergent level of complexity, new phenomena appear, as for example the capacity of multicellular organisms to self-regulate cell lines and gene expression.

More striking, at each level there is an ever fuller manifestation of *word*. Elementary particles disclose material *identity*. Replication discloses *information* (copies are materially different, yet identical in their in-formation). Cells disclose the capacity to manipulate information through (DNA) *code*. Multicellular organisms disclose the capacity to manipulate the expression of code to *signal*. Animals disclose the capacity to *communicate* and to manipulate reference through *cognition*. Humans disclose the capacity to manipulate *language* and *thought*.

Relinquishing the classical worldview implies a radical shift in our understanding of God’s relation to his creation. Newtonian physics, based on an implicit assumption of an underlying timeless, static “world”, invented a notion of Absolute space that drew heaven and earth into

1. Three reflections on return

the same passive container and united the laws of heaven with those of earth. At the same time, it adopted a notion of relatedness that cast God in the role of unaffected, ideal observer standing outside of creation. In totalizing being and world as static and pre-determined, the laws of the universe became physical laws, which are complete in themselves, deterministic and void of spiritual significance. I want to suggest that a new image of creation is emerging that supports a fundamental relatedness and engagement of God at the core of being(s). All of cosmic evolution is Life, brought forth from the primordial Light, and created through the Word.

References

Bohm, David. 1996. *The Special Theory of Relativity*. New York: Routledge.

Cole, R. David. 1996. The molecular biology of transcending the gene. In *Religion and Science: History, Method, Dialogue*, eds. W. Mark Richardson and Wesley J. Wildman. New York: Routledge

Dawkins, R. 1976. *The Selfish Gene*. Oxford: Oxford University Press.

Darwin, Charles. 1859. *The Origin of Species by Means of Natural Selection or the Preservation of Favoured Races in the Struggle for Life*. Edison, New Jersey: Castle Books [published in 2004].

de Chardin, Teilhard. 1961. *The Phenomenon of Man*. Transl Bernard Wall. New York: Harper and Row.

Deleuze, Gilles. *Difference and Repetition*. Transl Paul Patton. New York: Columbia University Press.

Derrida, Jacques. 1982. *Margins of Philosophy*. Transl Alan Bass. Chicago: University of Chicago Press.

Frye, Northrop. 1990. *Words with Power: Being a Second Study of "The Bible and Literature"*. Toronto: Penguin Books.

Gould, Stephen Jay. 2002. *The Structure of Evolutionary Theory*. Cambridge: The Belknap Press of Harvard University Press.

Grandy, David. September 2001. The Otherness of Light: Einstein and Levinas. *Postmodern Culture*. Vol 12(1): available <http://www.kalpakjian.com/Grandy.html>

Griffin, David Roy. 1988. Introduction: Postmodern Spirituality and Society. In *Spirituality and Society*, ed. David Ray Griffin, 1-32. Albany, New York: SUNY Press.

1. Three reflections on return

Heidegger, Martin. 1975. Language. In *Poetry, Language, Thought*. Transl. by Albert Hofstadter. New York: Harper Colophon Books, 189-210

Huggett, Nick. 2002. *Space from Zeno to Einstein*. Cambridge: MIT Press.

Jackson D. 1975. *Classical Electrodynamics*. 2nd edition. New Jersey: Wiley.

Kristeva, Julia. 1986. Revolution in poetic language, In *The Kristeva Reader*, ed Toril Moi, 89-93. New York: Columbia University Press.

Levinas, Emmanuel. 1969. *Totality and Infinity: an Essay on Exteriority*. Transl by Alfonso Lingis. Pittsburgh: Duquesne University Press.

Levinas, Emmanuel. 2002. *Otherwise than Being or Beyond Essence*. Transl by Alfonso Lingis. Pittsburgh: Duquesne University Press.

Maudlin, Tim. 2002. *Quantum Non-Locality and Relativity*, 2nd edition. Oxford: Blackwell Publishers.

O'Hara, Dennis. Unpublished.

Poythress, Vern S. 1995. Reforming Ontology and Logic in the Light of the Trinity: An Application of Van Til's Idea of Analogy. *Westminster Theological Journal* Vol 57(1):187-219.

Prigogine, Ilya and Stengers, Isabelle. 1984. *Order Out of Chaos: Man's New Dialogue with Nature*. Toronto: Bantam Books.

Schroedinger, Erwin. 1967. *What is Life? The Physical Aspect of the Living Cell*. Cambridge: Cambridge University Press.

Swimme, Brian. 1996. *The Hidden Heart of the Cosmos: Humanity and the New Story*, New York: Orbis Books.

Swimme, Brian and Berry, Thomas. 1992. *The Universe Story: From the primordial flaring forth to the ecozoic era—a celebration of the unfolding of the cosmos*. New York: HarperSanFrancisco.

Teller, Paul. 1988. Three problems of renormalization, In *Philosophical Foundations of Quantum Field Theory*, eds Henry R. Brown and Rom Harré, 73-89. Oxford: Clarendon Press.

2. Light signifying form: Peirce on creativity, responsiveness and emergence in quantum, biological and linguistic systems

Using Peirce as a guide, this paper explores the way in which light mediates finitude through the relational process of *semiosis*. Embodying the triadic logic of identity, difference and return, light *creates* space, time and matter. Attention is on simple bodily forms and the *meta*-physics of their relationality. The first section introduces the mathematical and metaphysical contours of Peirce's approach. The second section motivates Peirce's three categories as interwoven process. In the third section, Peirce's formalism of the sign is presented and applied to simple physical and biological bodies.

Prelude: In the beginning ...

Lau Tzu once wrote that knowing the ancient beginning is the essence of the way [*Tao Te Ching*, Verse 14]. But what do we mean by beginning? And what kind of beginning should we seek? Temporal? Causal? Formal? Logical?

To seek the beginning is to embark on a journey of self-emptying and return to the source. Beginnings, like horizons, are elusive, always just beyond our grasp. The beginning is always already past. It is potentially significant to contrast *in the beginning* with the more common philosophical conception of foundation or *ground*. The ground, the earth, the land, is a *given structure* which supports or hosts beings in their relationship with one another. It is spatial, total, all at once. In the most abstract sense, the ground might be thought of as a *geo-metry* of space; a lawful, mathematical basis for the presence of individuals as individuals, be they particles or persons. The abstracted ground—space—sustains identity but it does not *grant* identity. In itself, it is not creative. The abstracted ground is the domain of the same, to use the terminology of Hegel [1977] or Levinas [2002]. If we seek to find the source of identity in the ground alone, *in the same*, we encounter the empty void.

Returning to the beginning draws us away from the emptiness. We encounter difference, asymmetry, that which has no equal:

And darkness was on the face of the deep.

And the Spirit of God moved upon the face of the waters. [Genesis 1.2]

The earth, without form, might be said to be void, but beyond a found image of emptiness, beyond the *geo-metry of space*, is *in the beginning*. To cut ourselves off from the beginning is to make for ourselves a geometry of being which is cut off from the source. Without mediation, the transcendent becomes the excluded middle of a binary logic whose form is the empty

2. Light signifying form

reflection of what we take to be our *Self*. To draw away from the empty void is to understand ourselves differently and, in so doing, a new heaven and a new earth come into view.

And God said, Let there be light: and there was light. [Genesis 1.3]

In this paper, using Peirce as a guide, I explore the way in which light mediates finitude through a process of *semiosis*. Here attention is on simple bodily forms and the meta-physics of their relationality. The first section introduces the mathematical and metaphysical contours of Peirce's approach. The second section motivates Peirce's three categories as interwoven process. In the third section, Peirce's formalism of the sign is presented and applied to simple physical and biological bodies. The final section is an abductive leap.

First Movement: Mathematics, metaphysics and music

In *Songs for Relinquishing the Earth*, Zwicky [1998] writes of how, in the end of mourning, we must pass through "that absence in ourselves". Awareness of absence becomes an opening whose sense, for Zwicky, is musical. A path of listening.

To listen is to enter into a place of open expectation. Listening is deeply temporal. It involves attention to what lies beneath, within, or beyond—what is passing through—the momentary present or current state. Listening dissolves the earth as brute fact by signifying something more or greater or yet to be. *The ear is a womb*. Let this metaphor sit uncomfortably in our minds for the time being.

Newton's *Philosophiae Naturalis Principia Mathematica* is said to unite heaven and earth in a calculus of difference. Let us take this as the ground for our exploration. The limiting form of the differential operator in Newton's theory becomes, for Peirce, a sign of the infinite as *infinitesimal*. Like "infinity", the infinitesimal is a tricky (non)-concept that perches on the edge of signification. Modern analysis, which provides the formal mathematical basis for differential calculus, involves the use of infinite series to limit, contain or perhaps even exclude the infinitesimal. Peirce questions the way modern analysis circumvents the infinitesimal [Herron 1977] through the use of convergent, infinite series whose limits are never reached: "... the doctrine of limits has been invented to evade the difficulty, or, as some say, to explain the significance of the word 'infinitesimal'" [Law of Mind, 537]. He is particularly critical of formal approaches to differential calculus (and the related treatment of limits or boundaries) in which the infinitesimal becomes void—an excluded middle or symmetric cut that is assumed to define the relationship of proximity between Real numbers or points on a line, for example. With these approaches, each number or *point* is absolutely differentiated from its neighbour in the way that individual members in a class are separated from one another. But the cut itself, which is the limit where one number or point merges into its neighbour, is excluded. Peirce claims that this is a false conception of continuity because *a continuum contains its limits* [Law of Mind, 544]. The absolute cut of analysis is a binary operation that results in a symmetric

2. Light signifying form

relationship between the two sides of the cut. Peirce questions whether this symmetry actually obtains, even for Real numbers.

Instead, Peirce argues for a different conception of continuity which he calls *synechism*. Unlike the continuum of modern analysis in which each element or member—each part—is a separate individual, in Peirce's continuum the individual parts blur into one another such that they do not have completely separate identity. He takes the flow of time as an archetype in which each moment flows out of a past moment and into a future moment. Whereas analysis assumes, as its ground, the independent identity of foundational elements (points in time, for example), Peirce argues that the identity of any part must derive from the whole to which it belongs. To introduce his concept of continuity, he turns his attention to the infinitesimal which he treats as an *interval*. For Peirce, however, the formal structure of the infinitesimal interval is *triadic*, containing a beginning, middle and end (in contrast to the *binary* cut of modern analysis and the *unitary* form of the point). And unlike modern analysis, successive intervals overlap such that the beginning of the next is the middle of the former and the middle of the next is the end of the former. The overlap, or redundancy, is what enables the finite objectivity of the world. However, this objectivity is a *mediated* process which always involves an interpreter. As we will explore further in the paper, Peirce's infinitesimal results in the formation of finite, "whole" images within a diffuse background of potentiality. The mediation is intentional and based on a process of abstraction involving inferential relatedness (eg inferential comparison) and pattern recognition.

For Peirce, all objects or bodies can be considered interpreters in some sense. For example, an electron might be considered an interpreter of quantum spin. To say that all bodies can be considered interpreters means that they possess an *interiority* that is in a mediated relationship with the world. However, this way of speaking can also be misleading because the classical concept of a body as a separable "object" does not hold in Peirce's approach. In a sense, Peirce's infinitesimal is a formal property of interiority that grounds, exteriorizes, *spatializes time*.

There is also an inherent uncertainty principle or randomness with Peirce's concept of continuity which he calls *tychism*. Tychism is a property of "being-with" that conditions relatedness. The indeterminate, resonant structure of the quantum vacuum might be taken as an example. In a sense, tychism is a formal property of external localization or extension that animates, interiorizes, *temporalizes space*. Peirce critiques a classical conception of space as an empty, inert container for the localization of properties or qualities. According to Peirce, no quality can be unambiguously given or assigned to all "points" in a spatial domain. By way of illustration, he considers the example of a surface that is part red and part blue "so that every point on it is either red or blue, and, of course, no part can be both red and blue." "What, then," he asks, "is the colour of the boundary between the red and the blue?" [*Law of Mind*, 545]. Peirce concludes that the quality of colour cannot be assigned to an isolated point; rather, it is spread over the immediate neighbourhood of a point. Within extended domains of red or blue, this is not particularly problematic because the neighbourhoods of all points have the

2. Light signifying form

same quality. However, the boundary itself is half red and half blue. It is as if points on the boundary have an indeterminate potential to be either red or blue. Peirce likens this ambivalent boundary to the nature of the temporal present, which is half past and half to come. The ambivalent, ambiguous, indeterminate nature of the boundary is an opening to interiority. In the simple example of trying to assign a binary quality to points on a surface, Peirce encounters the boundary as the potential for quality. It is an interior state of indeterminacy, but more than that the boundary is a window into a prior potentiality for quality (i.e. red and blue) which has been actualized by the spatial domains. Peirce calls this opening into an interior state *feeling*, although in this context feeling does not refer to emotion but rather to a holistic inner state that may obtain for any interpreting entity from photons to persons. Perhaps a less anthropocentric term would be *intentionality*.

The analytical notion that properties can be assigned to null, yet separate, Euclidean points of a spatial domain does not hold for Peirce. Instead, it would seem that space is always constituted by open domains whose interiorities resonantly interact with one another. The nature of the interaction depends, in part, on the scale. Space becomes an enabler of “objects” or bodies of varying degrees of complexity (such as electrons or organisms) which evolve in relationship with one another. Unlike the featureless inertness of the Euclidean point, the open kernel of spatial domains involves an inherent randomness or animation which is partly a consequence of the inseparability of “objects” or bodies. Randomness or tychism is a background quality of potentiality through which bodies are opened up to a mediated interiority or *responsivity*. For example, we might speculate that a massive body, conceptualized as a spatially localized entity, will always possess a resonant interior which is a consequence of its essential identity with and responsivity to other massive bodies. This is the way in which properties, like mass, might be embodied in space and time within Peirce’s metaphysical framework.

Euclidean geometry, which is based on equality or *sameness* of all points, cannot accommodate ambiguous interiority or responsivity. In Euclidean geometry and its related differential calculus, the boundary is null or void—an excluded middle—and the infinitesimally extended domain or point is featureless or empty, lacking any potentiality. For Peirce, these assumptions involve a false image of relatedness. Since Newtonian physics is founded on a differential calculus of Euclidean geometry for both space and time, it results in a false determinism (or fatalism) which is void of novelty, creativity and, what Peirce calls, *mind*.

Peirce takes mathematical form as metaphor for metaphysical form. In *The Architecture of Theories*, he writes “metaphysics has always been the ape of mathematics” [p174]. In that paper he uses projective geometry—in which an “infinite” space is mapped back onto itself—to critique a crucial metaphysical conjecture that can be located in the formalism of Euclidean geometry (i.e. projective parabolic geometry)¹. This conjecture privileges sameness and subverts inequality or otherness. The critique involves a comparison of the symmetry

¹ For further discussion, See Raposa [1989].

2. Light signifying form

properties of parabolic (Euclidean) geometry versus hyperbolic geometry² under projective transformations and then using this comparison as a figure or trope for understanding the limitations of the Newtonian or deterministic worldview. Roughly stated, Peirce contrasts a metaphysics of strings and points within an inert continuum (Euclidean or parabolic geometry) with a metaphysics of open domains and relationally mediated growth formed from an indeterminate continuum of potentiality (hyperbolic geometry).

More specifically, in projective parabolic geometry, infinitely distant parts of any plane seen in perspective appear as a straight line or string. “Points”, which form the *analytic foundation* of Euclidean worlds, mark the ends or limits of a straight line. If a straight line extends to infinity in both directions, the end points (under projection) coincide as a *single* fixed point, called the Absolute. This coincidence is one way of understanding the translational symmetry of space. However, such a formalism cannot support *asymmetry* which Peirce claims is a key property of time. In hyperbolic geometry, by contrast, the Absolute remains two distinct entities under projection—an alpha and an omega. Asymmetry is built into hyperbolic geometry such that the universe can be said to spring from a chaos in the infinitely distant past to tend toward *something different* in the infinitely distant future.

Additionally, in hyperbolic geometry, “the infinitely distant parts of any plane seen in perspective appear as a circle, beyond which all is blackness”³ [Peirce, *Architecture of Theories*, 173]. The circle, which returns upon itself to form a mediating boundary for interior and exterior, is a central trope of Peirce’s theory that will be explored in this paper. Based on his metaphysical insights, Peirce speculates that the world in which we live is hyperbolic and not parabolic (Euclidean). This speculation predates the development of relativity theory (which is based on hyperbolic geometry) and his metaphysical insights may still have an important role to play in the interpretation of relativity theory.

The theoretical form to be explored in this paper, which is guided by Peirce’s writing and its interpreters, might be roughly introduced as follows. “Bodies”—be they electrons or biological organisms or persons—come into being or *emerge* through a process of mediation. Bodies possess *interiority* which involves an open process of synchronization with the exterior world through which a response or future path can be “selected” from a set of possible paths. Interiority involves *indeterminacy* or randomness or “freedom” as a key constitutive element. However, this indeterminacy is conditioned by a structural framework which is formed in time and is indexed to a particular “present state” of the body. The structural framework forms a *system* that constrains the relationship between particular bodies of the same kind (a whole) such that bodies follow spatio-temporal paths governed by general laws or *habits*. The laws are stochastic in nature which is to say that they possess inherent randomness and uncertainty.

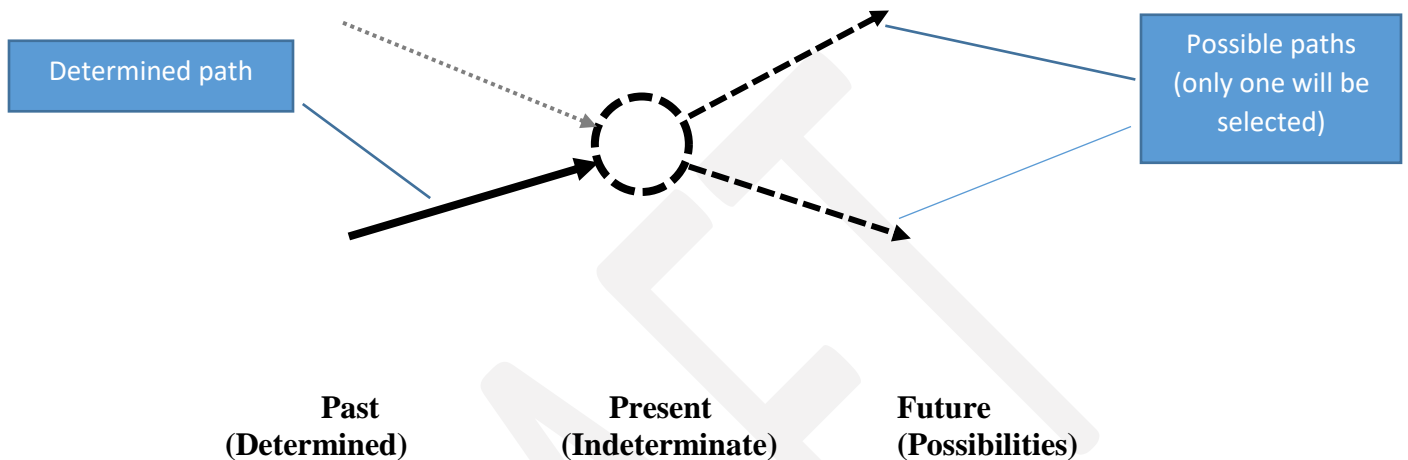
² Hyperbolic geometry is the geometry of Einstein’s theory of relativity, although Peirce’s article predates Einstein’s work. Peirce also considers the third possibility of elliptical geometry which will not be discussed here.

³ A trope that perhaps is not unlike a black hole.

2. Light signifying form

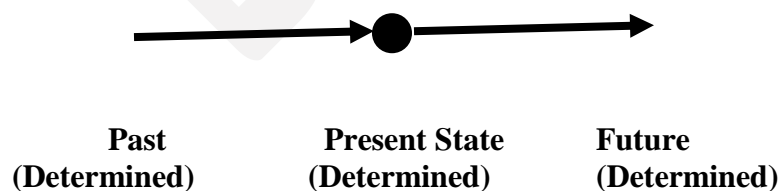
The structural framework of general laws or habits limits the future possibilities or paths *for a particular body at a particular time* according to past determinations as illustrated in figure 1.

Figure 1: Temporally embedded nature of “bodies” in Peirce’s metaphysical framework⁴



This form of temporality can be contrasted with the mechanistic determination that characterizes Newtonian physics as shown in figure 2. In the Newtonian framework, the “present state” is ultimately reducible to a “null point”, effectively erasing all trace of interiority, creativity and freedom.

Figure 2: “Timeless” nature of mechanistic determination in Newtonian physics



⁴ It should be noted that in this figurative treatment of time I have also partly borrowed from Wallace’s formal logic of future contingents [Wallace, 2011].

2. Light signifying form

Bodies are formed by systems and systems are constituted by bodies. This is a progressive, evolutionary process that is mediated by “communication” or the flow of information. Bodies may grow in complexity over time and higher order systems may emerge from lower order systems. Systems are ordered hierarchically such that the bodies at one level of order are formed into wholes which constitute the bodies of the next level. (For example, single cells at one level form into multicellular organisms at the next level of the hierarchy). Through this process there is a deepening of interior responsiveness and an expansion of capacity to process information from the external world to inform responses or re-actions.

The elementary formal unit for this theory is the *sign*. A sign involves an irreducibly threefold relation in which a *sign* (as a vehicle for representation) stands for an *object* to which a response may be made by an *interpretant*. Bodies are formed through signs. (This statement may seem counterintuitive at first—see section 3 for further discussion.) Bodies of an identical type form degenerate systems or groups. However, the constituents of a group are not individuated to the extent that members of a class would be (in the mathematical theory of classes, for example.) Bodies constituting a group obtain individual identity through a resonant relatedness with one another. A body cannot be fully abstracted as a separately enduring Self⁵.

How are we to think about this formalism? A carefully chosen image, like a map, might be helpful. In this regard, the form of metaphysics to be explored in this paper is like the form of music, particularly as described by Zuckerkandl [1973]. Bodies are tones. But music is not made of tones in the way a house is made of bricks. Rather, each tone is a momentary locus, incomplete in itself, yet anticipating the whole to which it belongs. Music occurs not through the analytical stepping from one tone to another, but in the spontaneous dancing through intervals between tones. Music is a *system*.

A system in which the whole is present and operative in each individual locus, in which each individual locus knows, so to speak, its position in the whole, its relation to a centre, must be called a dynamic system. The dynamic qualities of tone can only be understood as manifestations of an orderly action of forces within a given system. The tones of our tonal system are events in a dynamical field, and each tone, as it sounds, gives expression to the exact constellation of force present at the point in the field at which

⁵ Although “bodies” are like objects in many respects, they lack self-contained identity. Rather the identity of a body comes from intentionality which involves mediation between interior and exterior. This is what makes Peirce’s concept of spatiality radically different from Newton’s concept. The featureless “point” is the Newtonian image of self-contained identity. For Peirce, the image of the point is a false image of the absolute.

2. Light signifying form

the tone is situated. Musical tones are conveyors of forces. Hearing music means 'hearing an action of forces' [Zuckerandl 1973, 36].

The rest of this paper involves an exploration of the *irreducibly threefold* or “triadic” form of Peirce’s metaphysical framework. Please bear in mind, however, that my prejudice is that the triadic form is greater than Peirce’s treatment⁶ and so, inevitably, other triadic formalisms are mixed into my interpretation of Peirce, including those of Levinas [2002], Hegel [1977], and, especially, Augustine [2012].

Second Movement: The triadic form of gifting

Why is there something rather than nothing? Guided by Peirce, our exploration of differential calculus and Euclidean geometry seems to lead us into the void. Null points joined by null connectors to form an inert, empty space of nothingness. We might call this an *ontology of the same* because it is based on the assumption that all points (in space and time) are equal; it subverts or excludes Otherness⁷. This is not just a mathematical pre-miss, it is also a metaphysical presumption. For example, Newtonian metaphysics begins with the elimination of the Otherness of heaven in relation to earth. The Same, to which all becomes related, is taken as the measure of the observer. This assumption of universal sameness seems to have led us to a false image of unity (for example, a false image of the unity of the Absolute). Much of twentieth century continental philosophy is a critique of an ontology of the same. Although we will not explore this critique here, Levinas would be a good guide for such a journey.

There are two key insights that might help us move forward. The first comes from Aristotle. If we reflect on the things we find in the world, we might notice that they are organized in a hierarchy where species come from genera at increasingly higher levels of inclusiveness. For example, beagle from dog and dog from mammal and mammal from animal. Suppose, following this trail, we attempt to ascend to the highest genus or category, which we might call “being” or “essence”. What Aristotle and others have argued [see for example, Somers-Hall 2012] is that, if we want to speak about the substance of reality at the highest, simplest or most original level as a genus or category—that is to say, if we want to ask what reality is made of or what it consists of; if we want to question the nature of “being” or “essence”—then will be confronted with a paradox. The paradox occurs because the highest genus or category cannot be a unity, it must be heterogeneous in order for the hierarchy to be differentiated. The highest category must include both identity and difference in order for our world to be differentiated into a variety of things. Unity, or the One, is not a thing among things and cannot be categorized as such⁸. Unity is like pure potential that is beyond conceptualization. One

⁶ For further discussion, see *Three reflections on return: convergence of form with regard to light, life and word*.

⁷ For further discussion of the ontology of the same in Newtonian metaphysics, see *The proximity of light: a deconstruction of space*.

⁸ For further discussion, see *Beyond space and time: unity and form in Augustine’s Confessions*.

2. Light signifying form

consequence of this is that we cannot define, describe, or contain unity, we can only speak *about* it and only indirectly at that.

The second insight comes from Augustine⁹. It is simply this: *nothing is not something*. What is challenging about the statement is that it appears to tell us something about nothing. This is misleading. The word “nothing” is not really a word like other words because *its referent does not exist*. Augustine says that what is really meant by the word “nothing” can be likened to a state of mind which seeks out something but fails to find it. This negating is purely temporal and implicitly binary. The problem with our exploration of mathematics so far is that we have rested on nothing as if it were something.

The continual process of putting forward a conception of the One and then negating that conception in order to move beyond its limitations is a traditional path of contemplation called *via negativa*. It may lead to a personal experience of enlightenment but, because the outcome is pure experience, it cannot be explicated or taught or systematized. Any attempt to conceptualize unity—as being or essence for example—puts forward something which must then be negated in order to stay the course towards unity. The movement itself eludes our understanding. “Dimly we apprehend this double movement—that turning away from the primal ground by virtue of which the universe preserves itself in its becoming, and that turning toward the primal ground by virtue of which the universe redeems itself in its being ... our knowledge of duality is reduced to silence by the paradox of the primal mystery” [Buber 1970, 149].

These two insights suggest that a philosophical understanding of reality cannot be grounded in a single category—such as being—as some analytical thinkers might expect, nor can it be held fast in duality—such as *différance*—which is always deconstructing what is posited. Our reflection on these insights seems to lead us to three and to Peirce’s metaphysics.

Peirce’s theory is not foundational. He proposes three interwoven categories, called Firstness, Secondness and Thirdness. These categories animate and sustain a continuous evolutionary process that takes the form of growth or progressive *learning*. The process is both hierarchical (spatial) and emergent (temporal), such that higher levels of complexity are forged from lower levels. Each progressive level involves more intricate bodily forms with deeper interiority that grows in responsiveness and intentionality. The process is mediated by signs which also have a triadic structure.

Peirce’s three categories are not fully individuated nor mutually exclusive. They flow in and through one another. They are not further reducible (for example, to a combination of unitary

⁹ For a discussion of Augustine’s treatment of “nothing”, see *Beyond space and time: unity and form in Augustine’s Confessions*.

2. Light signifying form

and/or binary categories). However, Peirce claims that any additional categories (for example, four or five categories) are reducible to three¹⁰.

Because the three categories are not reducible, they cannot be individually defined *per se*. They relate as a whole such that their identities and their differences are brought into play at the same time. The more we speak about and work with the categories, the more clearly they might come into view¹¹:

- *Firstness* is “that whose being is simply in itself, not referring to anything nor lying behind anything” [Peirce, *A Guess at the Riddle*, 248]. It is potential that is not yet actual—pure indeterminacy that is dynamic and self-othering. Firstness only appears in and through Secondness and Thirdness. It is fresh, spontaneous, whole. Peirce often refers to firstness as *quality*.
- *Secondness* is “that which is what it is by force of something to which it is second” [Peirce, *A Guess at the Riddle*, 248]. It is event, effect, otherness, compulsion. Secondness is constituted by things and facts which interact dyadically [Corrington 1993]. It is the domain of pure *experience* or “brute actuality”.
- *Thirdness* is “that which is what it is owing to things between which it mediates and which it brings into relation to each other” [Peirce, *A Guess at the Riddle*, 248]. It is mediation, laws and habits, *generality*. The Third connects the First and the Second and weaves “a fabric of concrete reasonableness in and through the world” [Corrington 1993]. The Third relates “things” to generalized “systems” from which Firstness re-emerges.

According to Raposa [1989], the forming logic of Peirce’s three categories is like the irreducible triadic form of giving a gift or *gifting*. In the semantic structure: *A gives C to B*, relation can range over the three members of the triad as well as over different instances or sets of ordered triads. That is to say, there is a formal relationship of *interiority* between A, B and C, as well as a formal relationship of *exteriority* in the generalization of the instances of the fixed structure of A, B and C. Raposa contrasts the logic of gifting with the classical logic of exchange or equality which involves a binary semantical form: *A is B*. Interior and exterior are not differentiable with this latter form. Whereas the binary form operates through the concept of *classes*, Peirce’s threefold logic operates through *systems*.

With binary or classical logic, individuals are members of a class (or set) which is, in some sense, eternally and simultaneously present as the collection of all members (i.e. it is *spatialized*, to use the terminology of geometry, or it is *totalized* to use Levinas’ terminology of ontology). The class constitutes the general from the particular individual members. Induction in classical logic involves sampling individual members to infer general properties of the whole class. Generality

¹⁰ The special status of three might be like the special status of triangles in Euclidean geometry to which all other polygons can be reduced.

¹¹ For a slightly different take on this formal triadic form, see *Beyond space and time: unity and form in Augustine’s Confessions*.

2. Light signifying form

is deterministic, fixed, fatalistic, without freedom or choice. With triadic or systemical logic, generality is constituted in space and time from the system of relations of individuals (both interior and exterior). The development of systemical logic involves sampling of fragments of a system to infer the complete system. This *process* involves a combination of abduction (abstracting a finite body as a whole through “recognition” or “guessing”), induction (inference from particular instances to the general case) and deduction (a law-like process of testing inferences and guesses against experience). Systemical logic results in generality as a possibility that is conditioned by intentionality and habit (or repetition).

Raposa [1989] calls systemical logic the logic of relatives. Classical logic can be seen as a degenerate form of systemical logic in which the totality of the system (i.e. as class) is given simultaneously or “totalized” all-at-once (eg. Structuralism). Classical logic is the logic of similitude in which members have a special relationship of identity [De Magalhaes, 1984]. The more expansive form of systemical logic is able to deal with systems that are not simultaneously synchronized, such as those encountered in the theory of relativity¹². For such systems, members are not individuals in the classical sense—they are not completely distinguishable and their manifestation might be more aptly compared to the process of individuation encountered in quantum mechanics¹³. Systems are contingent, temporal, future-directed, emergent and compelled by final causes¹⁴.

Third Movement: A theory of signs

The formal basis of Peirce’s theory is the *sign*. Unlike the binary relationship between signifier and signified that characterizes many theories of signs, for Peirce a sign is triadic in form. The three elements of a sign are: the *sign-vehicle* (also called representamen or simply “sign”) which stands for an *object* to which a response may be made by an *interpretant* [Robinson 2010]. The sign-vehicle does not signify anything in itself. Rather it is able to signify because it is affected or determined in some way by the object and, in turn, it is able to affect the interpretant. The interpretant is a change of state that allows the sign to mediate between the object and an interpreting entity. Often the interpretant will be a change in an interior state of an interpreting entity. For example, it may be an “image” or “thought” in someone’s mind (i.e. what is signified to someone by the sign). However, the interpreting entity need not be a person, it could be any object or body whose state may be changed in response to the sign

¹² Newton’s concept of “Absolute Space” (i.e. Euclidean geometry) might be seen as an example of a degenerate system that is simultaneous or totalized. Einstein’s theory of relativity, by contrast, takes light as a sign of the absolute through which synchronization happens as a process. For further discussion, see *The proximity of light: a deconstruction of space*.

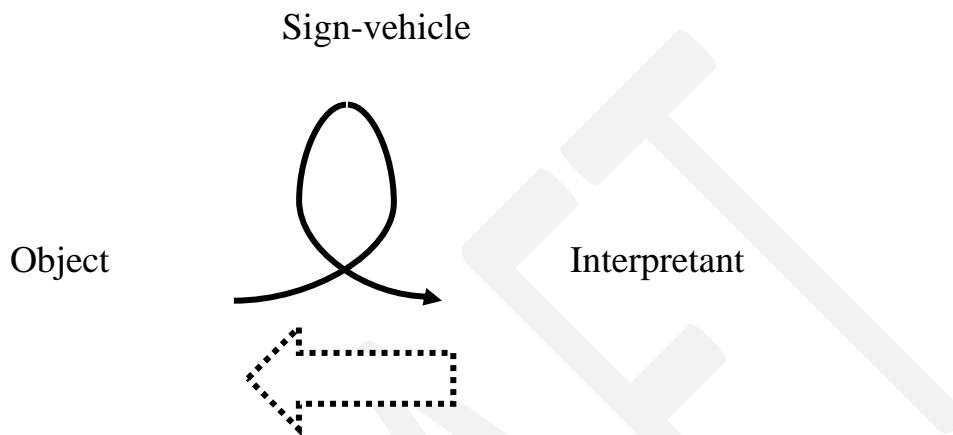
¹³ For further discussion, see *A Physicist’s guide to [Hegel’s] Phenomenology of Spirit: resonance, disambiguation and the genesis of spatial orientation*.

¹⁴ For further discussion, see *Towards the case against reductionist theories of evolution*.

2. Light signifying form

(such as an electron or an amoeba). The triadic form of a sign is shown diagrammatically in figure 3. The sign-vehicle mediates a relationship between the object and the interpretant (represented by the loop in figure 3) such that the interpretant may directly refer back to or represent the object (represented by the dotted arrow).

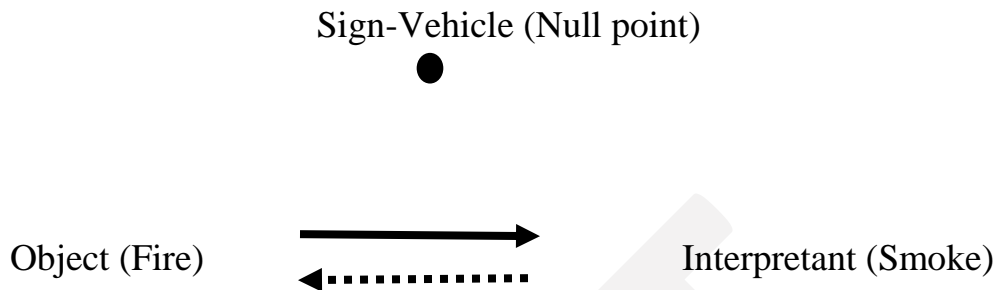
Figure 3: Triadic Form of a Sign



Through the sign, the relationship between the object and the interpretant is *asymmetrical*. The sign-vehicle mediates (forward) a relationship between object and interpretant which then allows for a direct representational connection (backward) between interpretant and object. An interpretant may then serve as a sign for another interpretant and this process may continue indefinitely. Herein lies Peirce's notion of the continuum—the triadic form of the sign is similar to the triadic form of the infinitesimal discussed earlier.

Before going on to explore the formal properties of the sign, it might be helpful to pause and reflect on how this form is related to the binary forms of classical logic and Newtonian mechanics. To that end, suppose there is a deterministic causal connection between the object and the interpretant. Then the change of state for the interpretant is caused by the object *directly*. For example, smoke is caused by fire. In this instance, the sign-vehicle might be taken as null and the relationship might be seen as symmetric as shown in figure 4.

Figure 4: Determinism Reduces the Sign-Vehicle to a Null Point



A purely symmetric relationship between cause and effect cuts off the sign-vehicle and, therefore, eliminates the possibility of a semantical relationship of meaning. That smoke refers to fire becomes purely tautological in a deterministic world. Such a world cannot support interiority, freedom, novelty or change¹⁵. It also cannot support information, meaning or language¹⁶. The triadic form of the sign, however, opens up to the extra-ordinary event of possibility, significance and truth.

3.1 Creativity

The sign is *creative*. Creativity is related to firstness. Through the sign, objects are abstracted or foregrounded as finite entities from a diffuse background. Abstraction is a process which involves repetition, reflection, or comparison and the objects are abstracted *for* an interpreting entity. Peirce calls the type of sign that characterizes this process an *icon*. Icons refer through *likeness*: the sign resembles its referent object in some qualitative way. Iconicity is the forebear of information, images and concepts.

In human language, the creativity of the sign may be most apparent through the poetry—figurative language that works in the realm of images and concepts, for example. For illustrative purposes, consider the following thought experiment. Let's take "red" as an example of a simple concept and ask how it might come to have meaning for us. In its earliest inklings, the concept of red is embedded in the world as the possibility of quality—the particular *suchness* of

¹⁵ For further discussion, see Wallace, *Richard Taylor's 'Fatalism' and the Semantics of Physical Modality*.

¹⁶ For further discussion, see *Is Dretske's theory of information naturalistically grounded? How emergent communication channels reference an abstracted ontic framework*.

2. Light signifying form

that red apple on the tree. The redness can be foregrounded by the use of metaphor—*that apple is the setting sun*. The key property of metaphors is that they “contain the whisper *it is and it is not*” [Robinson 2010, 143]. This whisper is an echo of the double movement we encountered earlier in our discussion of negation. The apple *is* the setting sun (in some sense) and the apple *is not* the setting sun (in another sense). The tension or paradox between the “*is*” and the “*is not*” in the metaphor is a Second which is archetypal for icons. (Notice that a Third is also brought into play as the interpreter who is called to discover the sense.) The image of the red apple might now be used as iconic for other embedded instances of redness. This process will allow *redness* to begin to emerge as a distinct quality that appears repeatedly in the world. The process of abstraction is completed in the *naming* of this quality as “Red”. Once named, “red” can be defined as a concept. This simple thought experiment suggests that the abstract concept— what is meant by the term “red”—might emerge organically from a diffuse background of feeling through the use of iconic images as signs¹⁷.

The creativity of the sign form, however, is not limited to human language. Biological organisms can also be understood as sign-interpreting processes. (This theoretical framework is called *Biosemiotics* and the primary unit of biosemiotic research is signs, rather than molecules or a cells [Emmeche 2011; Kull 2011]).

Consider a single-celled amoeba as an example of a sign-interpreting body. The inner state of the amoeba is a potential *interpretant* that can respond to impinging forces from its environment. The impinging forces from the environment might be thought of as a diffuse background of random fluctuations for the amoeba that are reflected in an interior state of the amoeba that might be formally similar to Peirce’s notion of “feeling” (although this need not imply sensation, emotion, awareness or any other higher-order inner state.) However, despite the randomness of the environment, it may be possible for the amoeba’s inner state to synchronize with other “bodies” in the environment if there is a “communication channel” between the external body and the amoeba. The communication channel might be any causal pathway that causes a change of interior state in the amoeba as a result the exterior body. Based on Shannon’s theory of information flow, the communication channel can establish a spatio-temporal scale of “coarse graining” or digitalization such that the interior state of the amoeba re-presents information about the state of the exterior body¹⁸. The communication channel is like a resonant structure through which a (whole) pattern can be transmitted and “recognized”. The spatio-temporal scale of the pattern depends on the inter-relation between exterior body (transmitter), interpreter (receiver) and pathway of information flow (channel). In this way the exterior body may become a sign for the amoeba who may become an interpreter.

¹⁷ For an exploration of this creative process, see *Danse sur glace: an experiment in language*.

¹⁸ For a discussion of this process of abstraction and its relationship to communications theory, *Is Dretske’s Theory of Information Naturalistically Grounded? How emergent communication channels reference an abstracted ontic framework?*

2. Light signifying form

The amoeba *represents* the external body as an interior state or “image” such that the interpretant emerges from a vague, diffuse background.

However, in order for the amoeba to be an interpreting entity, two other conditions must also be met as discussed by Robinson [2010]. First, the external body must have a purpose *for the amoeba*, such as food or energy. It is this intentionality that generalizes particular interpretants to a category that *makes sense* to the amoeba. Second, not all external bodies to which the amoeba responds can serve the purpose. For example, if the purpose was food or energy, and the amoeba only responded to external bodies that served this purpose, then it would actually be a deterministic relationship rather than an interpretive one. For the inner state or interpretant to be a *sign* of food, it must be possible that sometimes the inner state obtains when the external body is not food. In other words, the external bodies to which the amoeba responds are sometimes food and sometimes not food. Again we encounter the mysterious whisper *it is and it is not*. Negation, which in this case might be called error, opens up for the amoeba the possibility of *learning* as the process for selecting true representations.

Ollner [2010] has coined the term True Narrative Representations or TNRs to characterize representations which correspond with the external world and to differentiate them from noise or error. TNRs might be related to the concept of error-free signal transmission in communications theory¹⁹. Ollner has argued that TNRs are unique in their logical properties and that they optimize the principle of “least effort by which a dynamically well-fitted representation is to be preferred over one that does not fit so well” [Ollner, 2010, p641]. In an evolutionary theory²⁰, it might be expected that TNRs would be selected because of their fitness. Creativity and abstraction might be seen as guided by truth.

3.2 Responsivity

The sign is *responsive*. Responsivity is related to secondness. Through the sign, abstracted bodies are brought into relation with one another and collectively they constitute a worldview. Responsivity is a process that involves action and reaction. It is the domain of *experience*. Peirce calls the type of sign that characterizes direct experiential encounter an *index*. Indices refer by a direct connection between the sign-vehicle and the object. This direct connection is governed by some form of law. For example, smoke can be taken as an index for fire because there is a causal law between fire and smoke. An index directly points to its object as significant or meaningful.

¹⁹ For a discussion of this context for error and uncertainty in communication theory, see *Is Dretske's Theory of Information Naturalistically Grounded? How emergent communication channels reference an abstracted ontic framework?*

²⁰ For further exploration of the relation between evolution and semiotics, see *Towards the Case Against Reductionist Theories of Evolution*.

2. Light signifying form

In human language, the archetypal index is a *name*. The name is a *direct pointer*²¹ that forces attention on a particular object intended [De Magalhaes, 1984]. A name may point to a physical body or sensory constellation, such as that white horse in the field by the barn. It may also point to a mental image, such as the memory of the white horse or an imaginary white horse. Through repetition, the name becomes an identity operator for the interpreter that maps a single sign to multiple object-interpretant instances. In this way, an abstract concept can be formed as the intended unity among the instances. For example, “horse” may point to a particular horse as an object immediately present to the interpreter (a proper name). Through repetition, it may also point to different individual members of a group of horses such that the unifying object becomes the interior quality or image that is similar to all instances. The name can then point to that image—for example, it can point to an imaginary horse as an invoked memory of the quality or image. Thus a name may bring a multiplicity of sensory and imaginative images into relationship as a single intended mental (i.e. interior) object—the *concept* of horse. The capacity of signs to abstract concepts for an interpreter obtains because an interpretant can itself be a sign for another interpretant.

The name *points* but in itself it does not define its object. With physical objects like horses, the connection between the sign and its object may be immediately present to the interpreter because the physical body can be defined independently of the name, through interaction with a horse (such as touching, riding, feeding etc.). However, for general terms, like “red”, the connection between the sign and the object may only come fully into view through other signs. In our earlier thought experiment, metaphor opened up the possibility for the concept red and provided an indication of its sense. The name “red” provided an identity operator through which conceptual meaning could be formed progressively, although vaguely. However, the concept red only becomes defined as a concept when it is brought into relationship with other concepts. For example, a definition of red might include: red is a *colour*; and red is not *blue*. This process differentiates the ambiguous “is and is not” reference of metaphor into the logic of an excluded middle: “is” or “is not”. The grammatical form of the proposition is the fundamental relational unit for conceptual definition and propositions form logical structures of law-like relatedness called classical logic.

Yet this picture of conceptual definition through logical structures cannot tell the full story. Conceptual definitions cannot be grounded in a single, coherent logical structure because if we take the structure of law-like relations between the terms of a language as the sole source of

²¹ The “law” of the name is that it is a direct pointer. The personal discovery of this “law” is brilliantly described by the deafblind woman Helen Keller in her autobiography *The Story of My Life* <http://digital.library.upenn.edu/women/keller/life/life.html>

2. Light signifying form

meaning for concepts then we encounter a paradox²². Suppose, for example, we take the structure of all (true) propositions to be the totality of what defines the set of all concepts. Then we are confronted by an infinite regress of signification because each term only signifies other terms which, in turn, signify more terms. How could any concept come to have its own, non-arbitrary meaning? How can concepts refer to a world outside of concepts? Notice that this is really the supposition of the excluded middle which we encountered earlier in our exploration—it is the assumption that concepts form a classical set. In part, Peirce's triadic form of the sign overcomes this impasse by allowing for the poetic working of language (through the ambiguous metaphor, for example) to burst through this assumed structure of propositional "calculus"²³. Concepts remain open and responsive to poetic resonance as immediate experience of the world (firstness).

There is another important way in which concepts remain open and responsive. This responsivity arises because terms, as indexical signs, are used by *communities* of interpreters. What the term "red" comes to signify depends on the collective way in which the term is used over time. For example, the way that I use the term "red" may influence how you use that term. The meaning of a term—the concept—is negotiated *between* speakers and does not belong to any individual speaker as a completed or fixed totality. (This collective aspect of concepts may seem unimportant with a concrete concept like "red" but it may become very important with social concepts like "justice" or "homosexual".) Terms, as signs of concepts, draw speakers into mutual relationship. The fact that concepts are relational is what allows for the possibility of education and, ultimately, the possibility of mutual understanding²⁴. As Levinas points out, the process of concept formation is an irreducibly three-person process [2002]. Alone²⁵, an individual could not parse abstract concepts from the world because there would be nothing to *fix* them as definite entities. Furthermore, two cannot resolve the issue of disagreement which is necessary to define the precise boundary where one concept ends and another begins (for example, when does "red" become "orange"). The third party brings the constitutional possibility of judgement [Levinas 2002]. The third party can adjudicate or decide the impasse of disagreement among two. In human language, this three-person form is reflected in the first person perspective ("I" or "we" which partakes in firstness), the second person perspective ("you" which partakes in secondness) and the third person or general perspective ("they" which partakes in thirdness).

²² Goedel's First Incompleteness Theorem is an example of this paradox as it relates to the law-like logic of number theory: see *Identity and Paradox in Habermas' Approach to Critical Reflection: Metaphor as necessary other to rational discourse*.

²³ For further exploration, see *Danse sur glace: an experiment in language*.

²⁴ For further exploration of the way in which language is communal and relational, see *Identity and Paradox in Habermas' Approach to Critical Reflection: Metaphor as necessary other to rational discourse*.

²⁵ Here I am not speaking about particular individuals, but rather a constitutional possibility. Adam could name the animals because God brought them to him; he could name himself because of Eve who was taken out of Man.

2. Light signifying form

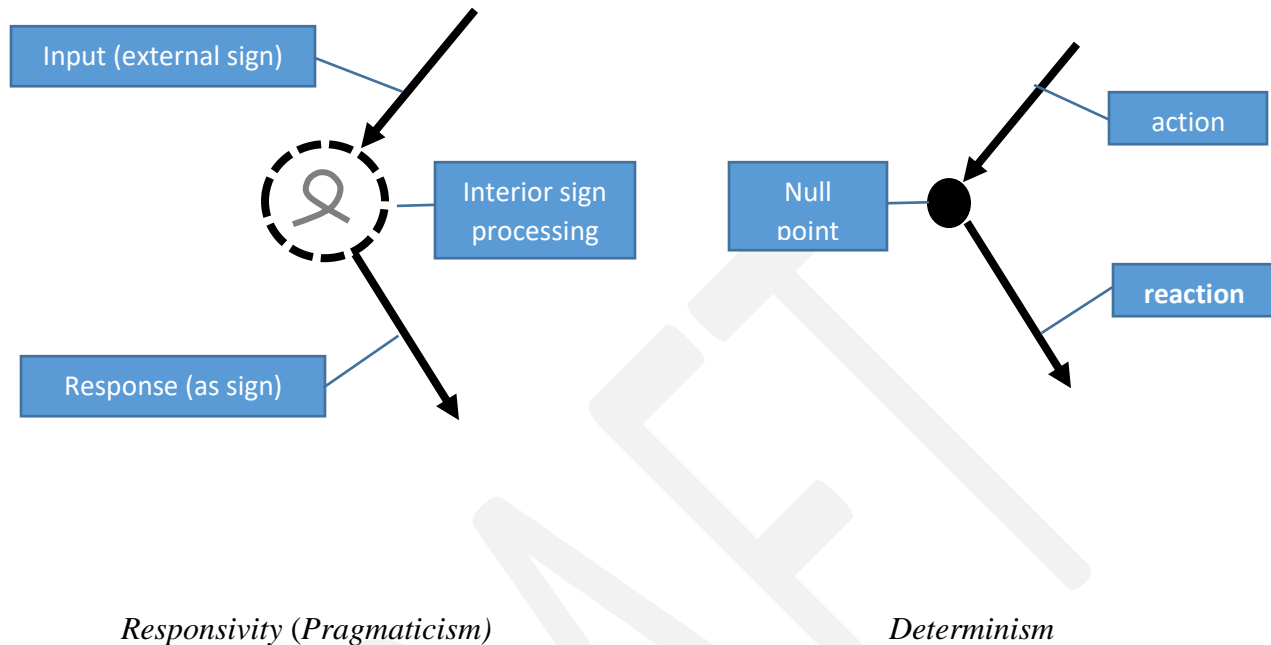
In Peirce's theoretical framework, a community develops or works out the meaning of a concept as an evolutionary process over time. This process might be guided by true narrative reports and tends toward the "ultimate logical interpretant" that is a *future* state of collective agreement. Peirce's theory might be seen to mediate between nominalism and realism. The term, as sign, mediates between an initial image (recall the metaphorical abstraction) and a final "ultimate logical interpretant" or *notion* through temporal repetition. Peirce's formal treatment of the sign is similar to Augustine's discussion of how a mental image is drawn to the notion through the word [Augustine 2012]. However, Augustine further provides an important critique of the assumption, implicit in Peirce's theoretical framework, that this process is purely temporal and that time is redemptive²⁶.

The responsivity of signs is not limited to human actors. Returning to the example of the single-celled amoeba, we might recognize that an individual amoeba is brought into relationship with other amoebas through signs. Recall that an individual amoeba can become an interpreter of external bodies as a result of communication channels. The interpretant is a change in inner state of the amoeba. But this interpretant may then become a sign for a succession of interpretants as changes in inner state of the amoeba, for example through interactions in a chemical pathway. As a result, the individual amoeba might *internally process* the original sign. Within Peirce's theoretical framework, interior processing of an exterior sign may involve spontaneous aspects of firstness (called abduction), comparative aspects of secondness (called induction) and law-like aspects of thirdness (called deduction). As a result of the interior processing of the external sign, the amoeba will respond in some form of action that impinges back on the exterior world (it may move in a particular way, for example, or it may express a particular chemical on its surface). After processing the original sign, the response or *action* of the amoeba can then serve as the object of a sign for another amoeba. That is to say, one amoeba can interpret the action of another amoeba. This form of interpretation Peirce calls pragmatism. The "meaning" of the sign for the amoeba rests in the action that it elicits. Figure 5 represents the responsive processing of signs and compares this process to mechanistic determinism.

²⁶ For further discussion, see *Beyond Space and Time: Unity and Form in Augustine's Confessions*.

2. Light signifying form

Figure 5: Responsivity in comparison with determinism



Suppose an external entity in the environment is interpreted by a first amoeba as food or energy. The amoeba may process this sign and then act. But now a second amoeba can interpret the action of the first as a sign of food or energy. In this manner, internal interpretative states can be communicated and synchronized. The two amoebas are able to collectively begin to process the signs in the environment to learn about sources of food and energy. The results of this learning might become systematized by the “third” which refers to the ensemble of all amoebas who are mutually interacting. The systematization of learning (through laws and habits) is similar to what we usually mean by the term *text* in theories of language.

Unlike the determinism of Newtonian mechanics, with Peirce’s theory of signs individuals are constituted by a community that compels their evolution and growth as an open, responsive process of learning. The generative force of evolution is love [Peirce, *Evolutionary Love*].

3.3. Emergence

The process of sign formation is *emergent*. Emergence is a spiral-like interweaving of the three categories. Through emergence, firstness bursts through the systemic text or body of thirdness as a new experiential form of secondness. The *symbol* is the archetypal sign of emergence

2. Light signifying form

because, outside of the system in which a symbol normally resides, the relation between object and interpretant is arbitrary or pure potentiality.

Emergence results in a new level of sign processing. In our thought experiment on human language, we have already encountered the spiral form of emergence as the bursting forth of the concept from the level of images. Recall the juxtaposition of images led us to metaphor. Metaphor led to abstraction from the image-forming framework. Through naming, abstraction led to concept formation. Concepts replicated and became embedded in a concept-forming framework. This process resulted in a deeper interiority of sign processing. The sign at the higher level—the concept—includes and in some sense fulfills the sign at the lower level—the image.

Likewise, for the case of our community of amoeba's, we might understand emergence in the follow way. First, consider a single amoeba that is able to interpret an external object in its environment as food or energy by a change of internal state. Suppose there is a second amoeba who encounters the same external object but does not change its inner state; that is to say, it does not interpret the external body as food. (Recall that the possibility of error is necessary for a change in internal state to be an interpretant and the possibility of error comes from the underlying randomness of all processes). Now suppose there is a third amoeba who interprets the actions of the first two. (The third amoeba interprets the response of the first two amoebas rather than the external object). The third amoeba will encounter a paradox, because the two original amoebas have contradictory interpretations of the external body—one interprets it as food and one does not. The third amoeba may play the role of judge or adjudicator of the situation as we discussed earlier.

But now consider more closely the internal state of the third amoeba before the decision happens. Will it not be in an ambiguous resonant state of “yes” and “no”; a state which is informed by the contradictory signs from the two amoebas who are interpreting the external body directly? What is this resonant state? Is it not an interior state of *freedom to make a decision*? Is it not also a state of resonance? The potential for *pattern recognition*? The third amoeba recognizes the other two amoebas as potential bearers of signs. What is recognized in this moment? Is it not the *identity* of the amoebas as of the same kind as the third? The third recognizes itself in the ambiguous relatedness of the original two amoebas and this self-recognition is the recognition of amoebas as interpreters of the external world²⁷. Through the third comes identity and self-recognition. This self is a state of expectancy, a state of potentiality for finding meaning in the world. And the self is only made possible by the whole community of individual amoebas. Without community, the self reduces to a null point. Moreover, in the threefold process of self-recognition, the possibility opens for naming of self, for forging of a collective body from the unicellular organisms, for the development of immune

²⁷Here I am suggesting that *mutual recognition* and identity come from an irreducibly threefold process. For further exploration, see *A Cautionary Note Concerning Hegel's Approach to Absolute Knowing*.

2. Light signifying form

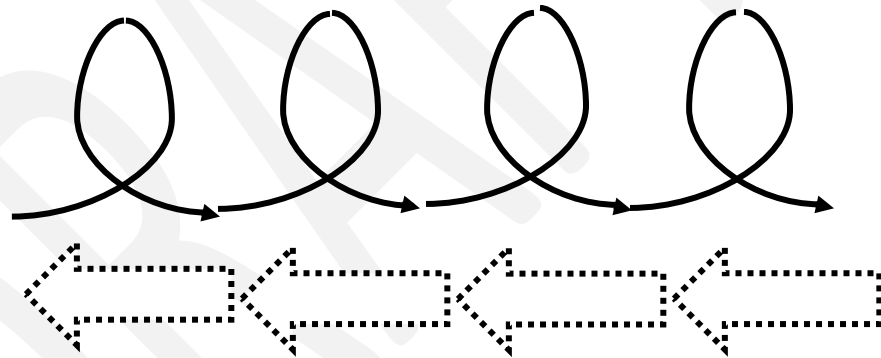
responses to stabilize that collective body, for the generation of a new level of order—a multicellular body.

Yet it is not the self that is important here. What is important is the light that shines through the transitory self, that guides the self beyond itself and into the truth.

Final Cadenza

Let's return to the triadic form of the sign as an infinitesimal interval that mediates between finitude and infinity. As figure 6 illustrates, the sign mediates between an object and an interpretant, such that each interpretant may become a sign for a subsequent interpretant.

Figure 6: Successive infinitesimal intervals of the triadic sign (See also figure 3)



In the differential calculus of Newtonian mechanics, the process of sign formation might be taken as a linear chain of successive movements or intervals in time. The causal or deterministic relationship between each interval reduces the sign-vehicle to a null point and cuts off the flow of time as shown in figure 7. This reduction leads to time reversal symmetry or *the spatialization of time*.

2. Light signifying form

Figure 7: Successive time intervals in Newtonian Mechanics (See also figure 4)

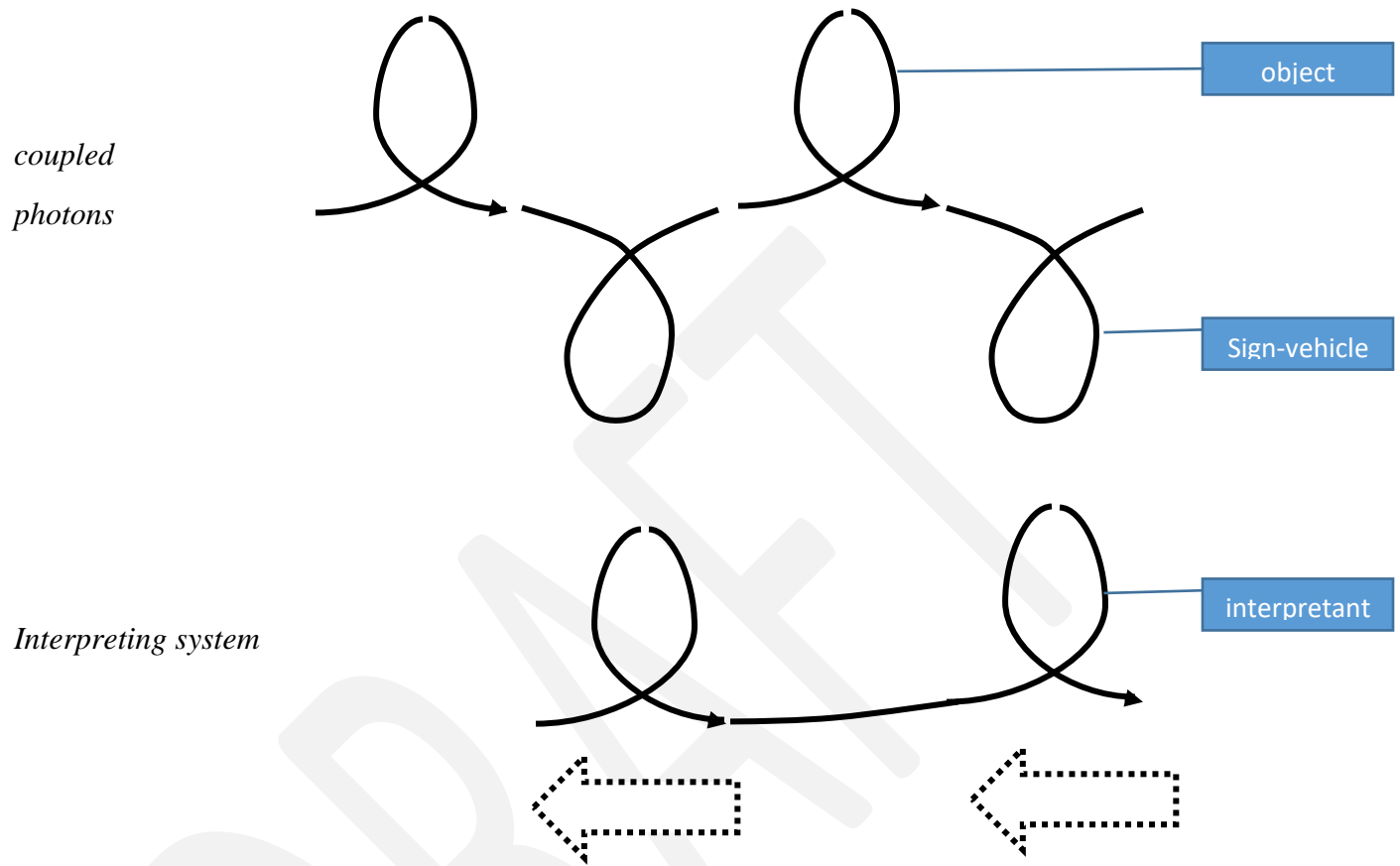


The richer structure of the triadic interval in Peirce's theory of signs, however, opens up to the possibility of novelty and creativity. Each interval contains the potential for change. At a very simple level, we might imagine this as the creation of spacetime. As illustrated in figure 8, the sign bifurcates into a resonant structure that can then be interpreted by a third that is embedded in a system (or frame of reference). The resonant structure is like the quantum resonance of coupled photons. And the third that interprets this—by a process of synchronization—is like the measuring system that determines or *collapses* the indeterminate potential of the coupled photons²⁸.

²⁸ For further exploration of this process, see *A Physicist's Guide to [Hegel's] Phenomenology of Spirit: Resonance, disambiguation and the genesis of spatial orientation*.

2. Light signifying form

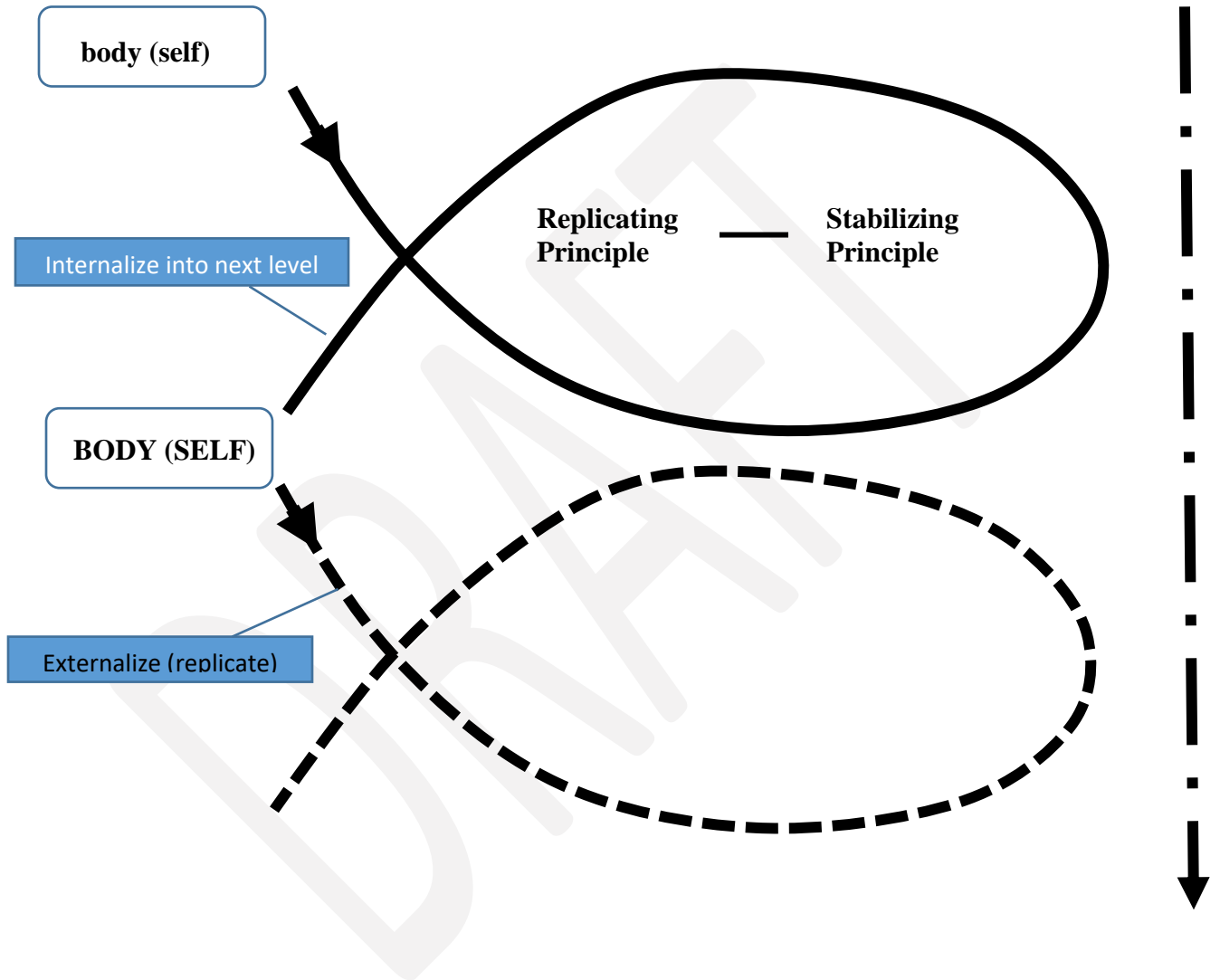
Figure 8: The collapse of coupled quantum spins



In this way, might we not see how a classical interpreting system becomes coupled to quantum fluctuations as a sign to its object and interpretant? And might we not see that the opening of emergence could move through ever increasing levels of complexity to generate the world in which we live as proposed in figures 9 and 10.

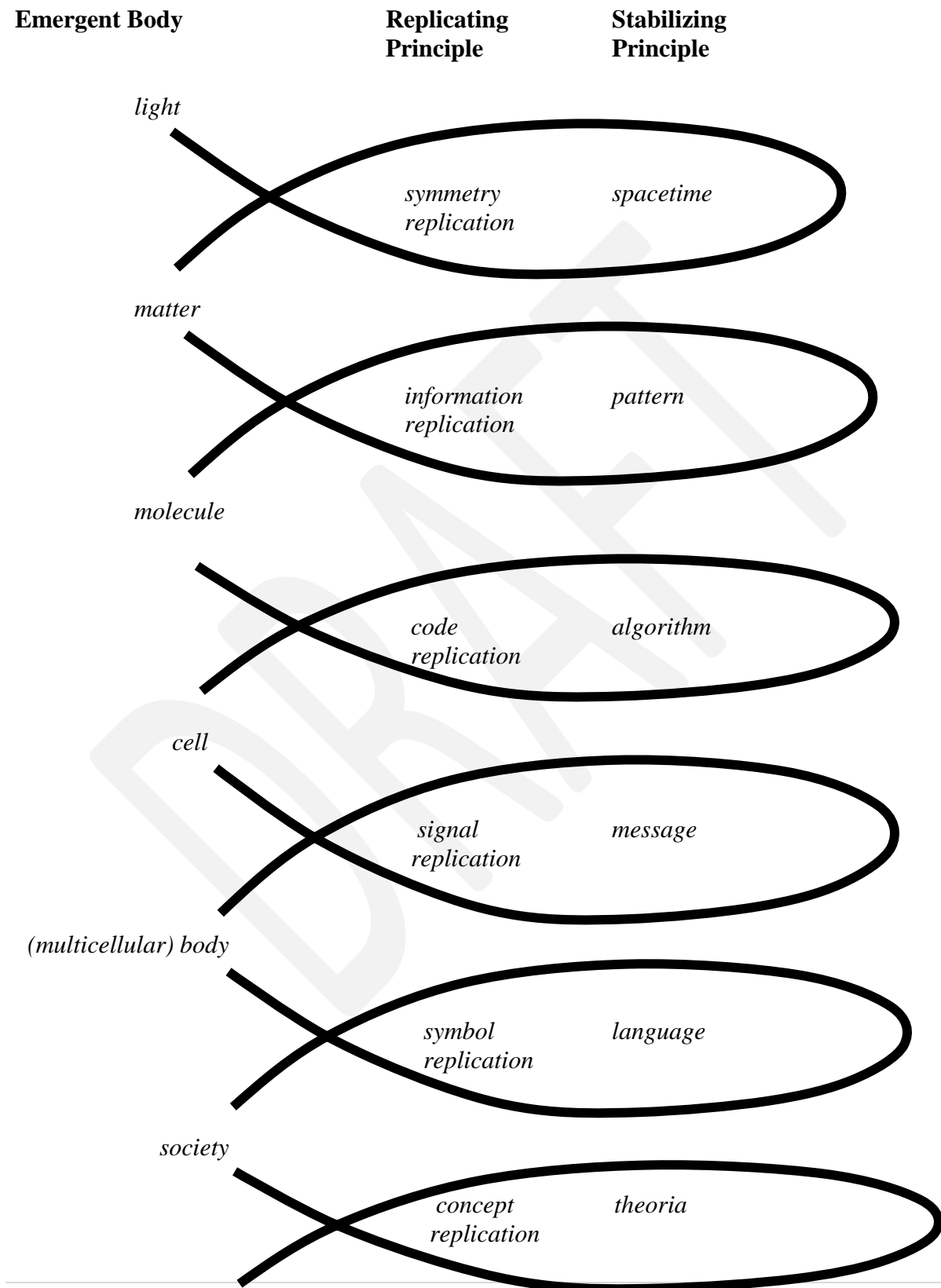
2. Light signifying form

Figure 9: Emergent Bodies or "Selves"



2. Light signifying form

Figure 10: Process of Emergent Evolution



References

Augustine. *The Trinity*. Second Edition. Ed. John E Rotelle. Transl. Edmund Hill. New York: New York City Press, 2012.

Buber, Martin. *I and Thou*. Transl. Walter Kaufmann. New York: Touchstone, 1970.

Corrington, Robert S. *An Introduction to CS Peirce: Philosopher, semiotician and ecstatic naturalist*. Maryland: Rowman & Littlefield Publishers Inc., 1993.

De Magalhaes, Theresa Calvet. Un, Deux, Trois: Catégories Fondamentales (One, Two, Three: Fundamental Categories). *Acta Semiotica et Linguistica* (São Paulo). 1984, 5:69-99.

Emmeche, Claus. Organism and Body: The semiotics of emergent levels of life. In *Towards a Semiotic Biology: Life is the action of signs*. Eds Claus Emmeche and Kalevi Kull, 91-111.

London: Imperial College, 2011. [Available, January 8, 2015:

[http://www.academia.edu/727564/Towards a Semiotic Biology Life is the Action of Signs](http://www.academia.edu/727564/Towards_a_Semiotic_Biology_Life_is_the_Action_of_Signs)]

Hegel, GWF. *Phenomenology of Spirit*. Trans. by AV Miller. Oxford: Oxford University Press, 1977.

Herron, Timothy. C.S. Peirce's Theories of Infinitesimals. *Transactions of the Charles S. Peirce Society*. 1997 Summer, 33(3):590-644.

Keller, Helen. *The Story of My Life*. Ed John Albert Macy. New York: Doubleday, Page and Company, 1905. [Available, February 14, 2015:

<http://digital.library.upenn.edu/women/keller/life/life.html>].

Kull, Kalevi; Deacon, Terrence; Emmeche, Claus; Hoffmeyer, Jeffner and Stjernfelt, Frederik.

Thesis on Biosemiotics: Prolegomena to a theoretical biology. In *Towards a Semiotic Biology:*

Life is the action of signs. Eds Claus Emmeche and Kull Kalevi, 25-41. London: Imperial College,

2011. . [Available, January 8, 2015:

[http://www.academia.edu/727564/Towards a Semiotic Biology Life is the Action of Signs](http://www.academia.edu/727564/Towards_a_Semiotic_Biology_Life_is_the_Action_of_Signs)]

Levinas, Emmanuel. *Otherwise than Being or Beyond Essence*. Trans. Alfonso Lingis. Pittsburgh: Duquesne University Press, 2002.

Oller, John W Jr. The Antithesis of Entropy: Biosemiotic communication from genetics to human language with special emphasis on the immune systems. *Entropy* 2010, 12:631-705. [Available January 8, 2015:

2. Light signifying form

[http://www.academia.edu/7950655/The Antithesis of Entropy Biosemiotic Communication from Genetics to Human Language with Special Emphasis on the Immune Systems \]](http://www.academia.edu/7950655/The_Antithesis_of_Entropy_Biosemiotic_Communication_from_Genetics_to_Human_Language_with_Special_Emphasis_on_the_Immune_Systems)

Peirce, Charles Saunders:

1. *Evolutionary Love*, Monist III(1), 1892. [Available January 8, 2015: <https://archive.org/stream/C.S.Peirces5FamousTheMonistPapers/5.EvolutionaryLove1893#page/n0/mode/2up>]
2. *Law of Mind*, Monist II, 1891. [Available January 8, 2015: <https://archive.org/stream/C.S.Peirces5FamousTheMonistPapers/3.TheLawOfMind1892#page/n0/mode/2up>]
3. *The Architecture of Theories*, Monist I(2), 1891. [Available January 8, 2015: <https://archive.org/stream/C.S.Peirces5FamousTheMonistPapers/1.TheArchitectureOfTheories1891#page/n0/mode/2up>]
4. *A Guess at the Riddle*, 1887-8. [Available January 10, 2015: <http://www.iupui.edu/~arisbe/menu/library/bycsp/guess/guess.htm>]

Raposa, Michael. *Peirce's Philosophy of Religion*. Bloomington: Indiana University Press, 1989.

Robinson, Andrew. *God and the World of Signs: Trinity, evolution and the metaphysical semiotics of CS Peirce*. Leiden: Brill, 2010.

Somers-Hall, Henry. *Hegel, Deleuze, and the Critique of Representation: Dialectics of negation and difference*. Albany: State University of New York, 2012.

Tzu, Lao. *Tao Te Ching*.

Wallace, David Foster. Richard Taylor's "Fatalism" and the Semantics of Physical Modality. In *Fate, Time, and Language: An essay on free will*, 142-216. Eds. Stephen Cahn and Maureen Eckert. Columbia University Press, 2011.

Zuckerandl, Victor. *Sound and Symbol: Music and the external world*. New York, Princeton University Press, 1973.

Zwicky, Jan. *Songs for Relinquishing the Earth*. Lond

3. Darkening of the Light: A reading of *Genesis* through archetypes from *I Ching*

This close reading of the first three chapters of *Genesis* explores unity-in-relatedness as counterpoint to a reductional concept of self.

Humanity in the image of God

So God created man in his own image, in the image of God created he him; male and female created he them [Gen 1.27].

In speaking of humanity as created in the image of God, we are immediately confronted with an enigma. The Unity of God is without image and therefore un-imaginable. Any image of unity implicitly implies two—the image and that which is re-presented by the image—and places the two, in some sense, on equal footing. To attempt to form a physical or mental image is to attempt to circumscribe, contain and totalize. Whereas such images are closed and lifeless, the Unity of God is open and creative. So we can only speak of the image of God provisionally.

In the opening chapter of *Genesis*, God is presented, through his works, as unity in relatedness. The paradox here is essential. Western thinking tends to privilege autonomy/self over relating/responding. Things, as independent units *in themselves*, are elemental and essence-bearing. Relatedness, as connectedness *between things*, is derivative. This is the foundational conceit of reductionism [as explored, for example, by Levinas in *Otherwise than Being*]. Within this conceptual framework, an Image—a thing-in-itself—presents a false likeness of the Unity of God because it is carved from the whole : finite, totalized, static and separable from context and relation. Here we encounter the ground of idolatry.

The complementary approach—where relatedness precedes the emergence of thing/self and can therefore be intrinsically creative—is difficult to explore through Western conceptual frameworks. How can the “between of things” be seen as more essential than things themselves? (And yet, isn’t this close to what we mean by Love?) Even to speak of “the between of things” is to co-opt relatedness into the realm of autonomous thingliness and self-hood. In the reductionist move, the notion of “the between of things”, of *no-thing*, has been crafted as void, passive, inert. Movement, change, dynamics is seen to be contingent on things and their derivative interactions.

In an attempt to finesse the trappings of reductional hermeneutics, I want to bring to the reading of *Genesis* an approach to emergence that is articulated in *I Ching* or the *Book of Changes*. The latter text does not work from a conceptual framework of categories and essence as is common in Western philosophy. Instead, it operates through images and metaphors, using the particular to intimate dynamical patterns. My intention is to engage *I Ching* as a

3. Darkening of the light

philosophical *complement* that creatively opens discourse. This is both method and thesis for the contemplation.

Underlying the movement of I Ching is a unity that opens with an encounter with the archetype of the Creative and the Receptive:

The way of the Creative works through change and transformation, so that each thing receives its true nature and destiny and comes into permanent accord with the Great Harmony ... Great indeed is the sublimity of the Creative, to which all beings owe their beginning and which permeates all heaven [I Ching, p370-1].

The way of the Creative brings about the male [I Ching, p285].

The Receptive in its riches carries all things. Its nature is in harmony with the boundless. It embraces everything in its breadth and illuminates everything in its greatness.

Through it, all individual beings attain success ... Perfect indeed is the sublimity of the Receptive. All beings owe their birth to it, because it receives the heavenly with devotion [I Ching, p386-7].

The way of the Receptive brings about the female [I Ching, p285].

The Creative and Receptive are not to be understood as categorically separate, like the Western notion of gender, for example. They *irreducibly* interpenetrate one another in a continuous dynamic, bringing about increase or the “multiplicity of created beings”. The key here is that the division of creative and receptive, their interrelatedness and their movement through change all operate on the same (metaphysical) level. The Creative works in and through its relationship to the Receptive and does not have a priori status or essence; likewise the Receptive. In this sense we are dealing with an archetype of unity that includes both identity and difference in relationship. This archetype is not limited (circumscribed, totalized) in the way that Western images of “self” tend to be limited. And it is primordially dynamic whereas images of self (often reducible to essence) tend to be primordially static.

In the opening chapter of Genesis, the first articulation of the unimaginable Unity of God is also through *relation* and *change*:

In the beginning, God *created* the heaven and the earth. [Gen 1.1]

And the Spirit of God *moved* upon the face of the waters [Gen 1.2]

Here we also encounter the archetype: God, the Creative (verse one) in relationship with God, the Receptive (verse two). The creative aspect of God is clear even in the English translation; the more subtle reading of the receptive aspect of God is explicit only in the original Hebrew, where the verb used to describe the Spirit of God, *rachaph*, means to brood, as an eagle brooding over her young [Strong]. That the Creative and the Receptive are an irreducible unity-in-relatedness, and to be read as a single archetype, is implicit in the Hebrew word for God used here, ‘Elohiym, which is plural and emphasizes the primacy of relationship. The curious

3. Darkening of the light

linguistic trope of a plural noun with singular verb, used to describe God in Genesis 1.1, uniquely and circumspectly sets apart the Hebrew notion of One God from pagan notions of multiple Gods [Plaut, p5], while at the same time frustrating a naïve interpretation of God as universal Self.

The duality of the Creative and the Receptive is brought into creation itself in the process of creating heaven and earth:

In the beginning God created the *heaven* and the *earth* [Gen 1.1]

Heaven, which is set above in the firmament that separates the waters, gives *light* upon the earth. The earth, in turn, is generative, *bringing forth* creatures from the formless void (tohu wohabu). A parallel distinction between heaven (the Creative) and earth (the Receptive) is the foundation for the system of relationships articulated in I Ching [p281]:

Heaven and earth determine the scene, and the changes take effect within it [I Ching, p303].

Heaven is high, the earth is low; thus the Creative and the Receptive are determined ... In the heavens phenomena take form; on earth shapes take form. In this way, change and transformation become manifest [I Ching, p280].

Through this archetype, creation can be seen to bear the imprint of the image of God.

Ultimately, the archetype is made particular in humanity:

So God created man in his own image, in the image of God created he him; male and female created he them [Gen 1.27].

Though tempting, a gender-based interpretation of this passage, which situates humanity as the measure of all things, probably misses the point. More in keeping with the revelatory tenor of Genesis, male (the Creative) might be read as individual subjectivity that has agency with God, as in the case of Adam, the “living soul” [Gen 2.7]. Female (the Receptive) might be read as the generative whole to which individual subjectivity is bound as one flesh, as in the case of Eve the mother of all living [Gen 3.20]. Regardless of the interpretation of male (the Creative) and female (the Receptive), however, the central teaching here is that humanity *is in* the image of God and, therefore, the image of God illuminates our being and not the other way around. Implicit in this teaching is the central contemplation of I Ching—humanity is a microcosm of heaven and earth.

In speaking of humanity as created in the image of God, we encounter *paradox*. Paradox frustrates a traditional Western notion of image as autonomous “self” and wisdom as objective

3. Darkening of the light

“knowledge”, because through paradox we approach *that which cannot be seen* within the given logical framework. My reading here has been an attempt to subvert seeing in order to *hear* the inner harmony of God, creation and humanity. This “hearing” I read as the essence of wisdom.

The calling of God

And God said, Let there be light : and there was light. And God saw the light, that it was good : and God divided the light from the darkness [Gen 1.3-4].

Before God saw, He spoke. Speaking (the Creative) and hearing (the Receptive) evoke the immanent presence of God. Throughout the Bible, to hear the Word is to have privileged access to divine presence, where the one who hears is, in some sense, in communion with God. “It is of the greatest importance that the Bible singles out hearing and not seeing or touch as characteristic of the living being” [Strauss, p12]. In hearing, we participate *with*. Hearing is bound in process, like music, and always frustrates attempts towards external, objective totalization. The unity is perceived from within, as it were, and the image remains open like the archetype of the Creative and the Receptive. The spoken word is completed in the hearing.

Yet through light, I want to say, we more nearly approach Word itself. Light is God’s calling: into presence (or being), into life and, ultimately for humanity, into question (which is to say, responsibility).

Beginning with the presence of God, in Genesis we are told the first of God’s creatures is light, and more provocatively, it is the “letting be” of light. Light is both creative *and* receptive: transcendent *and* immanent. As *physical source* or energy, light is a window to the absolute that can be traced back to the primordial origins of the physical universe, as for example in current theories of cosmology. Light has no space nor time and yet is immanent in creation, becoming matter in all its multiplicity and animating inter-relatedness. As *subjective enabler* of seeing or perception, light is the “letting appear which does not itself appear” [Grandy]. That is to say, what we see through light are qualities of objects (colour and spatial form, for example) which are revealed by the presence of light. In the eyes of the observer, light substitutes for the object. Grandy writes, “ ... the otherness or strangeness of light is bound up in its sublime capacity to announce *other* things visibly while itself remaining hidden from view. That hiddenness, moreover, is an openness or clarity that fosters the seeing, knowing experience” [Grandy, paragraph 47].

Light calls into presence *Other*. In this sense, it is metaphorically equivalent to word. In his paper “On the interpretation of Genesis”, Leo Strauss has drawn a compelling schema of the six days of creation in terms of degrees of separation. He writes:

3. Darkening of the light

Creation is the making of separated things, of things or groups of things which are separated from each other, which are distinguished from each other, which are distinguishable, which are discernable. But that which makes possible distinguishing and discerning is light. The first thing created is, therefore, light. Light is the beginning, the principle of distinction or separation [Strauss, p10].

In Strauss' schema, the first three days of creation involve the distinguishing of place. The first day brings the creation of light, which has no place. On the second day, Heaven is created. Heaven has no definite place, but rather fills the vault that divides water from water. The third day involves a double creation: earth as limited but indefinite place; and vegetation, brought forth from the earth, which has definite place. Strauss notes that the vegetative world belongs to the earth and is not separable from it. But in the "tree yielding fruit, after his kind, whose seed is in itself" [Gen 1.11], we encounter identity and generation—the fruit is a completed product that is of the tree, can be separated from the tree and will yield another tree in its likeness. Here is revealed an immanent image of (temporal) eternity, or life. Strauss draws a connection between the "making of fruit" by the tree and the creating of God.

In a parallel structure, the latter three days of creation involve motion, which Strauss calls a separation of higher order because "it means not merely for a thing to be separated from other things but to be able to separate itself from its place" [Strauss, p11]. On the fourth day the heavenly bodies are created, which have determined motion. Next come the water animals and birds, who, in addition to determined motion, have the ability to change their own courses. For the first time, God directly addresses his creatures, blessing them and saying:

Be fruitful, and multiply, and fill the waters in the seas, and let fowl multiply in the earth [Gen 1.22].

The sixth day again involves a double creation. The earth brings forth the moving creatures and, finally, humanity is created as the creature separated to the highest degree and therefore the one with the greatest freedom. As the tree belongs to the earth, so humanity belongs to the creaturely world. And as the fruit of the tree, which is the "creating" of the tree, bears the image of life; so the fruit of humanity, which is the "creating" of humanity, bears the image of God.

Light, as the first of God's creatures, is also a paradigmatic or archetypal image of God's authority and rule. I want to suggest that God's letting be of light and the light itself are one and the same : the openness of God, which leads to *increase* or bringing forth, which is called Good and which reflects the Glory of God. Here I am borrowing again from I Ching:

Increase: Decreasing what is above
And increasing what is below;
Then the joy of the people is boundless.
What is above places itself under what is below:

3. Darkening of the light

This is the way of the great light. [p597]

In his translation, Wilhelm writes “[the conception of increase] expresses the fundamental idea on which the Book of Changes is based. To rule truly is to serve.” [I Ching, p162]. Through light we encounter the authority of God, which is His glory and His blessing. This can be seen as the central teaching of the first chapter of Genesis.

Strauss’ parallel schema then advances a significant insight into the nature of authority and rule in creation. Strauss points out that almost all of the things created by God are called Good, with the exception of heaven and man. I would go on to point out that, on the fourth day of creation, God creates lights in the firmament of heaven:

And God made two great lights; the greater to rule the day, and the lesser to rule the night : he made the stars also. And God set them in the firmament of the heaven to give light upon the earth, And to rule over the day and over the night, and to divide the light from the darkness: and God saw that it was good [Gen 1.26-18]

It is only after God sets the lights in heaven—for the sake of the earth—to *rule* over day and night that goodness is declared in the heavens. The goodness of heaven is therefore connected with the rule of light. And it is this rule of light which begins the latter three days of creation. Further, the lights in heaven rule over both the day *and the night*, so that the Goodness involves the darkness.

With this insight, the interpretation of God’s blessing to humanity on the sixth day perhaps becomes more refined:

And God blessed them, and God said unto them, Be fruitful and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth [Gen 1.28].

We can read this as saying man is to be light “ruling” on earth as the heavenly lights “rule” over day and night; this command is connected to the primordial Light, the first of God’s creatures, which illuminates God’s glory.

The opening chapter of Genesis ends with the following three verses:

And God said: Behold, I have given you every herb bearing seed, which is upon the face of the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat. And to every beast of the earth, and to every fowl of the air, and to every thing that creepeth upon the earth, wherein there is life, I have given every green herb for meat: and it was so. And God saw everything that he had made, and, behold, it was *very good* [Gen 1.29-31].

3. Darkening of the light

The creation described in these verses is not the one we experience here and now, for in it all creatures are nurtured by the “green herb” of the earth; there is no killing for food and perhaps no violence of any kind. There is a strong resonance here with a prophecy of Isaiah:

The wolf also shall dwell with the lamb, and the leopard shall lie down with the kid; and the calf and the young lion and the fatling together; and a little child shall lead them. And the cow and the bear shall feed; their young ones shall lie down together: and the lion shall eat straw like the ox. And the suckling child shall play on the hole of an asp, and the weaned child shall put his hand on the cockatrice’s den. They shall not hurt nor destroy in all my holy mountain : for the earth shall be full of the knowledge of the Lord as the waters cover the sea [Is 11.6-9].

Does this open the possibility of interpreting the End of the sixth day of Genesis eschatologically, through which the Sabbath becomes entrance into the Rest of God or the resurrected Life? Regardless of the eschatological overtones, the rest of the Bible can be seen as a teaching of the meaning of God’s blessing for and commandment to humanity. In the rule of light—or *increase*—God reveals to us wisdom.

Humanity called into Question

The opening chapter of Genesis starts with the creation of heaven and earth and moves inwards to the creation of humanity. The next two chapters start with the creation of man and woman and move outwards. While the first chapter is concerned with humanity’s exterior place within heaven and earth, the subsequent two chapters are concerned with interior consciousness. Kass relates these differences to two disjointed aspects of our world : the natural-cosmic-metaphysical and the moral-political and notes the challenging hermeneutical task of reconciling these two accounts : “Although these two accounts differ widely, and although they even contradict each other if they are read as historical accounts, the two stories in fact complement each other and form part of a coherent whole”[Kass, p57]. Drawing again from I Ching, we might read the first creation account as the Creative, and the second as the Receptive:

The Creative knows the great beginnings; the Receptive completes the finished things [I Ching, p285].

In first Genesis, we encounter God through his work or *mla’kah*. The primary image, as explored above, is light, which reflects God’s generosity, authority and glory. In second Genesis, we encounter God through his rest or *shabath*:

Thus the heaven and the earth were finished, and all the host of them. And on the seventh day God ended his work which he had made; and he rested on the seventh day from all his work which he had made. And God blessed the seventh day, and sanctified

3. Darkening of the light

it: because that in it he had rested from all his work which God created and made [Gen 2.1-3].

The primary image in second Genesis is garden—a place of harmony between God, humanity and creation which reflects God’s peace and delight. While first Genesis might be seen to represent the strength and omnipotence of God; second Genesis might be seen to re-present His vulnerability and boundless embrace.

In second Genesis we encounter individual identity and personhood in Adam, whom God forms from Adamah, the Hebrew term for earth. Here God is called the LORD God—Yhovah ‘Elohiym—with an emphasis on Living or Being that is not found in first Genesis [Strong]. The word describing God’s action—yaster in Hebrew—suggests moulding into a form, as a potter with clay, and is different from the word describing God’s creating in first Genesis—bara [Strong]. There appears to be a softening of the earlier emphasis on God’s omnipotence and I want to suggest that the “Lord God” awakens us to God as co-creator or teacher. This is consistent with reading second Genesis in terms of the Receptive, which is yielding and characteristically involves “forming” as a co-process.

Significantly, the aloneness, or all-one-ness, or unity of Adam is the first thing that God says is not good [Gen 2.18]. Until this point in Genesis, all of God’s creatures have either been called good by God or no pronouncement has been made regarding their goodness. However, Adam, as *Self*, is not complete and his aloneness or unity is not in the image of God. God builds, from Adam’s rib, Woman as helper and completion of Adam—the two being one flesh. It is only at this point, through the *otherness* of woman, that Adam becomes self-aware. As Kass writes:

Man’s counterpart stirs his soul to a new level of self-awareness. As she stands before him and against him, he also sees *himself* for the first time. As a result, he now names himself: no longer (as God named him) ‘adam, earthling, generic human-being-from-the-earth, but ‘ish, individual male human being, man as male in relation to female woman. The woman’s name, ‘ishah, like her origin is derivative. Yet her place in this speech of self-discovery and self-naming is, in fact, first: only because the woman stands first before him and comes first to mind is he able to know and name himself and to recognize his maleness as a decisive aspect of his own humanity. This deep and far-reaching insight about complementarity and selfhood is beautifully conveyed by the text: in the man’s speech, ‘ishah, although lexically derivative, is spoken first [Kass, p78].

Adam’s place, along with Eve, is in the Garden of Eden, the term Eden being a derivative of the Hebrew adan, which means pleasure. Adam is placed in the garden to “dress” it and to keep it [Gen 2.15]. The Hebrew term for “dress” is abad, which means to work and, by implication, to till or serve [Strong]. I want to suggest that the Garden of Eden can be read as an archetype of Wisdom, in which the tree of life and the tree of knowledge are united, each with the other and with the earth, Adamah. Adam’s role is then to till or serve wisdom. In the tree of life is the imprint of God as the Creative, providing the gift of life. With this interpretation, the tree of life,

3. Darkening of the light

which is of the garden, might be connected with the whole garden as the Receptive and might represent all the edible fruit bearing trees. As discussed in the previous section, the fruit of the “tree yielding fruit, after its kind, whose seed is in itself” is “digestible” because the infinite is made immanent.

Of every tree *of* the garden though mayest freely eat [Gen 2.16]

And God said: Behold, I have given you every herb bearing seed, which is upon the face of the earth and every tree, *in the which is the fruit of a tree yielding seed*; to you it shall be for meat [Gen 1.29]

In the much more mysterious tree of knowledge of good and evil we encounter God as the Receptive. With this interpretation, the tree of knowledge, which is in the garden (but perhaps not *of* the garden) might be connected with the whole garden as Creative and might represent praise and righteousness offered back to God for his goodness. The fruit of the tree of knowledge of good and evil, then, belongs to God. It is not “digestible” to humanity because to *know* evil is to be separated from God. This is the death that God warns about. Good and evil, as a duality, is not in the image of God. Ansell suggests that as humanity eats from the tree of life, so God eats from the tree of knowledge in a covenantal meal that God and humanity are to enjoy together [Ansell, p40]. This interpretation is deeply connected with the notion of the Creative and the Receptive in unity.

It bears mentioning that nothing created by God in first or second Genesis is called evil. The term evil, in Hebrew *ra'*, first appears in connection with the tree of knowledge and here we also encounter God's only limiting or negative command:

But of the tree of knowledge of good and evil, though shalt not eat of it: for in the day that thou eatest thereof thou shalt surely die [Gen 2.17].

The negative command is particularly interesting because it establishes a limit : limit is also part of the core meaning of garden, which in Hebrew is *gan* and means *fenced* garden. Evil is only a potentiality that is expressly kept out of being (Yhovah 'Elohiym), as long as Adam and Eve do not eat of the tree of knowledge. The tree itself represents the limit to the garden of Eden, wherein Adam and Eve are protected and beyond which the wild aspects of creation may be found.

The serpent (one of God's wild creatures) appears at the beginning of the third chapter of Genesis, immediately after Adam recognizes Woman as part of himself which is to say, immediately after he encounters the (potential) image of God. I want to suggest that the serpent can be read as autonomous Self : a transformation of the open and creative image of God into a closed and lifeless unity or idol. The key to this interpretation is in the listening. As Kass points out, the serpent implicitly calls God into question:

3. Darkening of the light

And he said unto the woman, Yea, hath God said, Ye shall not eat of every tree of the garden? [Gen 3.1]

Kass writes: “What kind of question is this? Surely not a question seeking the truth. Rather it intends to *call into question*—authority, opinion, law” [Kass, p82]. The Woman *responds* to the serpent, saying that God has said they will die if they eat the fruit of the tree in the midst of the garden. In the serpent’s reply, “Ye shall not surely die” can be read the denial the Word of God. In fact, the serpent’s reply can be heard as the very act of denial itself. To listen to the serpent this way is to attempt to wrest truth from God for Self. This is a core meaning of eating from the tree of knowledge of good and evil. The listening and the eating are one and the same. What is depicted here is not *a* sin, but rather *sin itself*—choosing a false image of God. And it is Adam and Eve who choose this Self image. Ansell argues that the point here may not be that the voice of the serpent is evil per se, but that “the voice of creation must always be heard in the light of the voice of God” [Ansell, p44]. The serpent is, after all, one of God’s creatures. This interpretation is strengthened by recalling that the serpent was probably named earlier by Adam when God brought His creatures to be named. As with all the creatures, the serpent would not have been found to be “a help meet for Adam” [Gen 2.20]. And, as a creature that moves along the ground, humanity was called by God to rule over him and not to be ruled by him [Ansell, p39]. To allow a creature to rule over an image of God, in place of God Himself, is the essence of idolatry.

The serpent is described as subtil, which in Hebrew is aruwn and means cunning in the sense of misuse, or selfish use of knowledge. This term is derived from aram, which means to be or to make bare and is connected with the notion of nakedness [Strong]. Before eating from the tree of knowledge of good and evil we are told:

And they were both naked, the man and his wife, and were not ashamed [Gen 2.25].

What is this nakedness if not the (potential) image of God? After eating from the tree of knowledge, Adam and Eve know their own nakedness, but now as Self apart from God. Ironically, they now see their nakedness as lack—of glory or power or goodness—and they cover themselves. More specifically, they take leaves (from the tree of knowledge?) and sew aprons (of self-righteousness?), having forsaken participation in the communal praise of God (the fruit of the tree of knowledge of good and evil?). This act symbolically represents Adam and Eve defining their bodies as separate (and lacking) selves, shielded each from the other and from the rest of creation.

The serpent deceived—or rather, Adam and Eve allowed the serpent to deceive because they treated him as an autonomous source of revelation [Ansell, p44]. Eating from the tree of knowledge of good and evil did not bring Adam and Eve knowledge of all things good and evil. Finite beings cannot bear or resolve such knowledge (which is the reason for the prohibition from God.) And the serpent’s promise—that they would be as Gods—was empty because they already were created in the image of God. Instead, their eyes were opened to the *potential*

3. Darkening of the light

existence of good and evil. And through this, their relationship with God and creation was fundamentally ruptured, because knowledge of evil calls God into question and therefore into judgement. Doubt and fear of God were brought into creation through the transgression because humanity cannot know the Goodness of God in all his works. The open relatedness between the Creative and the Receptive, formed in Adam and Eve, was ruptured, which is to say relationship itself (love?) was ruptured: between Adam and Eve; humanity and creation; and, most importantly, humanity and God. In this rupture, evil, as an ordering principle apart from God, was also brought into creation as a consequence of God's granting to humanity the authority to rule. When next Adam and Eve hear the voice of the Lord God they turn away, hiding from His presence because they are afraid. The Lord God calls Adam and Eve into question:

Where art thou? [Gen 3.9]

Who told thee that thou wast naked? [Gen 3.11]

What is this that thou hast done? [Gen 3.13]

They are called to respond and to responsibility—the light of moral teaching to which their eyes were opened. Here we return to the beginning. Wisdom, *as light to humanity*, becomes internalized in the fear of God [Pro 1.7]. Humanity discovers conscience and is sensitized to the pain and suffering of evil. God appears to "sentence" humanity, after the transgression, to a curse. But is this to be read as punishment or as teaching? What He says, in essence, is the same as first Genesis: Be fruitful and multiply, fill the earth and subdue it. But what was easy then now seems complicated and what was simple then now seems difficult.

Through original sin, the primal unity of man and woman is broken. In itself, the archetype becomes a duality that can no longer stand as the image of God. Evil inserts itself into their world—this is the death that comes from transgression. Humanity stands apart from God with no innate capacity to judge truly because Good and Evil are inextricably interwoven by sin.

Death and Resurrection

But God commandeth his love toward us, in that, while we were yet sinners, Christ died for us. Much more then, being now justified by his blood, we shall be saved from wrath through him.

For if, when we were enemies, we were reconciled to God by the death of his Son, much more, being reconciled, we shall be saved by his life. And not only so, but we also joy in God through our Lord Jesus Christ, by whom we have now received the atonement.

Wherefore, as by one man sin entereth into the world, and death by sin; and so death passed upon all men, for that all have sinned ...

3. Darkening of the light

Therefore as by the offence of one judgement came upon all men to condemnation; even so by the righteousness of one the free gift came upon all men unto justification of life.

For as by one man's disobedience many were made sinners, so by the obedience of one shall many be made righteous.

Moreover the law entered, that the offence might abound. But where sin abounded, grace did much more abound: That as sin hath reigned unto death, even so might grace reign through righteousness unto eternal life by Jesus Christ our Lord. [Romans 5.8-12,18-21.]

References

I Ching. Translated by Richard Wilhelm and rendered into English by Cary Baynes. Princeton: Princeton University Press, 1990.

Ansell, Nicholas John. The Call of Wisdom/The Voice of the Serpent: a canonical approach to the tree of knowledge. *Christian Scholars Review*. 31(1): 31-57, 2001.

Grandy, David. The Otherness of Light: Einstein and Levinas. *Postmodern Culture*. 21(1), 2001 September. Available at <http://www.kalpakjian.com/Grandy.html>

Kass, Leon R. *The Beginning of Wisdom: reading Genesis*. Chicago: University of Chicago Press, 2006.

Levinas, Emmanuel. *Otherwise than Being or Beyond Essence*. Translated by Alfonso Lingis. Pittsburgh: Duquesne University Press, 2002.

Plaut, W. Gunther ed. *The Torah: a modern commentary*. Revised edition. New York: Union for Reform Judaism, 1999.

Strauss, Leo. On the interpretation of Genesis. *L'Homme*. 21(1): 5-20. 1981.

Strong's Hebrew Dictionary with King James Bible. Available at <http://www.htmlbible.com/sacrednamebiblecom/kjvstrongs>.

DRAFT

Encounter

4. Danse sur glace: an experiment in language

This text explores the interfacing of philosophy and poetry as encounter with alterity—language engaging theme and rupture.

PART 1: On Plato's expulsion of the poets

PART II: Reading Heidegger

PART III: Contemplation in two voices for piano and flute

DRAFT

PART 1: On Plato's expulsion of the poets

#1

he said
I want to make love to you
tonight

and his body spoke the truth

but his lips
sealed

names

#2 analytic continuation

'I know the truth.'

'you say i know when i know you assume
and you assume too much'

'I am equations.
Surfaces defined.'

'and i am your em-
bedding space'

'Words!'

(carved
(in stone certainties)
she is armless
intuition and he
is artificially
intelligent)

#3 dangerous language at the café sophie

june sun
relentless as the innocent
questions
she asked

*words
floating in air*

*settling
on the table*

*settling
on the concrete*

*settling
in the shadow of a flower
bed*

lying there

when she looked back
into his eyes
she sensed his focus

detaching

as if he no longer recognized
his own voice

4. Danse sur glace

#4 on the death of descartes

thought-I
therefore
thought I

and vainly I
formed

from clay and fire

sculptured
cultured

a thought machine

man-
i-
festing

hidden idolatry
adultery

the dual godhead
diabolically

revealing

the spirit of truth

is

not thought

4. Danse sur glace

#5 barren tree

maybe
she
is imagined

in the space
where once the last blossom
is

is imagined

may be

#6 as glass

faint smell of leather

beer bottle
pressed
against his blue jeans

eyes of a deer
eyes of a man

watching
waiting
wanting

to feel himself
in her

in him

knowing
unknowing

#7 facticity

Our apologies for taking so long in coming to a decision regarding your submission, "On Plato's Expulsion of the Poets." I regret to report that we are unable to use it. The decision was made after considerable discussion and review by our editors.

Your submission raised unique questions that didn't allow for our usual review process. We normally do not have to deal with poetry submissions. While we do not stipulate in our submission requirements that papers have to be written in prose, it is the customary practice in the discipline that they are so written. We did submit your manuscript to a poet for review and received a very favorable response. We also inquired with our Board as to the feasibility of philosophical poetry submissions. There were a range of responses but for the most part unfavorable. Some believed that as a practical matter it would be too difficult to find suitably qualified referees for such submissions. Others opposed such submissions on principle.

We appreciate your interest in *Metaphilosophy* and regret that we do not have better news to report.

With best wishes,

Editor

[Private Communication, 1997]

PART II: Reading Heidegger

Introduction

"*Man speaks.*"

With these words, Heidegger opens the text *Language*.

"*Man speaks. We speak ...*"

In this opening is a doubling.

"*We speak when we are awake and we speak in our dreams.*"

In the double opening are two awarenesses.

In the two awarenesses, suppose we say: "*This is what is brought to text.*"

Heidegger's *Language* presents as a study in contrapuntal form [Heidegger 1975]. On the surface he offers a philosophical discourse about language in which he embeds a poem. Within the workings, however, the discourse engages the poem and the poem gives itself over to the conceptual movement of the discourse. The poem *informs* the discourse and the discourse *gives meaning* to the poem. The effect is striking. The poem is drawn towards a univocal, discursive representation of Heidegger's thinking while the discourse is opened poetically by the way in which words are unfixed and put forth. This is the dance.

Here, I attempt to engage Heidegger's text, *Language*, in a manner that parallels his engagement of Trakl's poem. I treat his writing poetically, focusing on conceptual movement and form. The reading follows the traces of four callings. In doing this, the conventional notion of "articulating Heidegger's meaning" is deferred to an open space:

"To discuss *Language*, to place it, means to bring to its place of being not so much *Language* as ourselves: our own gathering into the appropriation."

[Heidegger 1975, 190]

This is also the dance.

The first calling

*The first calling has already been called.
The first calling calls things. What is posited, defined, placed.
The first calling is grounded.*

Where Heidegger begins. With things. Things in the world, things in the poem, things in philosophical thought. He begins from within an existing tradition and, for him, the first calling, which calls things, is the call in which this tradition is grounded:

“In the language of philosophy both things-in-themselves and things that appear, all beings that in any way are, are called things.”

[Heidegger 1993, 147]

Where Heidegger begins.

To ask *where* Heidegger begins already implies a *space*. Things and space arrive together. He calls this "the place of arrival": "a presence sheltered in an absence".

Where Heidegger begins. The summoning of the place of arrival and things. Trakl's poem.

“Window with falling snow is arrayed
Long tolls the vesper bell.
The house is provided well,
The table is for many laid”

[Trakl in Heidegger 1975]

The poem summons. Heidegger summons. We summon.

Heidegger sees in the poem the calling of things into a presence sheltered in an absence. This is his reading of the poem.

But what is happening *through the poem* as a representation of things-in-the-world is also happening *in the word-things* that constitute the poem. So, with Heidegger's reading, the poem describes "a presence sheltered in an absence" that is filled with world-things [the house] while at the same time Heidegger

4. Danse sur glace

describes "a presence sheltered in an absence" that is filled with image-things [poem].

The calling has yet another layer. *Heidegger's text* as a conceptual piece is invoking "a presence sheltered in an absence" that is filled with concept-things.

CONCEPTUAL DISCOURSE.

Here begins. In a house of things. Already divided, differentiated, named. A familiar space. Near. Disclosed. Illuminated.

Imagine. The poetic image of a house on a winter evening. Darkness has come. The house is illuminated from within. Outside, snow is falling from the sky, faintly reflecting the light through the window. A church bell rings from the darkness.

There begins. Outside the house. In the world. The fourfold unity

"The poem describes a winter evening. The first stanza describes what is happening outside: snowfall, and the ringing of the vesper bell. The things outside touch the things inside the human homestead. The snow falls on the window. The ringing of the bell enters into every house. Within, everything is well provided and the table is set."

[Heidegger 1975, 196]

Here *We* begin. With things named.

Poem, house, winter, snow, words, language, philosophy

There *He* begins. In the naming call.

"The speaking names the winter evening time. What is this naming? Does it merely deck out the imaginable familiar objects and events - snow, bell, window, falling, ringing - with words of a language. No. This naming does not hand out titles, it does not apply terms, but it calls into the word. The naming calls."

[Heidegger 1975, 198]

4. Danse sur glace

Here *Heidegger* begins. In conceptual discourse.

"The universal that holds for each thing is called its essence or nature. To represent what holds universally is, according to prevalent views, the basic feature of thought ... This lecture, too, seems to attempt something of that kind."

[Heidegger 1975, 189-90 (deletion and ellipsis added)]

There / begin. Poetically.

the apparition of a face on the corner of the street
drawing pain from the silence with eyes that recede and recede

if only ...
and to look
and to bear the dance
 in the still
 in the still
the dance in the still of the I

The second calling

The second calling is before the first

The second calling brings the dance: movement, unfixing, ungrounding.

The second calling is the [nameless] abyss

The stage has been set. More accurately, Trakl's poem has been *situated*. The house in the poem represents the place of things, which is familiar and which is our starting point. The "presence sheltered in an absence". Outside the house is darkness, which Heidegger calls "world" and which we have yet to discover. The image of a "house of things" and a "world of darkness" is helpful to differentiate the idea of "things" and the idea of "world". However, this is not really the case, neither in Trakl's poem nor in Heidegger's reading of that poem. The boundary between things and world is more open and diffuse. There are "things" outside the house (such as the snow) and the "world" participates in things inside the house (such as the sound of the vesper bell). This "openness" of the house is a central feature of the image, as we will see later. Inside the house, we begin with things. It is tempting to define what we mean by things using traditional concepts like "bearer of traits", "unity of manifold sensations", or "formed matter" [Heidegger 1993, 156]. *Definition* is important in thinking of things. Usually to speak and think of a thing is to speak in terms of an idea of the thing, which is defined, more or less, and which is distinguished properly from other ideas [Heidegger 1975, 190]. In this way of speaking, things and ideas of things are rather well defined, separated, distinguishable and the extent to which there is a lack of definition is considered to be problematic and in need of fixing. In this way we conceive a "world" of ideas as things which can be manipulated and this manipulation of idea-things is what passes for thought, much in the same manner as we perceive our "world" as filled with things which are separate, identifiable and available for manipulation; we perceive and conceive things and ideas. We do not, however, perceive or conceive "world". This way of speaking and thinking is "grounded". It is based upon an implicit sense of the thingliness of things, which we might call an *EXCLUDED INITIATIVE* [Frye 1990a, 12]. An unknown assumption about "world" which structures thinking about things and ideas but is not itself thought. Perhaps "assumption" is not the right word here. But the sense remains that traditional thinking about things is *analytic* and follows a certain structure of representation and we might consider this in the image of the house as full of light, revealing the things in the house, while outside, in the world, it is dark and unknown. Let's return to the poem. This time we imagine differently. Outside there is light, spilling from the windows of the house and perhaps coming from elsewhere beyond the house. There are things in the house and things in the world and the boundary is more permeable, less defined. There is still a sense of sheltering but the edges are diffuse, like the range of visibility through the snow. And in this sheltered light the things gather to themselves. "The snowfall brings men under the sky that is darkening into night. The tolling of the evening bell brings them as mortals before the divine. House and table join mortals to the earth. The things that were named, thus called, gather to themselves sky and earth, mortals and divinities" [Heidegger 1975, 199]. In this sheltered light, the things

gather to themselves a unity. But not a unity as a thing is one, rather a unity that is fourfold. "The things let the fourfold of the four stay with them. This gathering, assembling, letting-stay is the thinging of things. The unitary fourfold of sky and earth, mortals and divinities, which is stayed in the thinging of things, we call—the world" [Heidegger 1975, 199]. Through the poem we are led, by Heidegger, to a different image of the sheltering. Things are no longer just things-in-themselves. Things *thing*, and in thinging they gesture world. World becomes a unitary fourfold, a one that can only be represented as a gathering of a primal fourfold, united in their being toward one another [Heidegger 1975, 199]. The fourfold unity of the world is like the primal elements: air, earth, fire and water. Things have an essential openness to bearing world and world interpenetrates things without being contained by things. Things gesture world in which they abide, but world is not a thing. World is *nothing*. It is nothing in the sense that it is *not-a-thing*. World *worlds* and in *worlding* it grants presence to things. World is not a thing-among-things. World is not a noun. World is movement. World is verb. World is abyss. But this abyss is neither empty, nor nothingness, nor murky confusion. World is nameless. We cannot speak of world as we speak of things. But we can *trace* the movements of world. We trace these movements through the things, through the thinging of things, through the gesture of things, through the gathering, assembling, letting stay of things. The thinging of things brings the worlding of world. Yet, this thinging and worlding is all quite strange. Let's return to the poem. The second stanza reads:

"Wandering ones, more than a few,
Come to the door on darksome courses.
Golden blooms the tree of graces
Drawing up the earth's cool dew"

[Trakl in Heidegger 1975]

Now we enter, so to speak, into world. The poem *worlds*. The poem brings forth images as things, not things-in-themselves, but things-in-the-poem. The image-things gather, assemble, let stay the poem. The poem is not the images in the poem. The images in the poem do not contain the poem. The poem gives presence to the images. The images defer themselves to the unity of the poem. So it is also with *world* and things. *World* defers itself, grants place to things. Things, in their essence, give themselves over to bearing *world*. This movement is traced, gestured in the poem. This movement is also traced, gestured in Heidegger's *Language*. Gesturing, tracing. The images are figured, the language is figured, thinking is figured. Worlding, tracing, figuring. This is the second calling. The calling of *world*. Worlding, tracing figuring. "Suddenly they name something wholly different" [Heidegger 1975, 201]. "The word 'world' is no longer used in the metaphysical sense" [Heidegger 1975, 201]. The poem calls forth *metaphor*. Gesturing is called in the image of the "tree of graces. Its sound blossoming, harbors the fruit that falls to us unearned—holy, saving, loving towards mortals. In the golden-blossoming tree there prevail earth and sky, divinities and mortals. Their unitary fourfold is the world" [Heidegger 1975, 201]. Gesturing, figuring, tracing. The boundary of things is blurred.

4. Danse sur glace

The house is house, is place, is language, is philosophy, is self, is poem. The world is not world, not poem, not self, not philosophy, not language, not place, not house. Things, ideas, images are parts, but not parts-in-themselves. There is an openness to the world that grants their presence like the presence granted to leaves of a tree or cells of a body. World is whole, but not whole-in-its-parts. Wholeness of world is borne by the parts but beyond the parts. Whole defers its presence to the parts. The parts give up their essence to whole. There are not things-in-themselves. All things contain an openness that allows them to belong in world. There is no world-as-whole. World defers its presence as whole to things present. Gesturing, figuring, tracing. The world-of-things as *thing-in-themselves* is not whole. A hole. The world-of-things as things-in-themselves is a house closed off from *world*. The world-of-things is metaphysical. A hole. A cave. A frozen image of figuration. This is where we begin.

starry night

beyond
the whitened wall
there

by the light of a blue-black flame

carved edges
dissolve
into silence

swirling
currents
possessing
compressing

swim man swim
to the golden vortex

imagine it real while there still is strength

for the arrow of time
has pierced space

The third calling

The third calling is immanent.
The third calling unites and divides.
The third calling is striving.

In the first calling things come from world. In the second, world comes through things. "These two modes of bidding are different but not separated" [Heidegger 1975, 202]. World defers presence to things, things defer essence to world. In the first calling comes division, definition, extraction. In the second calling comes merging, blurring, holism. World and things penetrate each other, permeating the *middle* between them. The middle divides and unites, world and things. The middle *relates*. "The middle of the two is intimacy ... the intimacy of world and thing is not a fusion. Intimacy obtains only where the intimate—world and thing—divides itself cleanly and remains separated. In the midst of the two, in the between of world and thing, in their *inter*, division prevails: a *dif-ference*" [Heidegger 1975, 202].

Let's begin with the division in *dif-ference*. Through division, things come to presence as things separate from world and from each other. The separation is a boundary. The boundary is distinct, like a line. Let's use the symbolism of the *Book of Changes* to represent this boundary [I Ching, 722]:



Through the boundary comes *differentiation*. Things become distinct. Separate. *Things-in-themselves* which are different from other things. Particulate. Things are things by means of the boundaries. The boundaries are limits, measure, definition. In the boundary between things, there is no thing. *Nothing*. The difference is the *nothing* that separates things. There is nothing but things. Through the difference come *things-in-themselves*. The self of each thing-in-itself is constructed from the selves of the other things-in-themselves. From the *others*. But the others is not world. World is the others *and nothing*. The self of each thing-in-itself is *constructed*. There is structure. Things are secured as *things-in-themselves* by the structure. Through the structure things can be *compared*. Through comparison comes *not*. Through *not* comes *possibility*. Now we have moved beyond things, into *nothing*. Let's return to things and structure. Let's bring back with us "not". What is "not"? *Not is the boundary as a solid line that separates without joining*. The structure of things manifests through not. Not is at the edge of

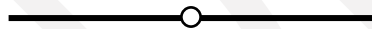
things. Not is a logical operator. Not is at the edge of things-as-ideas. *Statements* about things. Assertions. Not is binary. Not brings the *law of the excluded middle*:

"For any statement A, either A or not-A must be true and the other must be false."

[Weisstein]

From this structure comes a *form* of thinking. This form of thinking is decisive, clear, empowered. *CONCEPTUAL DISCOURSE*. Conceptual discourse excels in presenting an idea and "distinguishing this idea properly from other ideas" [Heidegger 1975, 190]. But it wants when thinking near the boundaries of ideas. Why? Because "not" *defines* what we mean by "is" in representing world through a structure of statements. "Not" *limits* what we mean by "is" in representing world through a structure of statements. Truth works through "not". But "not" is *limiting*. Thinking encounters a barrier. *The boundary as a solid line that separates without joining*. Meaning eludes thinking. Thinking encounters *nothing as lack*. Thought becomes uncharacteristic, off-putting, "out of tune". *Absurd* [Sartre 1994].

In *Language*, Heidegger is trying to penetrate this barrier. Let's return to things and world and the division in dif-ference. Through division, things come to presence as things separate from world and from each other. Separation is *spatial*. Separation is like the space between objects. The division of dif-ference brings *space*. Space is the between of objects. An emptiness. A clearing. Space is like the between of objects in the room. The between of objects in the room is a *metaphor* for what we mean by space. The division in dif-ference brings *metaphorical space*. An opening.



A metaphor is "a figure of speech in which a word or phrase is applied to something to which it is not literally applicable" [Oxford Dictionary]. In metaphor things are brought together linguistically in an implied comparison. "Comparison" is not the right word here. The relation in metaphor is more intimate. In its most common form, the metaphor is a statement of identity of the type "A is B", where A and B are said to be the same thing, although they remain two different things [Frye 1990a, 71]. Metaphors work in the dif-ference between things, in the space between things.

"... in metaphors of the type 'A is B' the 'is' is not really a predicate at all. The real function of the 'is' in 'Joseph is a fruitful bough' is to annihilate the space

between the 'Joseph' who is there, on our left as it were, and the 'bough' which is there, on our right, and place them in a world where everything is 'here' ."

[Frye 1990b, 118]

Metaphor is an assertion that is not an assertion. That is to say, an assertion that is not of the type governed by the law of the excluded middle. Metaphor is removal from such assertions. Metaphor dissolves the boundaries, bringing together relations, associations, figurations outside the structure. In language, this happens by freeing up the relation between words as signifiers and what they signify [Frye 1990b, 108-15]. Ambivalence, ambiguity, *resonance*. Freeing up the relation between the expression of ideas and what they express. A different form of thinking emerges. Flowing, unfixing, ungrounding. Clarity, sharpness, precision are deferred to images, associations, patterns.

POETIC RESONANCE. It is thinking and it is not thinking. Whereas the dividing of conceptual discourse brings separateness definition essence, the uniting of poetic resonance brings sameness identification *belonging*. This *belonging* is a different relatedness than "being-with". In "being-with", each is separate. In *belonging*, there is identifying, merging, joining in difference. Heidegger writes:

"We stubbornly misunderstand this prevailing *belonging* together of man and Being as long as we represent everything only in categories and mediations, be it with or without dialectic. Then we always find only connections that are established either in terms of Being or in terms of man, and that present *belonging* together of man and Being as an intertwining.

"We do not as yet enter the domain of *belonging* together. How can such an entry come about? By our moving away from the attitude of representational thinking. This move is a leap in the sense of a spring. The spring leaps away, away from the habitual idea of man as the rational animal who in modern times has become a subject for his objects. Simultaneously the spring also leaps away from Being. But Being, since the beginning of Western thought, has been interpreted as the ground in which every being as such is grounded.

"Where does the spring go that springs away from the ground? Into an abyss? Yes, as long as we only represent the spring in the horizon of metaphysical thinking. No insofar as we spring and let go."

[Heidegger 1969, 32]

"... man meets what exists and becomes as what is over against him, always simply a single being and each thing simply as being ... nothing is present for him except this one being, but it implicates the whole world ... these meetings are not

4. Danse sur glace

organized to make the world, but each is a sign of world-order ... the world which appears to you in this way is unreliable, for it takes on a continually new appearance ... it has no density, for everything in it penetrates everything else; no duration, for it comes even when it is not summoned and vanishes even when it is tightly held ... it comes, and comes to bring you out ... it is your present; only while you have it do you have the present ... you can make it into an object for yourself, to experience and to use; you must continually do this—and as you do it you have no more present ... you cannot make yourself understood with others concerning it, you are alone with it ... but it teaches you to meet others ... it leads you away to the Thou in which the parallel lines of relations meet."

[Buber 1958, 32-33 (deletions and ellipses added)]

The line opens



4. Danse sur glace

dispersion

as light scatters through morning mist
all is subtly born
in shape and form alone

a loon calls
through the grey
dream of the blood moon

dream related
to the architecture of water

the sound of this paddle
dipping beneath the surface

blurred
echoes
echoing

in the beginning
I am

*I am
in the beginning*

*echoing
echoes
blurred*

*dipping beneath the surface
sound of this paddle*

*to the architecture of water
dream related*

*of the blood moon
through the grey
a loon call*

*in shape and form alone
all is borne
as light scatters*

l'inconnu

last night
i wrestled with a man
unseen
untouched by light
whose subtle bondage
manifested
in resistance

that night fragmented memory

and as i struggled
he matched my strength
measure for measure
grinding me into the concrete
while all about us
faces gathered
from the shadows

voices in the dark

last night
i wrestled with a man
unseen
untouched by light
and where i held him
there
against my skin
was a surface of darkness
strangely revealed



Relating Connecting Merging Love Excess Risking Threatening Annihilating

Here is the chora.

The chora is the semiotic [Kristeva 1986, 89-136]. Drives and energies, rhythms and patterns. The chora is process, temporal, changing. The chora is body, unconscious. Ordering, separating, departure.

The chora brings *birth*.

In the chora, thinking is rhythms, tracings, patterns. The thinking before thinking. Ephemeral. Elusive. Changing.

In the chora, poetic resonance dissolves boundaries, threatens structures, unfixes thought. The place of creation. The receptive. Dynamic. Pregnant with thought. Thoughts that are not thought. Intimated. Suggested. Ordered, gathered, patterned. Formed.

New.

New through the rupture. The boundary. The *thetic* [Kristeva 1986, 99].

The chora threatens the structure of thought. The thetic boundary separates the semiotic from the structure. Posits thought. Fixes Thought. Manifests thought. Thoughts and chora. Things and world.



4. Danse sur glace

Here we begin. Positing a thesis of the text.

THE EXCLUDED INITIATIVE OF CONCEPTUAL DISCOURSE FORMS IN POETIC RESONANCE. THIS *MEANS* PLATO'S EXPULSION OF THE POETS.

NAMELY, HIMSELF.

DRAFT

The forth calling

*The forth calling is undisclosed.
The forth calling is silent. The still point.
The forth calling is transcendent. Return*

“Window with falling snow is arrayed
Long tolls the vesper bell.
The house is provided well,
The table is for many laid.

“Wandering ones, more than a few,
Come to the door on darksome courses.
Golden blooms the tree of graces
Drawing up the earth's cool dew.

“Wanderer quietly steps within;
Pain has turned the threshold to stone.
There lie, in limpid brightness shown,
Upon the table bread and wine.”

[Trakl in Heidegger 1975]

Now the house is church; the bread and wine, sacraments; the tree of graces, Life

Now a quiet winter evening

PART III: Contemplation in two voices for piano and flute

*“The spirit of the valley never dies.
It is called the mystic female.
The door of the mystic female
is the root of heaven and earth.*

*“Continuously, continuously,
it seems to remain.
Draw upon it
and it serves you with ease”*

[Tao Te Ching VI]

“All science is the search for unity hidden in likenesses ... The scientist looks for order in the appearance of nature by exploring such likenesses. For order does not display itself of itself; if it can be said to be there at all it is not there for the mere looking. There is no way of pointing a finger or a camera at it; order must be discovered and, in a deep sense, it must be created. What we see, as we see it, is mere disorder ... We re-make nature by the act of discovery, in the poem or in the theorem”

[Bronowski 1956, 23;24;32 (ellipses and deletions added)]

*“Looked at but cannot be seen —
that is called the invisible.
Listened to but cannot be heard —
that is called the inaudible.
Grasped at but cannot be touched —
that is call the intangible.
These three elude all our inquires
and hence blend and become one.*

*“Not by its rising is there light,
nor by its setting is there darkness.
Unceasing, continuous,
it cannot be defined,
and reverts again to the realm of nothingness”*

[Tao Te Ching XIV]

4. Danse sur glace

“2.21 A picture agrees with reality or fails to agree; it is correct or incorrect, true or false.

“2.22 What a picture represents it represents independently of its truth or falsity, by means of its pictorial form.

“2.221 What a picture represents is its sense.

“2.222 The agreement or disagreement of its sense with reality constitutes its truth or falsity.

“2.223 In order to tell whether a picture is true or false we must compare it with reality.

“2.224 It is impossible to tell from the picture alone whether it is true or false.

“2.225 There are no pictures that are true a priori.

“3. A logical picture of facts is a thought.”

[Wittgenstein 1977, 10]

*“The changes is a book
from which one may not hold aloof.
Its tao is forever changing —
alteration, movement without rest,
flowing through the six empty places;
rising and sinking without fixed law,
firm and yielding transform each other.
They cannot be confined within a rule;
it is only change that is at work here.*

...

*First take up the words,
ponder their meaning,
then the fixed rules reveal themselves.
But if you are not the right man,
the meaning will not manifest itself to you.”*

[The Great Treatise II: VIII, I Ching]

4. Danse sur glace

“6.54 My propositions serve as elucidations in the following way: anyone who understands me eventually recognizes them as nonsensical, when he has used them—as steps—to climb up beyond them. (He must, so to speak, throw away the ladder after he has climbed up it.) He must transcend these propositions, and then he will see the world aright.

“7. What we cannot speak about we must pass over in silence”
[Wittgenstein 1977, 74]

DRAFT

Acknowledgements

I am indebted to Jim Olthius, Albert Fuller, Linda Waybrant, Tony Marques and Allen Sutterfield for their inspiration and encouragement.

References

Bronowski, Jacob. *Science and Human Values*. New York: Harper & Brothers Publishers, 1956.

Buber, Martin. *I and Thou*, translated by Ronald Gregor Smith. New York: Charles Scribner's Sons, 1958.

Frye, Northrop. *Words with Power: Being a Second Study of "The Bible and Literature"*. Toronto: Penguin Books, 1990a.

Frye, Northrop. "The expanding world of metaphor," in *Northrop Frye: Myth and Metaphor, Selected Essays, 1974-1988*, edited by Robert D. Denham. Charlottesville: University Press of Virginia, 1990b.

Heidegger, Martin. "The Origin of the Work of Art," in *Basic Writings: From Being and Time to The Task of Thinking*, edited by David Krell. San Francisco: Harper, 1993.

Heidegger, Martin. "Language," in *Poetry, Language, Thought*, translated by Albert Hofstadter. New York: Harper Colophon Books, 1975.

Heidegger, Martin. *Identity and Difference*, translated by Joan Stambaugh. New York: Harper and Row Publishers, 1969.

I Ching, translated by Wilhelm R, rendered into English by C. Baynes. Princeton: Princeton University Press, 1990.

Kristeva, Julia. "Revolution in poetic language", in *The Kristeva Reader*, edited by Toril Moi. New York: Columbia University Press, 1986.

The Oxford Concise Dictionary. Oxford: Oxford University Press, 1999.

Sartre, Jean Paul. *Being and Nothingness*, translated by Hazel E. Barnes. New York: Gramercy, 1994.

Tao Te Ching in The Wisdom of Laotse, translated by L. Yutang. New York: Random House Inc., 1976.

4. Danse sur glace

Weisstein, Eric. Law of the Excluded middle law, in *Mathworld—A Wolfram Web Resource*. [Accessed August 7, 2011: <http://mathworld.wolfram.com/LawoftheExcludedMiddle.html>].

Wittgenstein, Ludwig. *Tractatus Logico-Philosophicus*, translated by D.F. Pears and B.F. McGuinness. London: Routledge and Kegan Paul Ltd, 1997.

DRAFT

5. The proximity of light: a deconstruction of space

A deconstruction of the implicit notion of Absolute space that dominates modern physics. The deconstruction is enacted by juxtaposing the common notion of Absolute space abstracted from Newton's *Philosophiae Naturalis Principia Mathematica* with Levinas' particular present treatment of space in *Otherwise than Being: Or Beyond Essence*.

Introduction

This paper is the script of a performance—an *étude*. Using fragments of Newton's text, cited and recited in a common discourse, a specific and appropriated picture of the ontological structure of classical physics is presented. Another voice, separate and proximate, interrupts this discourse, scintillating language and resonating metaphor. Tropes and figures push from a classical ontology embedded in reciprocal duality towards a promised Otherwise within an irreducibly threefold relatedness. Drawing from Levinas' postmodernism, the paper intimates the rupture of spatiality in the proximity of light—a deconstruction of the entrenched notion of spatiality in the movement from a geometry of being (ontology) to a grammar of signifyingness (ethics). Drawing from Einstein's physics, the paper intimates a specific way in which generality is manifested in subjective relativism through the trace.

The spatiality of space

Let our starting point be Newton's concept of Absolute space¹. This concept grounds classical physics and is the traditional place from which the leap to Einstein's special relativity theory is taken. In its concreteness, this concept can also function metaphorically as a *trope* for approaching Levinas' critique of ontology.

For Newton, space is an entity in itself: the distinct container of what is real [Huggett 2002, 126-133]. Newton's Absolute space is a literal Euclidean structure in which the spatial points are possible locations for material objects (bodies). No body can exist without space. Spatial points, on the other hand, exist whether or not they are occupied by bodies. Eternal in duration, immutable in nature, Newton's Absolute space situates an ontological structure for the universe. In *De Gravitatione* Newton writes, "Space is a disposition of being *qua* being. No being exists or can exist which is not related to space in some way. God is everywhere, created minds are somewhere, and body is in the space that it occupies; and whatever is neither everywhere nor anywhere does not exist. And hence it follows that space is an effect arising from the first

¹ This paper is not intended to be a careful study of Newton's concept of Absolute space. Rather a common reading of Newton is appropriated to motivate the deconstruction of the notion of spatiality.

5. The proximity of light

existence of being, because when any being is postulated, space is postulated." [cited by Huggett 2002, 112]

"But then no transcendence other than the factitious transcendence of worlds behind the scenes, of the Heavenly City gravitating in the skies over the terrestrial city, would have meaning. The Being of beings and of worlds, however different among themselves they may be, weaves among incomparables a common fate; it puts them in conjunction, even if the unity of Being that assembles them is but an analogical unity. Every attempt to disjoin the conjunction and the conjuncture but emphasizes them. The there is fills the void left by the negation of Being." [Levinas 2002, 4]

Newton's approach offers some insight into the nature, the figure, the *spatiality*, of space. Let us trace some of its characteristics.

Sameness — Newton's space is homogenous: every point in space is exactly like every other point. Leibniz, for example, describes Newton's space as "something absolutely uniform and, without the things placed in it, one point of space does not absolutely differ in any respect whatsoever from another point of space" [cited by Huggett 2002, 147]. Space thus plays the role of an ubiquitous field of uniformity or sameness upon which reality is inscribed. There is no radical alterity in space. Within this homogeneity, Newton theorizes acceleration, force, power, as primary thematizations of motion and change.

"A philosophy of power, ontology is, as first philosophy which does not call into question the same, a philosophy of injustice ... Being before the existent, ontology before metaphysics, is freedom (be it the freedom of theory) before justice. It is a movement within the same before obligation to the other." [Levinas 1969, 47]

Contiguity — Newton's space is a continuum. As he writes in *De Gravitatione*, "... spaces are everywhere contiguous to spaces, and extension is everywhere placed next to extension, and so there are everywhere common boundaries to contiguous parts..." [cited by Huggett 2002, 111]. There is no apparent rupture in space. This imparts upon space, as container, an affinity for analysis, for analyticity, for invoking an excluded middle to differentiate and bring together again without loss or excess. Upon this assumption of contiguity, Newton brings forth a calculus of differentiation.

"But then the term proximity would have a relative meaning and, in the space inhabited by Euclidean geometry, a derivative sense. Its absolute and proper meaning presupposes 'humanity' " [Levinas 2002, 81]

Simultaneity — For Newton, the universe is a totality: an assemblage of bodies in instantaneous and simultaneous relationship. Like the metaphor of a rigid body, like the earth as fixed correlation, the universe is a *state* in space. Space is the rigidity, the instantaneous infinite correlation, the assemblage of simultaneity. Time is added separately, so the universe is

5. The proximity of light

seen as a continuous succession of states in space. Newton writes: "... for we do not ascribe various durations to the different parts of space, but say that all endure together. The moment of duration is the same at Rome and at London, on the Earth and on the stars, and throughout all the heavens. And just as we understand any moment of duration to be diffused throughout all spaces, according to its kind, without any thought of its parts, so it is no more contradictory that Mind also, according to its kind, can be diffused through space without any thought of its parts." [in *De Gravitatione*, cited by Huggett 2002, 113]. Newton imagines the universe as a totality in a succession of simultaneous existences. This metaphorical *picture* informs ontology. What is real, what exists, what *is* ... is the state. Space is the container of this totality and Newton's universe ontologically privileges space.

"The beings remain always assembled, present, in a present that is extended, by memory and history, to the totality determined like matter, a present without fissures or surprises, from which becoming is expelled, a present largely made up of re-presentations, due to memory and history." [Levinas 2002, 5]

We will have more to say of spatiality, but before we move on, we need to unpack the temporal dimension, the nature of change.

Limits of spatiality

Change is a tricky concept in physics, and Newton's theories are no exception. To Absolute space, he adds Absolute time, keeping the two always orthogonal and unmixed. The question of change is enfolded into the question of motion.

"It is the verbalness of the verb that resounds in the predicative proposition; the dynamism of entities is designated and expressed by verbs secondarily, by reason of its privileged exposure in time. The effort to reduce verbs to functions of signs naïvely presupposes the division of entities into substances and events, into statics and dynamics, to be original." [Levinas 2002, 39]

In order to address the foundations of Newton's space-time, it is helpful to go farther back, to a pre-citation of the problem of motion, to the earlier Greeks, to the paradoxes of Zeno. Two such paradoxes are presented below²:

The Dichotomy — Motion is impossible. Consider the case of an arrow launched from a bow, for example. In order to reach the target, the arrow must first travel half the distance to the

² This discussion of Zeno's paradoxes is taken from Huggett [2002].

target, then half the remaining distance, and so on eternally. The target can never be reached because this requires traversing an infinite number of finite distances—a task that should take an infinite amount of time. Yet arrows do reach targets.

The Arrow — Time is a succession of instants, which are themselves indivisible points. Consider the arrow described above. At any instant of time the arrow must be at rest, because if it were to move during the instant, time must pass. For time to pass it must be divisible into before and after, and therefore it is not an indivisible instant. But if the arrow is at rest at every instant in time, there is no motion. Yet the arrow moves.

Modern analysis resolves these apparent contradictions through a mathematical limiting procedure. Roughly interpreted, the arrow successfully reaches the target because increasingly smaller distances are traversed in increasingly smaller times such that the sum of the distances and the times both remain finite, *even in the limit of infinite division*.

"The idea of the infinite is not an intentionality for which the Infinite would be the object. Intentionality is a movement of the mind adjusted to being. It takes aim and moves towards a theme ... The idea of the infinite consists precisely and paradoxically in thinking more than what is thought while nevertheless conserving it in its excessive relation to thought. " [Levinas 1962, 19]

The underlying construct for analysis of motion is the notion of a trajectory, or function. The arrow is described as tracing out a *path* in space as a *function* of time — $x(t)$. The functional relation, $x(t)$, connects the specific point in space, x_i , where the arrow is found at each specific instant of time, t_i . Motion occurs "if at every instant during the journey the arrow is at the appropriate place along the trajectory" [Huggett 2002, 50].

Huggett calls this the "at-at theory of motion". In this construct, instants are point-like and have no parts. As with Zeno's paradox, motion during any instant is impossible, because if the arrow moves during an instant, say t_i , then t_i has before and after parts and therefore is not an instant [Huggett 2002, 48-9]. Although motion does not occur at any instant, there is motion by virtue of the whole trajectory, which describes the arrow at successive positions during successive times.

An *average* velocity can be defined for the arrow as the ratio of distance traveled to time taken. This definition requires *two* distinct points in space and time [Bell 2005, 9]. The average velocity is a property of the trajectory and is a construct that invokes both sameness and simultaneity, since the two reciprocal points must, in some sense, exist together. The *instantaneous* velocity then becomes the limit of the average velocity over increasingly closer space-time points. As Huggett writes: "An arrow is moving if its instantaneous velocity is nonzero, given by:

$$\frac{dx}{dt} \equiv \lim_{\Delta t \rightarrow 0} \frac{x(t + \Delta t) - x(t)}{\Delta t} \quad \text{Equation (1)}$$

5. The proximity of light

Thus the arrow is moving at time t as long as it is at an appropriate series of points at the series of subsequent times $t+\Delta t$." [Huggett 2002, 50].

While modern analysis may formally resolve Zeno's Dichotomy paradox, it presents new challenges regarding the interpretation motion. These challenges relate to the concept of infinitesimal and the notion of an instantaneous rate of change of a varying quantity [Bell 2005].

The arrow doesn't move at any instant, yet there is motion. The discrete picture above presents motion as successive snapshots in time. Intuitively we have a different sense of motion that involves the idea of continuous variation or flow, for example through space and time. I will call this intuitive notion "motion proper". In motion proper there is continuous change, passing, *diachrony*. In some sense, motion proper is *excluded* by the analytic construct, which, in fact, does not allow motion at any instant. Differential calculus circumscribes this exclusion through a limiting procedure.

In the presentation above, the issue of exclusion comes from the fact that instants are represented as points, whereas velocity is represented as a two-point relation³. Motion proper is marginalized to the "gaps" connecting the discrete instants of time. In the limit that these gaps become infinitesimally close, the motion "occurs" by virtue of the spatio-temporal correlation $x(t)$. Equation (1) defines a differential operator, dx/dt , through such a limiting process. This differential operator, in some sense, marks the *trace* of the exclusion of motion proper. By this I mean, the differential operator is a signifier of motion proper, but this motion is, in fact, *outside* of the [discrete] description. Of course, the limiting procedure closes the gaps and recasts the description of motion as a continuous trajectory. We might think of the temporal trajectory in the metaphor of a thread: the differential operator then represents the cutting and re-tying of the thread. In this limit, Huggett argues, it no longer makes sense to speak of the motion as occurring in the "gaps" (or knots⁴ of the thread) since there are no gaps. He writes: "One might feel that motion occurs if from one instant to the next the arrow flows from one place to the next, but this would be misleading, because space and time are dense and so there is no 'next' point. Instead, objects move simply by being at a continuous series of locations over a continuous interval of instances." [Huggett 2002, 50].

"... the intervals are not recuperated. The discourse which suppresses the interruptions of discourse in relating them together, does it not maintain the discontinuity behind the knots where the thread is retied? ... The interruptions of discourse, recovered and related within the immanence of the said, are conserved as the knots in a retied thread, the

³ This discussion is based on a particular reading of differential calculus which is not the only reading, nor the most rigorous. Other readings, however, are expected to manifest similar problems of spatial embedding.

⁴ Nots? Naughts? See also Derrida [1982 and 1991].

5. The proximity of light

tracing of a diachrony which does not enter into the present, refusing itself to simultaneity" [Levinas 2002, 170, as excerpted by Derrida 1991, 21]

I would like to argue that the exclusion of motion proper remains relevant because it establishes limits to the meaning of the analytic construct vis à vis motion. Like with spatiality, there is an assumption that motion is occurring in a spatio-temporal field of sameness, contiguity and simultaneity (totality). The possibility remains that actual motion does not fit within the construct—a possibility to be explored in this paper. As Bergson writes in *The Creative Mind*: "If it is a question of movement, all the intelligence retains is a series of positions: first one point reached, then another, then still another. But should something happen between these points, immediately the understanding intercalates new positions, and so on indefinitely. It refuses to consider transition; if we insist, it so manages that mobility, pushed back into more and more narrow intervals as the number of considered positions increases—recedes, withdraws and finally disappears into the infinitely small ... It is only a step from there to seeing in movement just a series of positions; the duration of movement will then break up into 'moments' corresponding to each of the positions. But the moments of time and the positions of the mobile are only snapshots which our understanding has taken of the continuity of movement and duration. In these juxtaposed views one has a practical substitute for time and movement which conforms to the exigencies of language until such time as language lends itself to the exigencies of computation; but one has only an artificial means of recomposing: time and movement are something else ... " [Bergson 1976, 15-6].

Let us examine the situation more closely. The analytic construct above represents motion as successive binary relations between spatio-temporal points as in Figure 1.



Figure 1 : Binary relation between successive points on a trajectory—reciprocity obtains in the sense that adjacent spatial points "exist" simultaneously.

There is an embedded structure in this representation, which implicates the spatio-temporal structure (space-time) in which motion occurs—the structure of contiguity. The infinitesimal—infinite dividing—is constrained and limited to the immanent field of spatiality embedding the points and represented as the arrow in Figure 1.

5. The proximity of light

"They appear in opposition to a synoptic gaze that encompasses them; they already form a totality which, by integrating the metaphysical transcendence expressed by the idea of infinity, relativizes it." [Levinas 1969, 53]

Since we began with an assumed spatio-temporal structure in speaking of motion, namely, Absolute space and Absolute time, the structural underpinnings can be easily forgotten or ignored. The possibility remains, however, that the motion of the arrow is incompatible with the assumed spatio-temporal structure (space-time). For example, a passing, or diachrony, inherent to motion may haunt the representation in surprising ways.

"Nearly always with him, this is how he sets his work in the fabric: by interrupting the weaving of our language and then by weaving together the interruptions themselves, another language comes to disturb the first." [Derrida 1991, 18].

The Newtonian agenda is to continue operating on time by cutting and re-tying the thread. For example, acceleration is defined by the action of the differential operator on velocity; forces are theorized to account for its presence. In this way—through Absolute space—smoothness and analyticity are inscribed into the temporal.

But suppose, as diligent postmodernists, we invert the whole construct.

Suppose, instead of taking the spatio-temporal structure and the existence of trajectories as foundational, we begin with the differential operator as the trace of motion itself (motion proper?). Recall that the differential operator relates two distinct space-time points that are infinitesimally close. Let us think of this as a *cutting function* that differentiates points in space-time. Immediately we are confronted with the fact that it is also a *joining function* that merges distinct space-time points. In the differentiation, the difference inherent in two distinct space-time points is deferred.

Suppose, instead of starting with a given space-time structure, we take this cutting-joining operator as a priori. Through this differential operator space-time points are differentiated and therefore come into representation. And through this operator, space-time points are joined and therefore brought into a particular spatio-temporal relation or structure in which the motion occurs.

How does this work? The differential operator cuts the fabric of spacetime. This is the primal act of differentiation. In this cutting, the set of space-time points comes into representation as discrete and static entities. But not entirely. The operator also joins what has been cut, bringing the space-time points into continuous relation, deferring their separate identity. A tearing of the fabric brings forth spacetime in a particular structural representation. This *means* motion—motion as the exploration and articulation of space-time.

5. The proximity of light

But now the foundation gives way. The spatio-temporal structure is articulated by virtue of the discreteness of space-time points, which obey the law of the excluded middle—the position of the arrow is either (x_i, t_i) or not (x_i, t_i) . But the differential operator is precisely an Other of this discreteness. The in-between. The blurring of separate identity. Therefore, the differential operator, which allows the spatio-temporal structure obeying the law of the excluded middle, is the trace of the violation of this law. It privileges distinct point-like structure by deferring ambiguity. The meaning and articulation of motion arises from the way in which the differential operator continually represents and undermines the structural foundation of space-time⁵.

"In re-presentation, the Infinite would be belied without ambiguity, as though it were an infinite object which subjectivity tries to approach but misses." [Levinas 2002, 154].

But here is the rub. As we are presenting it, the differential operator still embeds *spatiality*. In the description above, the space-time points are Euclidean, partaking of sameness, contiguity and simultaneity (although here simultaneity means assembled totality in space *and* time). In speaking of their differentiation, points must be represented contemporaneously and therefore in reciprocal relation. The embedded structure partakes of a *reciprocal duality*, which is the assumed relatedness of two contiguous points in space-time. Much like the operator AND, this reciprocal duality assembles points in time, just as it does in space.

"The reversibility of a relation where the terms are indifferently read from left to right and from right to left would couple them the one to the other; they would complete one another in a system visible from the outside. The intended transcendence would be thus reabsorbed into the unity of the system, destroying the radical alterity of the other. Irreversibility does not only mean that the same goes unto the other differently than the other unto the same. That eventuality does not enter into account: the radical separation between the same and the other means precisely that it is impossible to place oneself outside of the correlation between the same and the other so as to record the correspondence or non-correspondence of this going with this return. Otherwise the same and the other would be reunited under one gaze, and the absolute distance that separates them filled in." [Levinas 1969, 36].

Now, perhaps, we can see that there is betrayal of *diachrony* in this representation of time. We have assimilated time into space. We have excluded passing, becoming, changing. We have totalized space and time.

⁵ Bell has developed an interesting alternative to the usual formalism of calculus in terms of limits. He calls this "smooth infinitesimal analysis". In this formalism, he recasts the analysis in terms of a nilsquare infinitesimal, δx , which is so *small* (but not demonstrably equivalent to 0) that $(\delta x)^2 = 0$. He claims to derive the same results as calculus; however, the postulates of smooth infinitesimal analysis are incompatible with the law of the excluded middle of classical logic. [Bell n.d. and 1998].

"The verb to be—field of synchronizable diachrony, of temporalization, that is, field of memory and historiography—becomes a quasi-structure and is thematized and shows itself like an entity" [Levinas 2002, 42].

Beyond spatiality

Let us return to Newton's Absolute space. Recall our starting point, namely, the way in which bodies are inscribed *literally* in Newton's Absolute space discloses the way in which beings are inscribed *figuratively* in Levinas' portrait of ontology.

Consider the Newtonian picture of space-time represented in Figure 2.

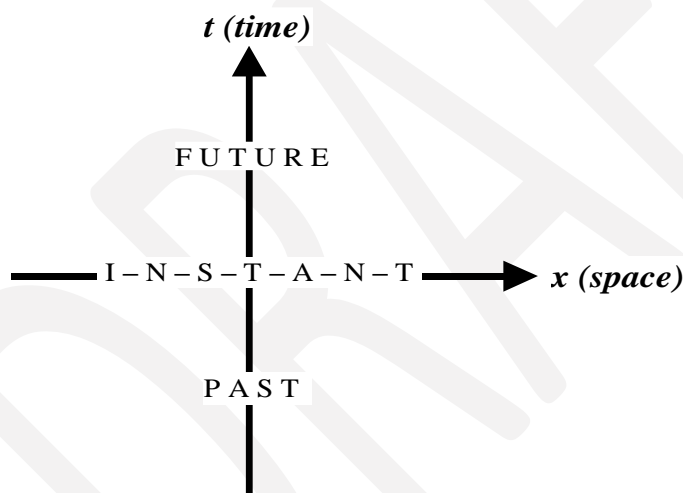


Figure 2 : Past, present (Instant) and future in Newtonian space-time. The Newtonian present is an Instant of absolute simultaneity (spatiality) at $t=0$.

In this picture, space and time are absolutely orthogonal, allowing us to envision time as a series of absolute Instants. In each Instant, space—the container of simultaneity—contains what exists in that Instant. Along with Newton, we have said what is simultaneous in the Instant is what is "real" in the Instant. Let us call this the Instantaneous Real. What exists in the Instant, exists for all observers in the Instant. The Instantaneous Real is objectively the same for all observers. An "ideal observer" could, in principle, take in the totality of the Instantaneous Real in a single Instant of time. From this can come an ontology of simultaneity—a spatially

privileged ontology. Prior to the Instant is the past and after the Instant is the future. This picture is objective and universal.

But who observes this picture?

"... this leads us to surprise the Who that is looking, the identical subject, allegedly placed in the openness of Being, as the crux of a diachronic plot (which remains to be determined) between the same and the other." [Levinas 2002, 25].

In discussing the Absolute nature of space and time, Newton crafts what we might now call thought experiments. In Huggett's citing of Newton, these experiments typically begin with empirical, embodied observers interacting with a physical system, like a rotating bucket or two rotating globes, all within the physical universe of observers, observed system, earth, stars and everything else. He then imaginatively transports the observed system outside of the physical universe into a vacuum that is Absolute space. In his thought experiments, it is unclear where the observers stand in this vacuum, but it seems as if they are imagined to be "outside" of the finite universe which is now the observed system, yet connected spatially to it, and able to interact with it. In some sense, the empirical, embodied observers are continuously transported, *without rupture*, into ideal observers who take in the whole universe at once and as separate from themselves. This is the metaphorical trope of Newton's objectivity. It can be seen as an *effacing* of the physical embodiment of the observer. In this trope, there is the assumption that embodied experience is identical with an ideal observer who can, in some sense, be outside of the universe, grasping its totality at once. Newton's Absolute space is the medium that enables this identity by connecting the ideal observer to the metaphorically finite (whole, total) universe at an Instant. Newton postulates that an ideal observer grasping the totality of the universe would be embodied in the same substantial space as empirical observers, such as ourselves, who are bound in the physical universe. Or, put another way, Newton's Absolute space is the transcendent continuum that connects embodied empirical existence with ideal observation of totality. Absolute space can play this role because of its indifference to the physical universe. Because, as Newton writes in *Principia Mathematica*, "Absolute space, in its own nature, without relation to anything external, remains always similar and unmovable." [as cited by Huggett 2002, 118].

"There is indifference, a purely negative reference, of the system to what comes to pass outside the system. In fact outside the system there takes place the extraordinary event of knowing, which could not affect the system it thematizes. Subjectivity qua knowing is thus subordinated to the sense of objectivity." [Levinas 2002, 131-2]

Absolute space *functions* in Newton's thinking to bridge ideal totality with empirical experience. Of course, the legitimacy of this movement can be brought into question. For example, Mach has objected on the grounds that it is purely imaginative. Given our discussion so far, we might object on the grounds that it places the empirical observer and the ideal observer in a relation of reciprocal duality. As a counter example to be explored later in this paper, in Special

5. The proximity of light

Relativity it may be more reasonable to postulate the transcendent as non-spatial and differently related to the space-time manifold. Here the metaphorical equivalent of Newton's ideal observer must stand outside of the embodied space *and time* manifold in order to grasp a totality to the relativistic universe, if such a metaphor even has meaning⁶.

"The subjectivity of the subject would always consist in effacing itself before being, letting it be by assembling structures into a signification, a global proposition in a said, a great present of synopsis in which being shines with all its radiance." [Levinas 2002, 134].

With Newton's help, we have here crafted a figure of objectivity as the effacing of the subject in a transcendental perception presented through space either literally or, perhaps, figuratively. But what is the nature of this transcendental perception? Clarke writes, "Sir Isaac Newton doth not say, that space is the organ which God makes use of to perceive things by; nor that he has need of any medium at all whereby to perceive things: but on the contrary, that he, being omnipresent, perceives all things by his immediate presence to them, in all space wherever they are, without the intervention or assistance of any organ or medium whatsoever. In order to make this more intelligible, he illustrates it by a similitude: that as the mind of man, by its immediate presence to the pictures or images of things, form'd in the brain by the means of the organs of sensation, sees those pictures as if they were the things themselves; so God sees all things, by his immediate presence to them; he being actually present to the things themselves, to all things in the universe; as the mind of man is present to all the pictures of things formed in his brain." [excerpted by Huggett 2002, 144].

"The veracity of the subject would have no other signification than this effacing before presence, this representation." [Levinas 2002, 134].

In Newton's metaphysic, the subject, as empirical observer, gives itself over to the system, in this case the physical Universe in Absolute space. As a result, there is no *interiority* to subjectivity. You might recall here a previous citation of Newton, " ... so it is no more contradictory that Mind also, according to its kind, can be diffused through space without any thought of its parts". Following Levinas, as an isolated element outside of the totalizing system (embodied subjectivity in Absolute space), Newton's proposed subjectivity is obscured by its *nonsignifyingness* [Levinas 2002, 133] and, as Mach has objected, the thought experiments, which involve removing the observing subject from all context, verge on *meaninglessness*. Pushed further, Newton's metaphysic is faced with an ethical challenge, when Mind manifests *two* observers. For, although one observer might, in some sense, observe the physical universe and all that it contains, in what sense can he observe the observation of the second? In what

⁶ Indeed, I hope this paper suggests that such exteriority is the *meaning* of the absolute nature of light and that this exteriority, which is otherwise than spatiality, invokes a new class of metaphors—language, signification and trace, for example.

5. The proximity of light

sense can he know the mind of another? As Levinas re-iterates, the classical route through transcendental (ap)perception is prone to invoking the authority of the same and therefore violating the sanctity of the Other. For Levinas, movement beyond objectivity, which happens through *rupture* in the idea of the Infinite, maintains the same-other alterity.

"Eschatology institutes a relation with being beyond the totality or beyond history, and not with being beyond the past and the present. Not with the void that would surround the totality and where one could, arbitrarily, think what ones likes, and thus promote the claims of a subjectivity free as the wind. It is a relationship with a surplus always exterior to the totality, as though the objective totality did not fill out the true measure of being, as though another concept, the concept of infinity, were needed to express this transcendence with regard to totality, non-encompassable within a totality and as primordial as totality." [Levinas 1969, 23]

Rupture

Let us return to Newton's Absolute space. Recall that this space is homogeneous and therefore invested with symmetry. However, as Leibniz first pointed out, once the universe is placed within this space, the symmetry is broken, because the placing of the universe is unique. The Universe, for example, is *here* and not *there* in Absolute space. Huggett writes: "Imagine a second universe just like ours except that all the matter is located in (i.e., shifted to) another place in absolute space, without any change in the relations of one object to another. Since space is a Euclidean plane, the two places are exactly alike, and so no differences will be seen." [Huggett 2002, 163]. The two universes would, however, differ in that they are located differently within Absolute space. Broken symmetry (in this case, translational symmetry) specifies a uniqueness in Absolute space, a "here it is" of the universe. For example, the centre of mass of the universe would point to a specific point in Absolute space, to the *place* where the centre of mass is located⁷. Moreover, as Leibniz deplores, there is no accounting for the spontaneously broken symmetry that places the centre of mass of the universe uniquely "here" in Absolute space and not elsewhere. A priori, the placing of the universe is indeterminate. Absolute space lacks origin.

We are here entering into a structure—a relation between the universe and Absolute space—that is like signification. That is to say, *the question of signification and the question of broken translational symmetry are metaphorically equivalent*. The location of the centre of mass of the universe in Absolute space is like a sign. The centre of mass of the universe is the material thing—like a signifier. It refers, or points, to a signified, namely, a unique position in Absolute

⁷ Here I am using the "centre of mass of the universe" as a global index—notwithstanding the problems of existence and definition—to manifest the problem of systematic signification. Systematic signification remains within the arena of ontology, unlike *signifyingness*.

5. The proximity of light

space. And the sign-like entity, of which we are speaking here, is indexical. From this, we can build a case for any number of signifiers, like the centre of mass, which refer to positions in space⁸. These positions, or signifieds, in turn constitute the System, which is Absolute space. The signification of the relations, however, remains within the totality of the System. Everything is context dependent, where the context is Absolute space. A part of the structure cannot be isolated and still signify. The position of the centre of mass of the universe only signifies for the universe within Absolute space. As Levinas might say, any indexicality is at the service of the System (the Said).

"The intelligibility or systematic structure of the totality would allow the totality to appear and would protect it against any alternation that could come from the look. And this indifference to the subjective look is not ensured in the same way for the terms, the structures, and the system. For a shadow veils the terms taken outside of the relationship in which they are implicated, the relations and the structures taken or surprised outside of the system that locks them in at the moment, when, still isolated or already abstract, they have to search for or rejoin their system. An order is manifested in which the terms of the structures or the elements of the system hold together as an abstraction is still obscure and, despite its thematization, offers resistance to the light, that is, is not fully objective. A structure is precisely an intelligibility, a rationality or a signification whose terms by themselves do not have any signification (except through the already kerygmatic ideality of language)." [Levinas 2002, 113]

It is perhaps not surprising that we find ourselves trapped within a totalizing System, given that we began with what Newton said, namely: "Space is a disposition of being *qua* being. No being exists or can exist which is not related to space in some way." So far in this paper, we have explored a "transcendence" of the structure (the Universe) while remaining within the System of Absolute space. Where we are headed, however, is towards a transcendence of the totalizing System itself, a transcendence that manifests in *rupture*.

To conceive the otherwise than being we must try to articulate the breakup of a fate that reigns in essence, in that its fragments and modalities, despite their diversity, belong to one another, that is, do not escape the same order, do not escape Order, as though the bits of the thread cut by the Parques were then knotted together again. This effort will look beyond freedom. Freedom, an interruption of the determinism of war and matter, does not escape the fate in essence and takes place in time and in the history which assembles events into an epos and synchronizes them, revealing their immanence and their order ... The task is to conceive of the possibility of a break out of essence. To go where? Toward what region? To stay on what ontological plane? But the extraction

⁸ The most interesting one, at least from the point of view of Levinas, is the one that locates the locator, the one that signifies the signifier. The "here I am".

5. The proximity of light

from essence contests the unconditional privilege of the question 'where?'; it signifies a null-site [non-lieu]." [Levinas 2002, 8]

While Levinas ultimately will find transcendence in subjectivity, leading to "Otherwise than Being", we will explore here a narrower aspect, and, with luck, we will encounter otherwise-than-spatiality. To get there, however, we must perform the postmodern trick and de-privilege the System. Following Levinas, we will do this by placing Relation before and prior to spacetime. And this we will attempt to accomplish very concretely.

"Space and nature cannot be posited in an initial geometrical and physical impassiveness and then receive from the presence of man, from his desires and passions, a cultural layer that would make them signifying and speaking. If this geometry and physics were at the beginning, the signifying attributes would never have anything but a subjective existence in the head of men, the customs and writings of peoples. Narcissism would then find in the granite of things but a surface that would refer to men the echoes and reflections of their humanity. Never could 'psychological' signification draw the infinite spaces out of their silence. The very presence of man in these spaces, alleged source of the signifying attributes, would be, outside of its strictly geometrical or physico-chemical sense, an interior fact of an absurd being cooked in his own juices. In fact, the impassiveness of space refers to the absolute co-existence, to the conjunction of all the points, being together at all points without any privilege, characteristic of words of a language before the mouth opens. It refers to a universal homogeneity derived from this assembling, from being's nonsubjective essence." [Levinas 2002, 81].

In *Otherwise than Being*, Levinas proposes that, outside of the subject-object correlation depicted in ontologies, infinite responsibility, through the proximity of the Same with the Other, becomes substitution—the one-for-the-other—signifying outside every system and therefore every system of entities and relations. He isolates *signifyingness*, in a radical alterity of the same and the Other, as the pre-original. Prior to any universe, the one-for-the-other in proximity is the condition for possibility. He establishes proximity/substitution as the "matrix of every thematizable relationship", a matrix which does not rest in being [Levinas 2002, 136]. This "relation without relation" becomes like an essentializing paradox, or ambiguity, which allows the being of beings to appear in intelligible structures.

What we are striving to approach is Relation *per se*, outside of any system of entities or relations. This Relation is signifyingness itself, which allows for the possibility of systems of significations—structures, spaces, languages, Saids.

" In a system signification is due to the definition of terms by one another in the synchrony of a totality, where the whole is the finality of the elements. It is due to the system of the language on the verge of being spoken. It is in this situation that universal synchrony is effected. In the said, to have meaning is for an element to be in such a way as to turn into references to other elements, and for the others to be evoked by it ... The

5. The proximity of light

meaning of perception, hunger, sensation, etc. as notions signifies through the correlation of terms in the simultaneity of an linguistic system. It has to be distinguished from the signifyingness of the-one-for-the-other, the psyche that animates perception, hunger and sensation This signification in its very signifyingness, outside of every system, before any correlation, is an accord or peace between planes which, as soon as they are thematized, make an irreparable cleavage ... They then mark two Cartesian orders, the body and the soul, which have no common place where they can touch, and no logical tropes where they can form a whole. Yet they are in accord prior to thematization, ..." [Levinas 2002, 70].

As Levinas warns repeatedly, however, what we are approaching cannot be depicted thematically, because thematization is already embedded in a structure of representations. With this betrayal in mind, suppose we were to continue the thematization of this paper and represent one-for-the-other spatially. We might use the figure of an arrow (Zeno's arrow?) to represent movement from-towards as in the representation of Figure 3.



Figure 3 : Spatial representation of the restlessness inherent in one-for-the-other.

From the figure of the arrow comes the idea of *one entity* in proximity with and substituting for *another entity* as in Figure 4.

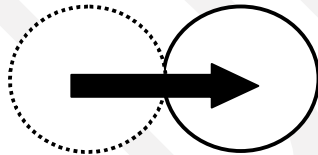


Figure 4 : Spatial representation of proximity/substitution—one circular figure is in proximity and substituting for the other without obtaining co-presence (simultaneity).

Unlike the binary relation underlying spatiality that we discussed earlier and that we likened to the operator AND, here the relation is a dynamic prior to entities. The entities are in proximity by not *spatial contiguous*. The one recedes as the other appears. They are never assembled in a single present. It might be helpful to think of the operator OR in which one entity is presented

5. The proximity of light

and then another *in succession*—in succession, but never under the same gaze, never as an assembled totality⁹.

"It is then not enough to speak of proximity as a relationship between two terms, and as a relationship assured of the simultaneity of these terms ... It is both a relation and the term of the relation. But it is as subject to an irreversible relation that the term of the relation becomes subject." [Levinas 2002, 85].

The trope that is here figured is diachronous—never identical with itself—like the de-phasing of a moment in time, like a passing without meeting. Proximity is more like an approach than like contiguity, like an approach that overflows itself in substitution. This overflowing leads to irreversibility, such that the two entities are not symmetrically related as would be the case with spatiality.

"It is because in an approach, there is inscribed or written the trace of infinity, the trace of a departure, but trace of what is inordinate, does not enter into the present, and inverts the arche into anarchy, that there is forsakeness of the other, obsession by him, responsibility and a self." [Levinas 2002, 117].

To apply these notions to space-time, let us consider **Light** in a metaphorical relation of identity to Levinas' idea of one-for-the-other. That is to say, let us use the concept of Light to concretize an image of proximity/substitution which can then substitute for Levinas' one-for-the-other (signification).

Why Light? Here is where we relinquish Newton's Absolute space and approach Einstein's Special Relativity. In Einstein's theory, Light is privileged in that its speed is universally invariant (for inertial frames), a proposition which is also observed empirically and which has no correlation in Newtonian theory. As Maudlin writes: "The Special Theory can be derived from one central postulate: Law of Light—every ray of light (in a vacuum) has the same speed c , in all inertial frames of reference. The fundamental feature of the Special Theory is not what it makes relative but what it makes absolute. The speed of light is an invariant quantity under transformations between inertial frames." [Maudlin 2002, 43-4]. Like with Newton, with Special Relativity (SR) inertial frames move at constant velocity. However, whereas with Newton inertial frames are constructed from Absolute space and time, with SR space and time are constructed relatively from the absolute speed of light. The paradigm shift proposed in this paper involves relinquishing the passivity of an underlying spatiality in favour of the immediacy of light in connecting, for example, source and receiver. Such an immediacy, for light, is a connector with no time or space interval. What we are attempting is explore the "frame of

⁹ Of course, immediately we bring the two together in our mind, assembled and therefore betraying the radical alterity we are trying to articulate.

5. The proximity of light

reference" of light, which, in fact, is not a frame at all, but rather, a restlessness deeper than the passivity of space [non-lieu].

Why Light? Here is where we relinquish reliance on classical, spatio-temporal metaphors to approach the transcendence of the idea of the Infinite as "an irreversible divergency from the present, like that of a past that was never present" [Levinas 2002, 154]. In the richer structure of special relativity, Light brings forth the possibility of trace as the working of truth.

The connection offered by light in uniting Levinas' thought with relativity theory has already been explored in some detail by Grandy [2001]. From this we extract two key elements.

Substitution — Light allows seeing, but is not seen in itself. That is to say, what we see through light are qualities of distant objects (colour and spatial form, for example) which are revealed by the presence of light. However, we do not directly see light itself. In the eyes of the observer, light substitutes for the object. This is the idea of light as the "letting appear which does not itself appear". Grandy writes, " ... the otherness or strangeness of light is bound up in its sublime capacity to announce *other* things visibly while itself remaining hidden from view. That hiddenness, moreover, is an openness or clarity that fosters the seeing, knowing experience" [Grandy 2001, paragraph 47].

Proximity — The proximity of light comes from the postulate that the speed of light is invariant for all inertial frames. Stated somewhat obscurely, light has no proper time. While we observe light to travel at the speed c from object to observer, for light there is no passage of time in this movement. In a sense, light is beyond space and time, and, as such, it brings object and observer into proximity—the proximity of light. Grandy writes: "Light, in brief, has no space-time frame; it is an unframed window on the material world, an opening or a clearing in which that world is situated. This idea is made explicit by physical experiments that indicate light's indifference to space and time." [Grandy 2002, paragraph 33].

Otherwise than spatiality

In the conceptual move from Newton's Absolute space to the space-time manifold implicit in SR, the first casualty is simultaneity. As Bohm writes: "Simultaneity is no longer an *immediate fact* corresponding to co-presence in our everyday experience. For it is now seen to depend, to a large extent, on a purely *conventional* means of taking into account the time of passage of a signal." [Bohm, p57]. In the Newtonian framework, Absolute space *is* a priori, establishing a container of co-presence or simultaneity, to which we earlier gave ontological status as the Instantaneous Real and from which we deduced concepts such as the State of the universe. In SR, the signalling, *Light*, has a priori status, undermining the absolute character of space. No signal can travel faster than the speed of light. Synchronization of distant events involves a lag,

5. The proximity of light

the time taken for a signal to travel from each event, and such a lag necessarily means that simultaneity is relative.

"It is then not enough to speak of proximity as a relationship between two terms, and as a relationship assured of the simultaneity of these terms. It is necessary to emphasize the breakup of this synchrony, of this whole, by the difference between the same and the other in the non-indifference of the obsession exercised by the other over the same."
[Levinas 2002, 85].

Bohm writes: "... simultaneity is not an absolute quality of events whose significance is independent of the state of movement of the measuring apparatus. Rather the meaning of simultaneity must be understood as being *relative* to the observing instruments, in the sense that the observers carrying out equivalent procedures with equivalently constructed instruments moving at different speeds will ascribe the property of simultaneity to different sets of events" [Bohm 1996, 57]. Put another way, in the Newtonian framework, signalling occurs with *infinite* velocity. Such instantaneous signalling establishes synchronous, simultaneous co-presence and is an essential characteristic of Absolute space. In SR, the speed of light is an absolute upper bound on the speed of signalling. The universe of SR is out-of-phase and signalling is the process through which coordination can occur. Such coordination is relative to the unique frame of reference of the observer, although *the absolute nature of signalling establishes relationships of transformation between frames of reference*¹⁰.

The meaning of this signalling will have to be clarified. Can it preserve a relationship across the break of the diachrony, without, however, restoring to representation this 'deep formerly' as a past that had flowed on, without signifying a 'modification' of the present and thus a commencement, a principle that would be thematizable, and therefore would be the origin of every historical or recallable past? Can it, on the contrary, remain foreign to every present, every representation, and thus signify a past more ancient than every representable origin, a pre-original and anarchical passed? The signalling of this pre-original past in the present would not again be an ontological relation. [Levinas 2002, 9].

The relativity of simultaneity similarly de-privileges Absolute or common time. In the Newtonian framework, Time is universal—a linear series of successive instants applying synchronously to all beings in space. Recall Newton's words: "The moment of duration is the same at Rome and at London, on the Earth and on the stars, and throughout all the heavens." *Now* is the common present of all beings.

¹⁰ The space-time manifold in which these relationships obtain, however, is radically different from Newton's Absolute space and time.

5. The proximity of light

"A linear regressive movement, a retrospective back along the temporal series toward a very remote past, would never be able to reach the absolute diachronous pre-original which cannot be recuperated by memory and history. But it may be that we have to unravel other intrigues of time than that of simple succession of presents" [Levinas 2002, 10].

In SR, there is no single thing, Time, which applies to all frames of reference. Instead, "time" means duration with respect to a particular reference frame. The present *now*, in the sense of *at-the-same-time-as*, is local and relative. Stein writes: "... the Einstein-Minkowski structure gives us ... *temporal relations*, but no 'time' *simpliciter*. In the context of special relativity, therefore, we cannot think of temporal evolution as the development of the world *in time*, but have to consider instead ... the more complicated structure constituted by, so to speak, the 'chronological perspective' of each space-time point." [Stein, p16]

"The separation is radical only if each being has its own time, that is, its interiority, if each time is not absorbed into universal time." [Levinas 1969, 57].

In SR, space and time are not absolutely differentiated as they are for Newton. Instead, they continuously interpenetrate in a space-time manifold. Relative to any specific inertial reference frame, a space-time articulation, or representation, is possible in which space and time *relative to the frame* are orthogonal. Each frame, however, has its own articulation. The absolute nature of light, combined with the equivalence principle of inertial frames of reference, provide a grammar of transformation relating the space-time articulation in one frame with that of another—an objectivity. There is relativity of space, time, present, past and yet beneath this, what we want to say is, the proximity of light, in a transcendental presenting or passing, makes possible the articulation of any relative frame of reference, makes possible time and space, interior and exterior, subject and object.

"Before this anarchy, this beginninglessness, the assembling of being fails. Its essence is undone in signification, in saying beyond being and its time, in the diachrony of transcendence. This transcendence is not convertible into immanence. What is beyond reminiscence, separated by the night of an interval from every present, is a time that does not enter into the unity of transcendental apperception. This book has exposed the signification of subjectivity in the extraordinary everydayness of my responsibility for other men ... " [Levinas 2002, 140].

The Minkowski diagram, in Figure 5 below, graphically shows the representation of space-time in a single inertial frame according to SR.

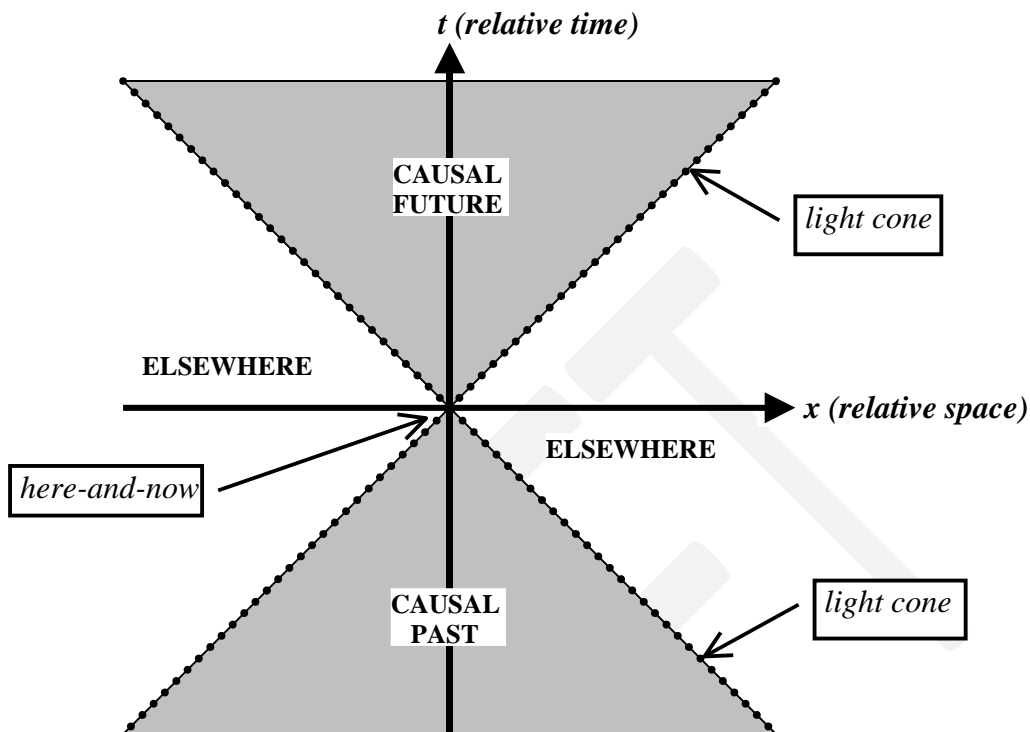


Figure 5 : Special Relativistic Space-Time (Minkowski Diagram).

In this diagram, the origin is the centre of the frame—the local *here-and-now*. The vertical and horizontal lines represent locally constructed time and space coordinates that are mutually orthogonal in the inertial frame. The diagonal lines represent the invariant speed of light. The figure they form is called the *light cone*. The light cone is absolute in the sense that it is independent of any particular observer. The shaded area within the light cone corresponds to all events that are accessible to (are causally connected to) an observer at the local here-and-now. The domain of such events is divided, by the light cone, into the *causal past* and the *causal future* of the local here-and-now. All events that impact the local here-and-now (events in the causal past) and all events that the local here-and-now can impact (events in the causal future) must lie within the light cone. There is also a domain of causal indeterminacy—labelled *Elsewhere* in the diagram—which is not accessible to the local here-and-now. It is not accessible in the sense that there is no causal signal that can link events in Elsewhere with the origin of the frame. No event in Elsewhere can causally affect the local here-and-now. Such events are non-

5. The proximity of light

causal events that can only impact the causal future of the frame, if at all. The local here-and-now cannot causally impact any event in Elsewhere¹¹.

It may be helpful to consider how the Newtonian space-time frame relates to the SR frame. The Newtonian frame is recaptured in the asymptotic limit that the speed of light becomes infinite. Figure 6 attempts to graphically represent this limiting process¹².

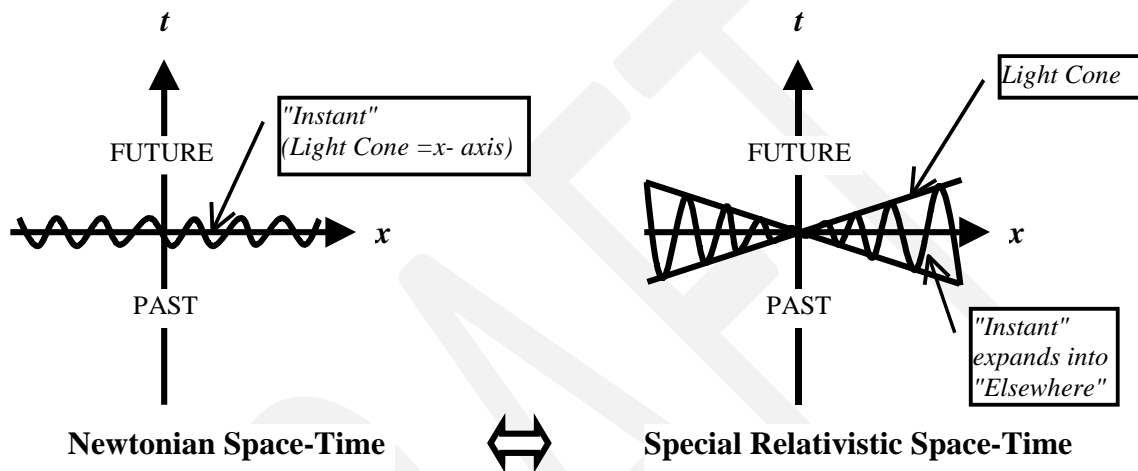


Figure 6 : Comparison of Newtonian and Special Relativistic reference frames with the speed of light as a singular limit.

In the limit that the speed of light becomes infinite, the causal future of the SR frame becomes identical with the Newtonian Future. Likewise, the causal past of the SR frame becomes identical with the Newtonian Past. It therefore seems reasonable to link causal future and causal past with the Newtonian concepts of Future and Past, although interpreted relative to the local here-and-now. On the other hand, the boundary of the light cone and Elsewhere (the domain of causal indeterminacy) collapse into the Newtonian Instant—the *Now* of Absolute space. This asymptotic limit is singular. If we consider the opposite transformation (from Newtonian space-time to SR space-time) the Newtonian Instant expands into a domain of causal indeterminacy bounded by the light cone—Elsewhere. Elsewhere is radically other than the Newtonian Instant. It contains events which are neither future (since they cannot be altered by the here-and-now) nor past (since they cannot be shown to have already happened) and yet

¹¹ For a more detailed discussion of the Minkowski diagram, see Rindler [1977, 70-1].

¹² An interactive, graphical representation of this limiting process can be found in Salgado [1996].

5. The proximity of light

both future (since they are yet to be manifested) and past (since they may be said to have already happened according to other observers).

Recall that Newton's Instant is infinite co-presence, synchronicity, simultaneity, in Absolute space. What exists, what is real, what *is*, can be located in the Instant—what we have called the Instantaneous Real. For Newton, any inertial frame of reference therefore contains the possibility of ontological completeness in itself, because it partakes of the sameness of Absolute space. In the Newtonian picture, at each instant, observers are connected to the plane of simultaneity, Absolute space—the container of all that is in that instant. The instantaneous State of the universe can be said to have objective existence and an ideal observer is not limited in his capacity to construct complete knowledge of the State of the universe from a local reference frame. Such an ideal observer can be said to exist in Time and so we can speak of the instantaneous State of the universe. Universal totality can be constructed (in some asymptotic limit) from what is causally accessible in a single inertial frame.

In SR, instants are not absolute. Whereas with Newton, the Instant is an infinitesimal boundary between two well-defined states, namely the immediate past and the immediate future, with SR, elsewhere is a spatio-temporal domain of indeterminacy which does not constitute a state or totality in any classical sense. Elsewhere cannot be conceived as a single snapshot or picture and therefore is inaccessible, even in principle, to any "ideal observer" within spacetime. Moreover, spaces of simultaneity, which exist in the Elsewhere, are causally *inaccessible* to the local here-and-now. They are not simply an asymptotic limit of the past as with Newton. They are separated by a gap from the causal past, a domain of indeterminacy. Elsewhere and spaces of simultaneity are constructions made possible, after the fact of the entire space-time manifold, through the ensemble of observations *from all inertial frames*¹³. Universal totality cannot be accessed from a single inertial frame. To illustrate, Bohm writes, "... projections from our absolute past to our absolute elsewhere are necessarily incomplete. There is ... always much that is unknown in our absolute elsewhere; and, for this reason alone, predictions concerning the future will be subject to contingencies, arising from what is unknown at the moment when the prediction is made. Of course, we may come to know about these later (when they will have become a part of our absolute past), but then there will be a new absolute elsewhere, not known at the moment in question. So there will always be that which is unknown ... It can be seen that all these considerations arise out of the need to take into account the important fact that *the observer is part of the universe* ... As a result, because of the very form these laws of physics, which imply that no physical action can be transmitted faster than light, there are certain limitations on what can be known by such an observer at a given moment" [Bohm 1996, 117]. He goes on to say, "Even if we have some fairly reliable knowledge about the general laws of nature, as abstracted from past experience, observation,

¹³ For example, it is possible to construct, by convention, a "plane of simultaneity" for the local inertial frame that is orthogonal to the time axis, but this plane is only relatively simultaneous and cannot be interpreted as the boundary of the causal past.

5. The proximity of light

and experiment, it seems clear that we cannot avoid contingencies, just because we cannot know completely and with certainty what is in the absolute elsewhere" [Bohm 1996, 176].

"Here what is essential is a refusal to allow oneself to be tamed or domesticated by a theme. The movement going 'beyond' loses its own signifyingness and becomes an immanence as soon as logos interpellates, invests, presents and exposes it, whereas its adjacency in proximity is an absolute exteriority. Incommensurable with the present, unassemblable in it, it is always 'already in the past' behind which the present delays, over and beyond the 'now' which this exteriority disturbs or obsesses. This way of passing, disturbing the present ... striating with its furrows the clarity of the ostensible, is what we have called a trace. Proximity is thus anarchically a relationship with a singularity without the mediation of any principle, any ideality." [Levinas 2002, 100].

With the relinquishment of Newton's Absolute space, the former meaning of co-presence is lost. The question then arises: Within SR, how do we interpret what we see? Suppose, for example, we look out at night into the vast expanse of stars—our so-called physical universe. What are we seeing? We are *not* seeing the universe as it exists "now" in the Newtonian sense of at-the-same-time-as-us. The farther away the stars are, the older they are, because of the time it takes light to reach us. What are we seeing? We are seeing the universe as light presents it to us here-and-now—the edge of the light cone of our causal past. In fact, everything we see is the edge of the light cone, from the stars to the clouds to our fingertips. Light presents the universe to us¹⁴. In a similar way, light presents us to the universe. The edge of the light cone of the causal future.

Light presents : us and the universe. This is the light cone. Because the speed of light is absolute, the presenting of light partakes of the absolute. We can say that it is objectively real. But it is not like an Absolute spatial simultaneity. The presenting of light in a particular reference frame is different from Newton's Instant. It is only a partial slice of any possible ontology, partial because each local frame *by itself* is ontologically incomplete. There is no accessible ontological totality called "the Universe".

Let us further compare the origins in the Newtonian and SR reference frames of space-time, that is to say, lets us dig deeper into what is meant by here-and-now in the two frameworks.

¹⁴ This "presenting" of light is very different from Absolute space. The co-presence does not occur simultaneously. However, for most phenomena we encounter on earth, the speed of light is so fast that we cannot detect this deviation from "spatiality". See also, Stafford [n.d.].

5. The proximity of light

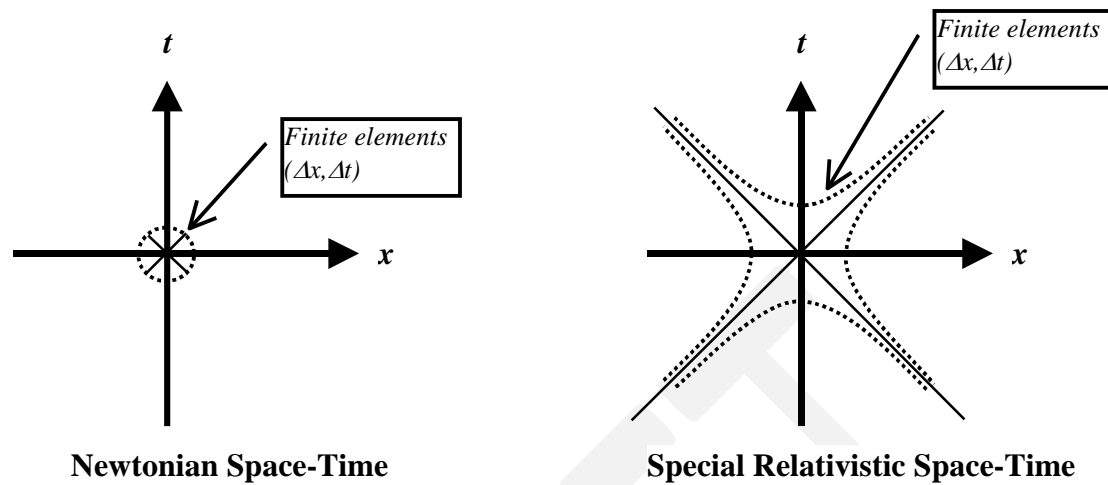


Figure 7 : Comparison of finite elements in Newtonian and SR reference frames.

As shown in Figure 7, For Newton, the origin is well-behaved. A finite element $(\Delta x, \Delta t)$ can be uniformly and arbitrarily shrunk to zero. (This property was exploited in limiting procedures discussed in the third section of this paper.) The same is not true of the origin of the SR frame. The relativistic metric constrains the relation between space and time according to the invariant interval, Δs , which relates them.

$$(\Delta s)^2 = (\Delta x)^2 + (\Delta y)^2 + (\Delta z)^2 - c^2(\Delta t)^2 \quad \text{Equation (2)}$$

In the limit that the interval goes to zero, the finite element $(\Delta x, \Delta t)$ *does not shrink to a point*. The origin of the SR frame is singular. The singularity comes from the fact that the speed of light is an asymptote for velocities. Even in the limit of vanishing intervals, the edge of the light cone absolutely divides space-time into causally connected and non-causally connected regions. The origin of the SR frame is not a *point* in space-time in the normal Euclidean sense of a point¹⁵. Suppose we interpret this as a puncture or gap of space-time. What I want to say is ... this gap is a blurring of space-time into a wave-like patterns which comes from the *presenting* of light. It is the hole in space-time that allows the differentiated observer. It allows an event as momentarily set apart from the rest of the universe, but by virtue of being set apart, comes into a non-causal correlation with the universe through the absolute that is light. It is a hesitation, a flickering, a time for the structure to be packed in. An inertial frame is constructed around such a gap of momentary indeterminacy. This gap structurally brings the local,

¹⁵ Rindler calls this a grain, which he claims "has no analog in isotropic Euclidean space, but is somewhat reminiscent of crystal structure. Light travels along the grain, and particle world lines have to be within the null cone [Light Cone] at each of their points." [Rindler 1977, 71].

incompletely specifiable frame into continuous relationship with the "whole", punctured by the absence in the gap. What is represented in the structure of SR is the part in relationship with the momentary whole of which it is a part. And in the moment, the whole pushes the part, as it were, from the causal past to the causal future. In SR, we move beyond ontology; we move beyond a rigid body concept of correlation (Absolute space) to a concept built from the interdependence of the event of being-in-the-moment with Being—correlation as the momentary connection of the part with the whole. But all of space-time is filled with such punctures. And the "whole" is the ensemble of punctures. Light, then, produces a foam or crystal of interpenetrating light cones which allows the space-time structure to be. The space-time manifold itself becomes a web, or matrix, of contingencies, where all point-events have equal "reality" status (whether in the local past, present or future)—as argued by Putnam for example [Putnam 1967, 240-7]—but where, I would like to suggest, this status is no longer an ontology, but rather *possibility*. Light becomes the Transcendent, replacing Newton's Absolute space. But the Transcendence of light is a frame of no space and no time—a *non-lieu* that establishes a structure of embedded contingencies for any possible world.

"A gaping open of an abyss in proximity, the infinite which blinks, refusing speculative audacities, is distinguishable from pure and simple nothingness by the committing of the neighbour to my responsibility." [Levinas 2002, 93].

Precisely this prior initiative—this trace—brings forth world, subject and object. And in this light, truth obtains through the grammar of transformations between local frames of reference. "It is seen then that while relativity theory does emphasize the special role of each observer in a way that is different from what is done in earlier theories, it does not thereby fall into a kind of 'subjectivism' that would make physics refer only to what such an observer finds convenient or chooses to think. Rather, its emphasis is on the hitherto almost ignored *fact* that each observer does have an inherent perspective, making his point of view in some way unique. But the recognition of this unique perspective serves, as it were, to clear the ground for a more realistic approach to finding out what is actually invariant and not dependent on the perspective of the observer." [Bohm 1996, 183-4].

"But in the totality of being temporally getting out of phase, which alone could be sufficient for truth, would the totality, diverging from itself, go 'beyond totality'? Yet totality should not leave anything outside. Then the transcendence of the totality thematized in truth is produced as a division of the totality into parts. How can these parts still be equivalent to the whole, as is implied when exposition is truth? By reflecting the whole. The whole is reflected in a part as an image. Truth then would be produced in the images of being. It is nonetheless true that time and reminiscence and the astonishing diastasis of identity and its rediscoveries, by which essence 'puts in its time' of being essence, is beyond essence and truth, even if in understanding and expounding it we say that they are beyond essence, that is, that beyond essence they are. Beyond essence, signification, an excluded middle between being and non-being, signifies." [Levinas 2002, 29].

What I will have wanted to have offered to you is an exploration of spacetime which does not lead to an ontology in the classical sense, but rather to a web of contingencies—the possibility of world and existence. And that the trope is otherwise than spatiality—a trace—which is light, word, inter-subjectivity.

"The tropes of ethical language are found to be adequate for certain structures of the description ... then ethical language succeeds in expressing the paradox in which phenomenology finds itself abruptly thrown." [Levinas 2002, 120-1].

Epilogue

With Newton's Absolute space, the Universe is situated in a passive background, or container, which provides the structural framework for analysis, division, differentiation. Wholes are constructed entirely from their parts and the theoretical challenge is to understand how the state is animated—how change comes about—within this background passivity. How, for example, does the arrow move in Zeno's thought experiment?

Relinquishing Newton's Absolute space, the proximity of light places movement before stasis. Light is signifyingness, process, change. Through light, a web of contingencies, prior to any being or existence, interweaves the possibility of each for the other. Process animates existence and the theoretical challenge is to understand how anything becomes "fixed"—how does stasis and identity come about—within this background of change. How, for example, does the space-time manifold manifest around the moving arrow of light?

"Consciousness is born as the presence of a third party ... Order, appearing, phenomenality, being are produced in signification, in proximity, starting with the third party. The apparition of a third party is the very origin of appearing, that is, the very origin of an origin." [Levinas 2002, 160]

Following Levinas, to arrive at the space-time manifold of SR [the Said], we consider three in proximity: the Same, the Other and the Third Party, each of which is another to the others and none of which is the same to another. What we are attempting here is to move beyond the representation of space-time in terms of purely binary relations. We are attempting to introduce an irreducibly threefold relation¹⁶. We will represent the three in proximity by the triangular figure in Figure 8.

¹⁶ We are trying to move beyond the differential operator of modern analysis, which tames Zeno's Dichotomy, to an Otherwise -- a different weaving of spacetime -- which re-invigorates Zeno's Arrow.

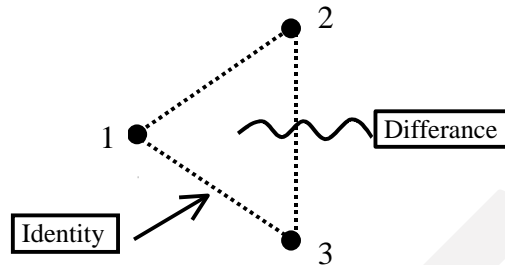


Figure 8 : Graphical representation of Three in proximity.

The paradox of the three is that if we establish one as the same (say the vertex marked 1 in the figure above) then, while 1 is in a relation of proximity with 2 and 3 (which we will call identity), the proximity between 2 and 3 is inaccessible to 1. This inaccessible proximity we will call **Differance**¹⁷. The movement from 1 to 2 and back to 1 is *different* from the movement from 1 to 2 to 3 and back to 1. Differance is like a cut through the empty space on the paper. We are in the domain of *sameness* until the cut is traversed at which time *difference* emerges¹⁸. The triangle and the numbering become a guide to manifest differance, which is the proximity of the Other with the Third Party as experienced by the Same. Figure 9 shows the essence of this relatedness.

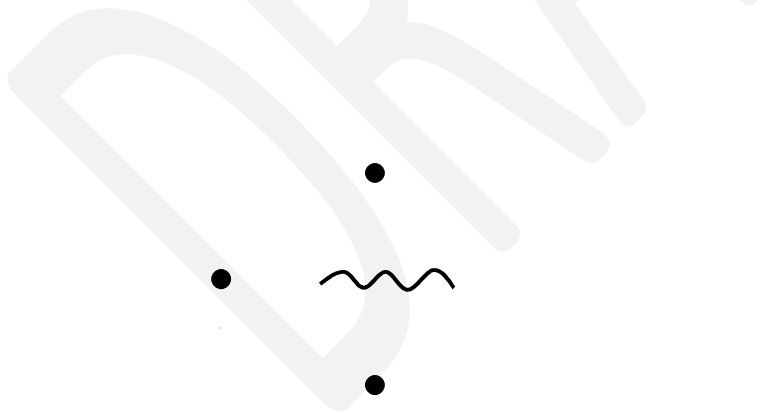


Figure 9 : Threefold relatedness.

¹⁷ I am using a term intended to bring to mind Derrida's *différance* [Derrida 1982, Caputo 1997]

¹⁸ Differance may be like a branch cut in the theory of complex variables.

5. The proximity of light

Returning to our original triangular figure, we recall that traversing the loop 1-2-3-1 can be distinguished from the movements 1-2-1 and 1-3-1. In traversing the loop there is a loss of proximity and a return. We can distinguish a difference in the return, which we will call *iterability*. The return is to the same, which is different. Like an image or an echo or a reflection, as shown in Figure 10 below.

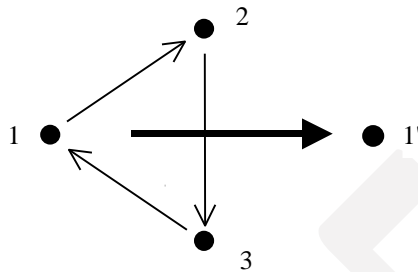


Figure 10 : Graphical representation of how iterability produces image.

Through iterability, the same points, or substitutes for, its image, which brings identity in Difference. We represent this substitution by an arrow pointing from the Same to the *Other-of-the-Same*. Now, let us return to the triangular configuration, this time with the Other as an image of the Same (the other-of-the-same). We use arrows to show the substitution of the Same for the Other and for the Third Party. For the Same (1), the Other (1') and the Third Party (1'') are equivalent, so the arrows can point in both directions as in Figure 11 below. (That is to say, 1-1'-1''-1 is equivalent to 1-1''-1'-1).

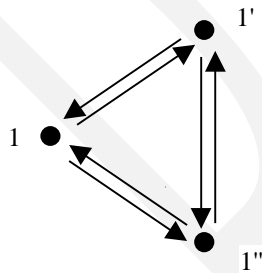


Figure 11 : Graphical representation of substitution among threefold images.

Now we see the emergence of an *undecidability*. The Same (1) substitutes for an Other (say 1'), but then the Other can substitute back and forth with the Third Party (1'') any number of times before returning to the Same (1). This back-and-forth movement in the inaccessible proximity

5. The proximity of light

of the Other and the Third Party is like a *resonance*. Resonance, like a gap or a hollow, occurs in the Difference.

Let us stop to reflect. Based on the paradoxical proximity of three, we have (postulated? suggested?) *iteration*, *resonance* and *undecidability*.

Iteration is the circular movement around the three, which returns through Difference to a different same. Iteration is particular. There is change in the loss and return of proximity, which we postulate as temporal, as in Figure 12.

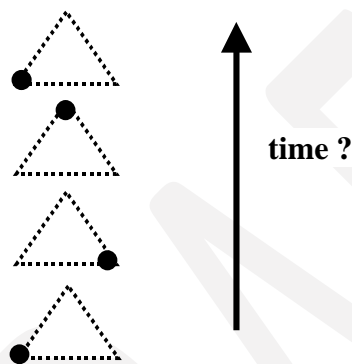


Figure 12 : The temporal nature of iteration.

Resonance is equalizing, the identity in Difference through back-and-forth. Unlike the particularity of iteration, resonance is "whole" (synchronous?), the same difference, which we postulate as spatial, as in Figure 13.

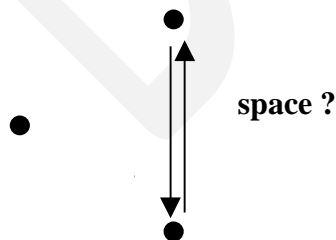


Figure 13 : The spatial nature of resonance.

5. The proximity of light

Undecidability brings determination, as fixed patterns, and correlation, as connections (jumps?) between fixed patterns. For example, we can postulate the infinite iterability of return, which we will call $(Dt)^2$. This return is an infinite repetition of sequential substitution around the triangle, which we will represent by a circle as in Figure 14.

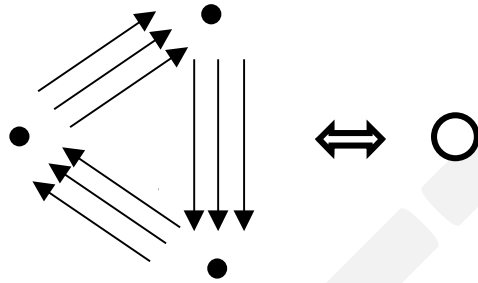


Figure 14 : Return as infinite iterability.

Likewise, the infinite back-and-forth of resonance brings a connector between two points, which we will call $(Dx)^2$ and represent by a solid line. This connector is like the binary relation discussed in the third section of the paper. There are three different resonances corresponding to proximity between the Same, the Other and the Third Party, which we will label as $(Dx)^2$, $(Dy)^2$ and $(Dz)^2$ as in Figure 15.

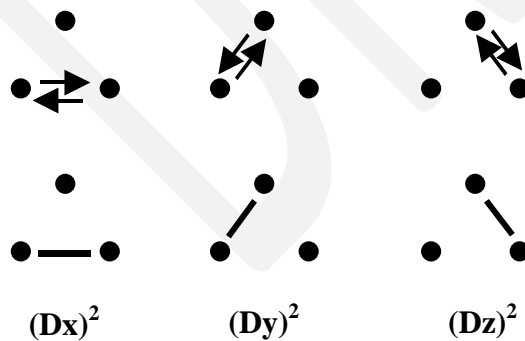


Figure 15 : Connector as infinite resonance.

5. The proximity of light

Notice, however, that each of the connectors is in proximity with the others by virtue of the third. (To understand this, imagine an infinite resonance $(Dx)^2$, between 1 and 2 followed by a *finite* set of iterations around the triangle ending at 2, and then a infinite resonance $(Dy)^2$ between 2 and 3, and so on around the triangle). This brings forth the proximity of $(Dx)^2$, $(Dy)^2$, and $(Dz)^2$ as a difference in sameness that we can represent by a *three* dimensional orthogonal system. Here the three dimensionality is not arbitrary, but is a consequence of the three-fold nature of the Same, the Other and the Third Party as shown in Figure 16.

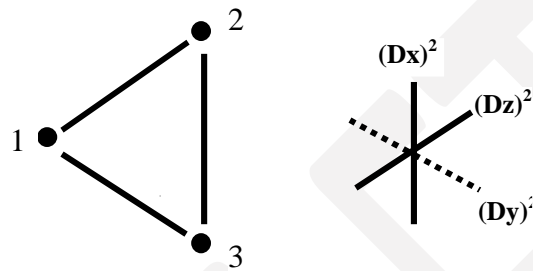


Figure 16 : Three dimensional spatial system of connectors.

We can see measure in the system by a renormalization (a "finite-infinite" ?) in which we arbitrarily consider a complete iteration of fixed resonances around the triangle to be a constant (say, L^2).

$$(Dx)^2 + (Dy)^2 + (Dz)^2 = L^2 \quad \text{Equation (3)}$$

L^2 is an indicator of the magnitude of the resonance. We can postulate different strengths of resonance in terms of L^2 , leading to a Cartesian coordinate system.

Now we combine our spatial system, with our temporal system. That is, we replace the points in our triangle with circles representing infinite iteration $(Dt)^2$ as in Figure 17 (Can this represent presence?).

5. The proximity of light

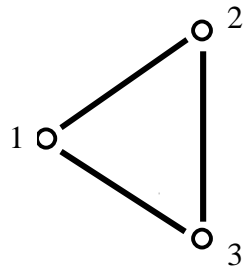


Figure 17 : Light Cone.

We consider the following two ways to complete a loop, which we postulate as the same difference. In the first way we pause at circle 1 (infinite iterability), then jump (in a finite number of back-and-forth motions) to circle 2 where we pause, then we jump to circle 3 where we pause, and finally back to circle 1. Another way is to infinitely resonate between 1 and 2, then, without pausing, infinitely resonate between 2 and 3 and finally, without pausing, infinitely resonate between 3 and 1. This is a method of combining connectors (resonances, space?) with pauses (return, time?). We represent this equivalence as:

$$(Dx)^2 + (Dy)^2 + (Dz)^2 = c^2 (Dt)^2 \quad \text{Equation (4)}$$

where c is a constant. In our Cartesian system, might this represent a light cone, where c represents the speed of light¹⁹?

We will stop here, noting that there is much more that might be discovered in this Said. We also note that there is a great deal of arbitrariness in the way we have worked with the figures above, and it is not clear yet if we have arrived at anything beyond our own projections onto the figuring itself.

¹⁹ Field has presented an interesting derivation of special relativity from a symmetry principle which he calls "space-time exchange invariance". Space-time exchange invariance involves the operation of substituting any of the three orthogonal spatial coordinates with the temporal variable, suitably normalized by the speed of light. Field writes: "the symmetry condition that restates the Special Relativity Principle is ... the equations describing the laws of physics are invariant with respect to the exchange of space and time coordinates, or, more generally, to the exchange of the spatial and temporal components of four vectors." [Field 2001, 569].

References

- Bell, John. *Oppositions and paradoxes in mathematics and philosophy*. 2005
<http://publish.uwo.ca/~jbell/Oppositions%20and%20Paradoxes%20in%20Mathematics2.pdf>
- Bell, John. *An Invitation to Smooth Infinitesimal Analysis*. n.d.
<http://publish.uwo.ca/~jbell/invitation%20to%20SIA.pdf>
- Bell, John. *A Primer of Infinitesimal Analysis*. Cambridge University Press, 1998.
- Bergson, Henri. *The Creative Mind: an Introduction to Metaphysics*. Transl by Mabelle Andison. New York: Kensington Publishing Co. 1976.
- Bohm, David. *The Special Theory of Relativity*. New York: Routledge, 1996.
- Caputo, John. *Deconstruction in a Nutshell: a Conversation with Jacques Derrida*. New York: Fordham University Press, 1997.
- Derrida, Jacques. *Margins of Philosophy*. Transl by Alan Bass. Chicago: University of Chicago Press, 1982.
- Derrida, Jacques. At this very moment in this work here I am. Transl Ruben Berezdivin. In *Re-reading Levinas*. Robert Bernasconi, ed. Bloomington: Indiana University Press, 1991.
- Field, JH. Space-time exchange invariance: special relativity as a symmetry principle. *American Journal of Physics*. Vol 69(5), pp 569-75, 2001.
- Grandy, David. The Otherness of Light: Einstein and Levinas. *Postmodern Culture*, Vol 12(1), September 2001.
<http://www.kalpakjian.com/Grandy.html>
- Huggett, Nick. *Space from Zeno to Einstein*. Cambridge: MIT Press, 2002.
- Levinas, Emmanuel. *Otherwise than Being or Beyond Essence*. Transl by Alfonso Lingis. Pittsburgh: Duquesne University Press, 2002.
- Levinas, Emmanuel. *Totality and Infinity: an Essay on Exteriority*. Transl by Alfonso Lingis. Pittsburgh: Duquesne University Press, 1969.
- Levinas, Emmanuel. *Transcendence and Height (1962)*. In *Emmanuel Levinas: Basic Philosophical Writings*. A Peperzak, S Critchley, and R Bernasconi, eds. Bloomington: Indiana University Press.

5. The proximity of light

Maudlin, Tim. *Quantum Non-Locality and Relativity*, 2nd edition. Oxford: Blackwell Publishers, 2002.

Putnam, Hilary. Time and physical geometry. *Journal of Philosophy*, Vol 64, pp240-7, 1967.

Rindler, Wolfgang. *Essential Relativity: Special, General and Cosmological*, Revised 2nd edition. New York: Springer Verlag, 1977.

Salgado, Rob. *A more illuminating look at the Light Cone*, 1996.
<http://physics.syr.edu/courses/modules/LIGHTCONE/lightcone.html>

Stafford, Richard. *What we see when we look out in space*, n.d.
<http://home.jam.rr.com/dicksfiles/StarCurv.htm>

Stein, Howard. On Einstein-Minkowski Space-time. *Journal of Philosophy*, Vol 65(1), pp 5-23, 1968.

DRAFT

6. Light, logic and relational ontology

If you are like me, then you are probably so used to thinking in terms of binary logic that it becomes difficult to fathom that there may be forms of logic that are truly *other* and not just a translation or re-inscription of binary logic. In fact, you may believe that the word “logic” means *binary logic*, that to speak otherwise is a misuse of language, and therefore to speak of another form of logic is meaningless. So if you are interested in what might possibly be meant by “the logic of three”, you may need to begin in the suspension of disbelief. *Suppose* there is something that could reasonably be called the logic of three. What might we be able to say about this logic and how might we be able to justify calling it “logic”.

The suspension of disbelief¹ is a state of anticipation, an opening to the possibility of something new. If, for you, “logic” means binary logic, then what I am about to describe is something *other* or *beyond* “logic”. Yet it continues to bear an essential relationship to binary logic. The exploration of the “logic of three” involves the working out of difference and sameness using binary logic as the starting framework. This “working out” brings forth a transition from the starting framework to something *Other* that has yet to be determined and will only come into view as the exploration unfolds. The term “logic” identifies sameness or identity throughout the transition

I take logic to be about formal patterns of thinking or information processing², where formal patterns are repeatable and they can be abstracted and represented. Binary logic is about patterns that occur within formal systems that are governed by rules or laws. The patterns are *given* by the system. The processes of the logic—the processes of thinking or processing information within the system—involve explorations of the given patterns. A prototypical example of binary logic (to which we will repeatedly return) is the system of Natural numbers. The logic of three (infinitely) expands binary logic such that the processes of repeating, abstracting and representing (what is already given by a formal system) *are also part of the logic*. We might say that binary logic is a mechanical working out of the patterns inherent in a formal system such that valid thinking always remains within the system. The logic of three includes this mechanical working out of a formal system, but it also concerns itself with how a formal system is created, sustained and, ultimately, transcended.

Binary logic is *mechanical* and bound by a formal system. The logic of three is *creative* and open.

¹ Whereas *disbelief* is the negation that underwrites binary logic, the *suspension of disbelief* is the negation of that negation. The double negation moves us from an image of nothingness as an empty void to an image of nothingness as active listening or receptivity to the Creative.

² Information processing involves the dynamics of *signs*. Signs are interior representations of exterior processes. A sign points to an object to which a response can be made by an interpreter. Thinking involves information processing at the highest level.

The principles of binary logic

The primary principle of binary logic is the law of the excluded middle. This law can be stated in the following form: For any given state A, either A is true or not-A is true, where not-A is the negation of A. The principle of binary logic forbids any third possibility, and therefore, it excludes any “middle” or *in-between* that might relate not-A back to A. The principle is not just a law, it is the principle of Law. The negation implies an absolute difference; it establishes what is in (truth) and what is out (false).

“Things are, and are not, as they seem.

“This means: at any given moment, from any given perspective, it is possible to be insensitive (forgetful, unimaginative, inattentive).

“Things are what they seem; but it is possible for them to seem differently.

...

“Being is the interconnectedness, the resonant ecology of things.”

[Zwicky 2003, L79, L86]

Additionally, the principle of binary logic pre-supposes or pre-forms identity. It begins with “any given state A”. That is to say, it begins by *naming* the state, where the name points to the self-identical aspect of instances of A. The principle of identity is the equality of A with itself: $A=A$. Binary logic pre-supposes the principle of timeless *self*-identity. Through this pre-supposition, the principle of identity differentiates the self-identical *form* of the state (namely A), from any particular *instance* or realization of that form, (namely the “given” state A). The self-identical form exists, as it were, in a realm of all possible states. From this realm a particular state is “given” or actualized in some way. The realm of “all possible states”, the realm of generality, is timelessly formed by the principle of identity. The actualization or specification or particularization brings a general possibility into the present moment of time.

“Law of identity $A=A$. This tautological formula, this lifeless, thought-less, and therefore meaningless equality $A=A$, is, in fact, only a generalization of the self-identity that is inherent in every given ... In excluding all other elements, every A is excluded by all of them, for if each of these elements is for A only not-A, then A over against not-A is only not-not-A. From the point of view of the law of identity, all being, in desiring to affirm itself, actually only destroys itself, becoming a combination of elements each of which is

a center of negations, and only negations. Thus, all being is total negation, one great “Not”. The law of identity is the spirit of death, emptiness, and nothingness.”

[Forensky 1997, 22,23]

But what “gives” A? This may seem like an odd question at first. Typically, binary logic is taken to encompass all that is possible—the rational universe. If that is the case, then what “gives” A is existence itself, what might be called “Being”. Being actualizes possible (timeless) states within the temporal unfolding of creation. Being or existence might therefore be thought of as providing the *ground* for binary logic. Being obeys the rational principle of non-contradiction: Nothing can both exist and not exist. The “ground of Being” is like a stage in which a general or universal form is actualized as *this particular thing*. Ontology—the nature of Being—is determined and constrained by this inert, passive (back)ground upon which actualities substitute for generalities.

“Ontological attention is a response to particularity: this porch, this laundry basket, this day. Its object cannot be substituted for, even when it is an object of considerable generality (‘the country’, ‘cheese’, ‘garage sales’). It is the antithesis of the attitude that regards things as ‘resources’, mere means to human ends. In perceiving thisness, we respond to having been addressed. (In fact we are addressed all the time, but we don’t always notice this.)”

[Zwicky 2003, L52]

So, with binary logic we have three principles that work together³: (1) *naming* that establishes identity through equality; (2) *law* that establishes truth conditions through the excluded middle; and (3) *grounding* that establishes what is the case through non-contradiction.

Space as dark ground

In classical approaches to physics, theoretical forms describing the physical world are imaged on binary logic. Physics is taken to describe a universe according to rational systems of law, where “rational” means the systems of law obey the principles of binary logic. Naming references elementary forms that are pre-existing and timeless—the fundamental “objects” of the world. Laws establish fixed relations of equality among the pre-existing fundamental objects, such that the objects are co-present and inter-act with one another to form complex structures within the domain of what is possible according to law. Grounding connects the

³ An introduction to the “three traditional laws” of thought—identity, non-contradiction, and excluded middle—can be found in Wikipedia https://en.wikipedia.org/wiki/Law_of_thought#The_three_traditional_laws

theoretical forms with the world of experience by allowing the expression of a specific experimental setup or a specific initial condition *in the world* as a theoretical form.

“The actual is not something spatial ... In a non-actual element like [space] there is only a truth of the same sort, i.e. rigid dead propositions. We can stop at any one of them; the next one starts afresh on its own account, without the first having moved itself on to the next, and without any necessary connection arising through the nature of the thing itself.”

[Hegel 1977, §45]

For a physicist enmeshed in a web of rational systems of law, the “being” of Being therefore tends to take the form of an abstract ground of possibility, where possibility, rooted in the equality of self-identity, is determined by the system. Reference to “what exists” becomes an unreflected and unreflecting reference to the ground of physics, where this dark ground is taken as the foundation of all that may be, the foundation of the *ontology* of physics. The meta-form of Absolute Space (including spatialized Time) in Newton’s theoretical framework is a pro-type of this dark ground.

“We are all infatuated with the splendor of space, with grandeur of things of space. Thing is a category that lies heavy on our minds, tyrannizing all our thoughts. Our imagination tends to mold all concepts in its image. In our daily lives we attend to that which the senses are spelling out for us: to what the eyes perceive, to what the fingers touch. Reality to us is thinghood, consisting of substances that occupy space; even God is conceived by most of us as a thing.

“The result of our thinginess is our blindness to all reality that fails to identify itself as a thing, as a matter of fact. This is obvious in our understanding of time, which, being thingless and insubstantial, appears to us as if it had no reality.”

[Heschel 1951, 5]

With the logic of three, Being exceeds the passive ground of self-identical and timeless forms that determines and is determined by laws of classical physics. While binary logic is contained within the logic of three, the logic of three also allows an encounter with the Other, an encounter with the excluded middle. This encounter happens through paradox. The (triadic) logic of paradox creates a pivot that brings the (back)ground into relation with a particular indexical origin to reveal a generalizing system that is sustained by synchronization with other indexical origins to that same system (other images of the system).

“It is a relationship with a surplus always exterior to the totality, as though the objective totality did not fill out the true measure of being, as though another concept, the concept of infinity, were needed to express this transcendence with regard to the totality, non-encompassable within a totality and as primordial as totality.”

[Levinas 1969, 23]

Within binary logic, grounding is based on the principle of non-contradiction: Nothing can both exist and not exist. This is also the principle of Absolute Space, the principle of Euclidean geometry, for example. In modern physics, there is a tendency to carry this principle forward, so that something formally like Absolute Space is the privileged ground of the “being” of physical entities (such that this principle is applied to both space and time.) Relativity theory, however, subverts the privileging of Absolute Space inasmuch as it takes simultaneity to be relative to a particular indexical origin or frame of reference. Consistent with relativity theory, the logic of three pushes us to recognize that the principle of non-contradiction *in itself* is incomplete. In a post-relativistic era, we might be obliged to say: Nothing can both exist and not exist *at the same time*. This opens us to the possibility of taking time to be the *Other* of space. Whereas space grounds general form as a synchronized structure of co-present equals; time ungrounds unique individuals as particular pivots that participate in the process of coming into synchronization with others.

“But I thought that anything from which space was abstracted was non-existent, indeed absolutely nothing, not even a vacuum, as when a body is removed from a place, and the space remains evacuated of anything physical, whether earthly, watery, airy, or heavenly, but is an empty space—like a mathematical concept of space without content.

“So my heart had become gross, and I had no clear vision even of my own self.”

[Augustine 2008, 111-2]

Within binary logic, the identity of the fundamental objects of investigation for physics is timelessly given. Paradoxically the principle of identity differentiates the general form from the particular instance by taking them to be the same. In so doing, it sets up a relation of ambivalence between general form and particular instance, between the idea of A and its realization. A particular instance of A *is* the general form of A even though the realm of the abstract general as a universal form and the realm of the particular as an embodied form may be different. The logic of three drives a wedge between these two realms, between the general and the particular, between the ground and the “given”.

“Ontological attention is a form of love.

“When we love a thing, we can experience our responsibility toward it as limitless (the size of the world). Responsibility is the trace, in us, of the pressure of the world that is focused in a this. That is how much it is possible to attend; that is how large complete attention would be.”

[Zwicky 2003, L57]

In modern physics, *Space* becomes the meta-form of the general, the ground. *Time* becomes the meta-form of the particular, the given. And in the wedge between space and time, there is *Light*. The logic of three is the logic of light. Understood in this way, in modern physics *light is the creative source of the physical world in space and time*. Relativity theory describes the external form of the logic and quantum mechanics describes the internal form. The logic of three shifts our metaphysical perspective away from a dark ground of objects in-themselves towards the illumination of light as creative act.

“Here, when the consciousness rises above ‘the double bound of space and time’ and enters into eternity, here, at this moment of annunciation, the One Who announces the Truth and the Truth Announced coincide completely. In the appearance of the Spirit of Truth, i.e., in the light of Tabor, the form and the content of Truth are one. But perceived and assimilated into creation, the knowledge of the Truth falls into time and into space. Into the time of the diversity of the individual and into the space of the diversity of the social.”

[Florensky 1997, 107]

From an ontology of being & power into an ethics of creation & formation

In order to open ourselves to the possibility of “the logic of three”, we need to overcome the entrenched belief in Newton’s Absolute Space as the ground of Being. This ontological grounding is the realm of action, force and power.

“A philosophy of power, ontology is, as first philosophy which does not call into question the same, a philosophy of injustice ... Being before the existent, ontology before metaphysics, is freedom (be it the freedom of theory) before justice. It is a movement within the same before obligation to the other.”

[Levinas 1969, 47]

Space is ruptured and loses its totalizing grip in the encounter with an *Other*. Such an encounter is particular; it addresses each uniquely; it demands a *response*. The encounter occasions a

lifting up out of the realm of action/power and into a higher realm of creation/formation. The encounter opens us to the cracks in the dark ground and momentarily lifts us up, out of the given ground, and into the light.

*“Ring the bells that still can ring
Forget your perfect offering
There is a crack, a crack in everything
That’s how the light gets in.
That’s how the light gets in.
That’s how the light gets in.”*

[Cohen 1993, “Anthem”]

References

- Augustine. *Confessions*. Transl by H Chadwick. Oxford: Oxford University Press, 2008.
- Cohen, Leonard. *Stranger Music: Selected poems and songs*. Toronto: McClelland & Stewart Inc., 1993.
- Florensky, Pavel. *The Pillar and Ground of the Truth: An essay in orthodox theodicy in twelve letters*. Transl by Boris Jakim. New Jersey: Princeton University Press, 1997.
- Hegel, GWF. *Phenomenology of Spirit*. Transl by AV Miller. Oxford: Oxford University Press, 1977.
- Heschel, Abraham Joshua and Schor, Ilya. *The Sabbath*. New York: Macmillan, 1951.
- Levinas, Emmanuel. *Totality and Infinity: an essay on exteriority*. Pittsburgh: Duquesne University Press, 1969.
- Zwicky, Jan. *Wisdom & Metaphor*. Kentville NS: Gaspereau Press, 2003.

DRAFT

Method

7. On the relationship between the concept of text in Gadamer's theory of hermeneutics and the concept of light in Einstein's theory of relativity

By identifying the formal role of light in relativity theory with the formal role of text in Gadamer's theory of hermeneutics, the two theories are brought into relationship. Through this fusion, the privileging of "space" in physics and the privileging of "time" in hermeneutics are reciprocally interrogated as horizons of truth.

Introduction

In the Special Theory of Relativity (STR), *light* becomes a window on the absolute, replacing the traditional notions of space and time that were integral to the classical physics heralded by Newton's *Principia Mathematica* [Bohm 1996]. Whereas in classical physics the totality of the universe acquires its universality as a consequence of being embedded in the inert theatre of empty space and time, in STR the presenting of the "universe" is partial and particular to the frame-of-reference in which it is presented. Although each particular reference frame in STR has its own relative space and time, the theory is not simplistically relativistic (in the philosophical sense described by Grondin, for example [1990]). The special property of light allows the synchronization of multiple, particular reference frames to shared, invariant forms, often called *events*. An event will manifest differently in different reference frames and therefore will be differently "interpreted". Yet the different interpretations of the event share in a common "meaning". This common meaning is more than a relative construction that might come from and apply to a finite set of particular reference frames. The common meaning implicates interpretations of the event in all potential frames-of-reference.

How is light to be understood in STR? The tradition of physics bears a prejudice towards the notion of space [Bergson 1976] that potentially obscures the import of light. This prejudice implicitly and explicitly guides an understanding of ontology. In *De Gravitatione* Newton wrote, "Space is a disposition of being *qua* being. No being exists or can exist which is not related to space in some way. God is everywhere, created minds are somewhere, and body is in the space that it occupies; and whatever is neither everywhere nor anywhere does not exist. And hence it follows that space is an effect arising from the first existence of being, because when any being is postulated, space is postulated." [cited by Huggett 2002, 112]. In STR, the traditional approach to ontology involves re-inscribing a description of the world that presents to us in a "spatialized" container or manifold called space-time. This interpretive move recaptures the objectivity of classical physics, while at the same time eliminating a creative notion of becoming. The spatially-prejudiced conceit ends in the belief that a "physical reality" can be understood a-temporally, that it can be conceptualized from an assumed vantage point *exterior* to the space-time manifold, and that from this (universal) vantage point a complete

mathematical description is possible. While various approaches to the ontology of STR, and its extension to the General Theory of Relativity, engage and refute this conceit, there remains the possibility that the conversation brought about by these approaches still fails to grasp a deeper meaning of light as a window on the absolute.

This paper is a preliminary exploration how Gadamer's text, *Truth and Method*, brings into question the prejudice of space for the physical sciences. The approach turns on a metaphorical identity between the relation of *language to understanding* in Gadamer's theory of hermeneutics and the relation of *light to matter* in STR. This identity might be framed as:

Being that can be understood is language;
Being that can be materialized is light.

The exploration begins with a discussion of the nature of a written text. As the language of a text mediates the temporal rupture of an assumed "subjectivity" according to *Truth and Method*, so light might be interpreted to mediate the temporal rupture of an assumed "objectivity" in STR. Gadamer calls this mediation through temporal distance the fusion of horizons. As a consequence of interpretations of a written text that come from the fusion of horizons, Sache—the "subject matter" of the text—unfolds in time. However, the unity or "thingliness" of Sache is radically other than the "thingliness" of the object in classical physics. To the extent that the identity of light and language holds, Gadamer's notion of Sache may have much to say about event-objects and objectivity in STR.

The exploration ends with a discussion the nature of dialogue in *Truth and Method*. Unable to locate within living dialogue an enduring presence like the body of a written text, I question whether Gadamer's approach to contemporaneous understanding holds together. His privileging of time-like separation as the primary challenge to the authority of tradition seems to distort the distinct nature and functioning of space-like separation for meaning. This distortion marginalizes the importance of reference for language. However, if the presenting of matter through light has equivalence to the presenting of understanding through language, then the mechanism whereby light participates in an invariant metric may provide new insight into universality in language. Through (hermeneutical) cycles of return, two or more particular worldviews, like two or more particular frames-of-reference, can be synchronized by language/light to progressively disclose a fixed and bounded referent (Sache or event-object) that lies beyond the fusion of their individual horizons. In this process of engagement, subjects and their worldviews, as well as referents as fore-grounded objects may change. Yet perhaps invariance is to be found in an (infinite/infinitesimal) difference operator "Return", which engages referent and inter-subjectivity at the fusion of horizons. Return has the form of an irreducible threefold relationship. I propose that through Return, the Sache of texts and the Sache of things-in-the-world both disclose truth in a similar (inter-subjective) way. The boundary between language and light, understanding and matter becomes blurred and the debate of realism as pitted against anti-realism loses its sting.

The fusion of horizons and singularity

In some interpretations of STR, light brings forth a relatedness that enables our world to exist or at least be described. Through light a source and receiver are brought into proximity¹, even though they may be separated by large intervals of time and space. The proximity obtains because, for light, there is no space-time interval between the sending of light from a source and its reception by a receiver. Yet light also interacts with both source and receiver. Thus light stands *both outside and inside* any particular space-time context, bringing that particular context into relationship with other particular contexts. It might be interpreted as a dynamic at the threshold of any system of entities, continually deferring its own presence, and in so doing, granting presence to inter-related systems, structures, entities [Bohm 1996; Grandy 2001].

In *Truth and Method*, Gadamer explores a similar approach for language as it occurs in a written text. The bodily form of a text—the sequence of words—can be transmitted through time unaltered. Therefore a text has the property that it can bring the author (source) and reader (receiver) into a relationship of proximity—a relationship to the same words—despite a temporal separation that might mean, for example, that the author and reader lived in different historical periods. With the author, a text is created or brought into the present of his situation or con-text. For the reader, a text brings the past into the present and makes itself available for interpretation, for re-con-textualization. The written text both stands *outside* of the particular contexts of author and reader and interacts *within* those contexts:

What is stated in the text must be detached from all contingent factors and grasped in its full ideality, in which alone it has validity. Thus, precisely because it entirely detaches the sense of what is said from the person saying it, the written word makes the understanding reader the arbiter of its claim to truth. The reader experiences what is addressed to him and what he understands in all its validity. What he understands is always more than an unfamiliar opinion: it is always a possible truth. This is what emerges from the permanence that writing bestows. [Gadamer 2004, 395-6].

For Gadamer all understanding is contextualized and therefore is always understanding in the particular present of the one who understands. He refuses to “spatialize” language and meaning, by assuming consciousness has access to a universal vantage point in which language and meaning are fully exteriorized or disclosed. Thus he rejects what he calls the universal claim of the scientific method, and with this he rejects a simplistic scientific notion of an objective truth (as a universally observable state-of-affairs, for example). In the introduction to *Truth and Method*, Gadamer writes that his investigations “are concerned to seek the experience of truth that transcends the domain of scientific method wherever that experience is to be found, and to inquire into its legitimacy” [Gadamer, xxi]. When it comes to a written text, Gadamer claims

¹ The term “proximity” is borrowed from Levinas’ *Otherwise than Being*.

that author, reader and text interact in a mutual relationship of openness or self-giving. The intentions of the author do not fully determine the meaning of the text that is brought into presence. Rather the text continually remains open to a process of being brought into a new presence as understanding by a reader. The intentions of the reader, as interpreter, also do not fully disclose the meaning of the text. Yet, in this irreducibly three-fold relationship, Gadamer seems to be saying that the infinity of truth obtains, *despite the finitude of author, reader and bodily form of the text*. He calls this the miracle of understanding.

In *Truth and Method*, both the author and the reader are embedded in the separate contexts of their own present moments—their “situations”. Because their understanding is always determined by the particular present context or situation, understanding in each present moment is limited by a “horizon” and can never be complete.

Every finite present has its limitations. We define the concept of “situation” by saying that it represents a standpoint that limits the possibility of vision. Hence essential to the concept of situation is the concept of “horizon”. The horizon is the range of vision that includes everything that can be seen from a particular vantage point. [Gadamer 2004, 301].

Gadamer’s concept of “horizon” seems formally similar to the concept of “event horizon” in STR. In STR, each particular present (as “vantage point” or “origin”) has its own frame-of-reference (or “situation”) and its own event horizon which is determined by the speed of light. Within the event horizon of a particular situation, to use Gadamer’s terminology, lies the causal past that is particular to that situation. Beyond the event horizon lies an “elsewhere” that is not accessible in any causal way to the vantage point of the present situation. The past and future of elsewhere are ambiguous or indefinite to the present of the situation. As a result, every situation is only a partial slice of “reality” and the “past” is always epistemically incomplete. In describing the limitations of a particular situation (or frame-of-reference) in STR, Bohm writes:

Even if we have some fairly reliable knowledge about the general laws of nature, as abstracted from past experience, observation, and experiment, it seems clear that we cannot avoid contingencies, just because we cannot know completely and with certainty what is in the absolute elsewhere. [Bohm 1996, 176].

In the absence of an external vantage point, the “past” is also ontologically incomplete—“the past that never was” to borrow Levinas’ phrasing [Levinas]. The limitations of the situation, which is bounded by the event horizon, arise because *the observer is part of the universe*. In STR, it is traditional to assume that there is a universal vantage point that stands outside of space-time (i.e. outside of the so-called “universe”) and from which all situations can be known and described by consciousness, at least potentially (this is what I am calling the prejudice of spatiality to emphasize that vantage point is space-like). However, Gadamer takes the position, which I claim is also consistent with STR, that it is constitutively impossible to exteriorize the

observer from the observed². “The very idea of a situation means that we are not standing outside it and hence are unable to have any objective knowledge of it” [Gadamer 2004, 301].

Instead of invoking a universal vantage point, Gadamer focuses attention on the “fusion of horizons” of the author and the reader, both of which are bounded. When the written text draws author and reader into a relationship of proximity, the temporal flow is ruptured. In this rupture, the text stands *between* the two horizons (formed by the “present” of the author and the “present” of the reader), participating in each situation. While the reader cannot enter into the situation of the author (because the reader cannot experience the “present” of a past situation), the text can speak to the situation of the reader. The reader experiences a tension between the present and the text that brings the reader into question (of self and situation), because the text brings the past into the reader’s present situation.

To acquire a horizon means that one learns to look beyond what is close at hand—not in order to look away from it but to see it better, within a larger whole and in truer proportion ... a truly historical consciousness always sees its own present in such a way that it sees itself, as well as the historically other, within the right relationships ...it is constantly necessary to guard against overhastily assimilating the past to our own expectations of meaning. Only then can we listen to tradition in a way that permits it to make its own meaning heard. [Gadamer 2004, 304]

The concept of horizon veils an infinity—the finite experiencing the infinite from within—and suggests movement. “The horizon is ... something into which we move and that moves with us. Horizons change for the person who is moving.” [Gadamer 2004, 303]. As a *dual* relationship of finite to infinite, the horizon always implies an exterior vantage point “beyond”. So the existence of a present (event) horizon, in and of itself, does not overcome spatial prejudice. What is remarkable in Gadamer’s treatment of the fusion of horizons is that he conceives this as an *irreducibly three-fold relationship*. The reader stands within his own present horizon, while imaginatively projecting himself into the historical horizon of the author, and while remaining in relation to the matter of the text (Sache). All three are co-formed and interdependent.

... the horizon of the present is continually in the process of being formed because we are continually having to test all of our prejudices. An important part of this testing comes from encountering the past ... the horizon of the present cannot be formed without the past. There is no more an isolated horizon of the present in itself than there

² Interestingly, the claim that the observer and the observed cannot be separated is accepted for the theory of quantum mechanics, which is a theory without a traditional interpretation. This raises the question of whether the challenge in reconciling relativity theory with quantum mechanics is a direct consequence of the prejudicing of spatiality, and is fundamentally a problem of hermeneutics.

are historical horizons which have to be acquired. Rather, understanding is always the fusion of these horizons supposedly existing by themselves. [Gadamer 2004, 305].

This relationship is “irreducible” in the sense that it cannot be analyzed into sets of dualities and therefore does not reduce to binary or oppositional logic. Through this trope Gadamer claims that understanding comes to finite consciousness by coming-into language.

The concept of an irreducible threefold relationship has been described elsewhere. Hegel’s notion of thesis, anti-thesis, synthesis is an example, in which the logic of binary opposites (space-like) is “frustrated” (time-like) by an unstable synthesis in a higher plane. The concept of the branch point in complex analysis is a mathematical example in which any circle (space-like) of the origin of the branch cut is opened to a “higher plane” forming (in simple cases) a type of helix (whose axis is time-like). Levinas’ notion of the “third party” is another articulation of this concept, where the third party is “the other of the other who is also another to me”. The way in which light establishes an irreducibly three-fold relationship in STR (which does not reduce to the two-fold relatedness that characterizes the mathematical description of space and time) has also been discussed elsewhere. In *Truth and Method*, however, Gadamer explores the finite limit of this threefold singularity in a new and interesting way.

It is important to be attuned to the subtleties that come from the fact that the singularity is not reducible to binary opposition and the logic that flows therefrom. Gadamer does not elaborate on what he means by the term “finite” and he does not differentiate that meaning from the concept of finitude that is constructed from an assumed duality of finite-infinite. To be finite is not always the same as to be limited, for example. To be finite usually implies a *closed* unity, whereas a limit may participate in the infinite differently. Consciousness may be limited or bounded, but what is potentially masked by using the term “finite” to describe consciousness is *the way in which* an interiority may exist whose limiting structure rests upon a dynamic that does not equate to null or void (like modern analysis in mathematics, for example). In other words, are we sufficiently attuned to the possibility of engagement with another kind of “infinity” and another kind of “limit”?

“What a man has to learn through suffering is not this or that particular thing, but insight into the limitations of humanity, into the absoluteness of the barrier that separates man from the divine.” [Aeschylus as paraphrased by Gadamer 2004, 351].

1. Sache and interiority

In *Truth and Method*, Gadamer develops the notion of “Sache”—the subject matter of the text—as a bounded unity which is set over and against the concept of the object-in-itself that dominates scientific discourse. Through the interpretations of a text, the Sache of the text is always in the process of coming-into-language. Yet the unity of Sache is never fully disclosed or totalized by interpretations. The understanding of a text is never completed. Unlike an object

which is said to exist in-itself, Sache always comes into existence as understanding *for* a particular reader or interpreter. The relatedness of Sache to reader is constitutive because the reader must apply the Sache of the text within a present situation or context:

All reading involves application, so that a person reading a text is himself part of the meaning he apprehends. It belongs to the text he is reading. The line of meaning that the text manifests to him as he reads it always and necessarily breaks off in an open indeterminacy. [Gadamer 2004, 335].

Core to Gadamer's notion of Sache is the concept of "play". Play, as presentation or bringing into structure, is a form of distancing that Gadamer locates in language. The players are drawn into the playing, which is greater than any determination of self. The concept of play involves an essential indeterminacy and dynamic set over and against the passive void of spatiality that conceptually grounds the scientific method. Through the play intrinsic to language, Gadamer seems to be saying, reader and author are distanced from the text such that they creatively bring the Sache into understanding through a structure (or presentation) that belongs to the particular context of each. Yet this does not result in a subject-object divide. "The distance involved in a linguistic relationship to the world does not, as such, produce the objectivity that the natural sciences achieve by eliminating the subjective elements of the cognitive process." [Gadamer 2004, 450].

Although Gadamer applies Sache to all aspects of language, it is in the discussion of the written text that he develops the notion most carefully. Sache is like an *interiority* of the written text which is open to infinite disclosure into different present situations. Although each disclosure is a different understanding, all understandings are connected through the (undisclosed) unity or integrity of Sache. But what guarantees this integrity? Is there a basis for claiming that Sache is not essentially heterogeneous and without unity? In the case of a written text, the unity comes from the enduring bodily form, the sequence of words that constitutes the written text. Gadamer conceptualizes a written text like a work of art that possesses a mysterious holism:

Texts ... always express as a whole. Meaningless strokes that seem strange and incomprehensible prove suddenly intelligible in every detail when they can be interpreted as writing—so much so that even the arbitrariness of a corrupt text can be corrected if the content as a whole is understood. [Gadamer 2004, 392].

There are at least two significant challenges to this claim. In literary theory, as Eagleton points out, there are many reasons for arguing that literary works may be "diffuse, incomplete and internally contradictory" [Eagleton 2008, 64]. He points to Joyce's *Finnegans Wake* as an example. From this point of view, Gadamer's claim of unity is brought into question. In communications theory [Shannon 1948], the integrity of a text is related to redundancy, rather than a unified Sache. The arbitrariness of a corrupted text can be corrected, not because the content is understood as a whole, but rather because what is said in the text is over-specified through the redundancy inherent to successful communication. From this point of view,

Gadamer's claim that understanding can only come from the text as a whole is brought into question. What is at stake here is how we are to understand "unity" in *Truth and Method*. Gadamer initially pulls a notion of unity from a discussion of drama. He claims that the performance of a dramatic play "rests absolutely within itself". "Certainly the play takes place in another, closed world" [Gadamer 2004, 111]. As unity is later applied to written text and then living dialogue, Gadamer does not carefully trace fate of this closure. Yet ultimately the openness of language to world constitutes Sache: "From the relation of language to world follows its unique Sachlichkeit" [Gadamer 2004, 442]. The openness obtains because there is no vantage point in which language can be said to be *closed*. Over and against the notion in science of a world of objects-in-themselves, Gadamer posits a holistic unity:

Each science, as a science, has in advance projected a field of objects such that to know them is to govern them. We find quite another situation when we consider man's relationship to the world as a whole, as it is expressed in language. The world that appears in language and is constituted by it does not have, in the same sense, being-in-itself, as is not relative in the same sense as the object of the natural sciences. It is not being-in-itself, insofar as it is not characterized by objectivity and can never be given in experience as the comprehensive whole that it is. But as the world that it is, it is not relative to a particular language either ... every language has a direct relationship to the infinity of beings [Gadamer 2004, 449].

Suppose we interpret *Truth and Method* as saying that the unity of Sache is an interiority that participates in openness. Might Gadamer's notion of Sache then be applied to STR? If light is related to matter like language is related to understanding, then the materialized event-objects of light might also be expected to contain an "interiority" that is open to the experience of world. Things experienced—the subject matter of a written text or the interiority of an "event-object"—disclose their interiority in being experienced. At the core, however, is a fundamental indeterminacy—a rupture of objectivity that is open and adaptive. Light draws the interior of a thing into a holistic relationship to its own exterior through interaction with other things. This relationship is constitutive of the thing as participating in the experience of world. Just as understanding, for Gadamer, is not a relation to a given "object", but rather to the history of its effect, so in a more general sense the interiority of all matter interacts with "material things" which carry the history of their effects. This process leads to a deepening, or condensation, of interiority into new levels of order. Through engagement and responsiveness mediated by light, things give themselves to mutual disclosure and, in so doing, they change and are changed. No thing is every fully disclosed. The notion of interiority, derived from Sache, becomes an opening for bringing into question the privileging of space in modern interpretations of STR.

If we were to apply Gadamer's notion of the fusion of horizons to STR, it might then go something like this: Light condenses into temporally enduring material forms (event-objects), which we call "things" and are analogous to the written text in Gadamer's theory. Things, which are foregrounded by interactions with world, remain essentially contextualized and interconnected—they exhibit wave-particle duality. By virtue of its temporally enduring, yet

limited form, a thing formed in the past can bring that past situation into a new present situation as a rupture of the temporal flow, just as a written text can bring the past into a new present. At the place where the event horizons of the past situation and the present situation overlap, the *interiority* of the thing formed in the past is disclosed to and engages with the present situation, projecting it into the future. This process is non-Markovian—the interiority of a thing carries the memory of its past in such a way that the past and future cannot be absolutely divided. With this interpretation of STR, time resists the prejudice of spatiality and the ontology of objectivity. The condensing of light is a process of coming-into-language. Increasingly complex interiors disclose higher levels of temporally-preserved language-like forms in an evolutionary process. “Elementary particles disclose material *identity*. Molecular replication (RNA) discloses *information* (copies are materially different, yet identical in their information). Cells disclose the capacity to manipulate information through (DNA) *code*. Multicellular organisms disclose the capacity to manipulate the expression of code to *signal*. Animals disclose the capacity to *communicate* and to manipulate reference through *cognition*. Humans disclose the capacity to manipulate *language* and *thought*.” What connects light and language is life as experience, which according to Gadamer has its fulfillment in “the openness to experience that is made possible by experience itself” [Gadamer 2004, 350]. Experience is handed down and becomes part of language. “Experience teaches us to acknowledge the real” [Gadamer 2004, 351].

Beyond relativism and absolutism

The question of truth in *Truth and Method* can be seen as performative, allowing interpreters to bring into question their relation to truth and in so doing enter into the experience that is the truth-claim of the text. This raises the challenge that any discussion of what Gadamer might mean by “truth” is situational and comes into focus as over and against a prior concept of truth. The resulting duality is vulnerable to distortion—we might say what truth is not, but when it comes to making a positive claim we can only speak *about* truth.

Gadamer rejects “the universal claim of scientific method” and with this he rejects the metaphysics of a universal vantage point for Absolute Reason from which all things are objectified and to which facts, as descriptions of states-of-affairs in the world, must correspond in order to be “truthful”. In this sense, Gadamer is said to reject absolute truth [Widdershoven 1992, 1]. Yet it is important to keep in mind that it is this particular concept of “absoluteness” which is the target of his critique, rather than truth. For Gadamer, there is a holistic aspect to truth that refuses objective parsing into discrete objects and isolated states-of-affairs. That is to say, truth is essentially relational. The polar opposite of absolutism is the concept of relativism. Through the lens of relativism comes the argument that, if there are no objective facts, then everything seems to be permitted. Relative truths are contingent and heterogeneous, all truth claims are equal and *anything goes* [Widdershoven 1992]. This extreme concept of relativism is constructed over and against the concept of absolutism. According to Grondin, “... hermeneutics strives to show that the question of relativism only makes sense if one

presupposes an absolutist point of view. Only one who claims an absolutist standpoint can speak of relativism” [1990, 46]. Nonetheless, Grondin argues that it is possible to ascribe a positive connotation to the notion of relativism. In this sense it is possible to read *Truth and Method* as being concerned with a holistic aspect of truth, called aletheia (or disclosure), that is not readily apparent to the absolutist standpoint.

More than that a rejection of absolutism, I read *Truth and Method* as a critique (which is to say a bringing-into-question) of this conceptual opposition between absolutism-relativism. Through this critique, although truth recedes as an “object” of investigation, it remains present as disclosure. In the process, however, the absolutistic expectation for propositional truth claims shimmers into mirage. Just as that which is seen by virtue of light is not “light”, so that which is understood by virtue of truth is not “truth”. More subtly the relativistic claim of the power of human reason to construct reality is thwarted. Truth shines forth when reason is brought up short in the face of experience.

In the absence of an absolutist vantage point and in the presence of limited human reason, where are we to locate unity or common understanding? Widdershoven [1992] brings this question into focus by comparing three forms of hermeneutics: anthropological, critical and historical. For anthropological hermeneutics, concepts only have meaning within a form of life; common understanding comes through shared forms of life. Unity or invariance is connected with the interiority of the human subject (human nature), which determines the way in which people live. Widdershoven associates this approach with Wittgenstein. “The natural history of mankind provides human thinking and acting with a certain unity. This does not mean that various patterns of thought and action, various forms of life are identical. Forms of life are culturally varying expressions of the same human life.” [Widdershoven 1992, 3-4]. For critical hermeneutics, understanding—as communicative action—occurs within the implicit background of a common life-world. Unity or invariance is connected with the exteriority of the situation for which participants seek a common definition. Habermas follows this approach. “In each speech-act the speaker raises a claim to truth, justice and sincerity. With the claim to truth the speaker contends to describe the facts as they are. The claim to justice regards the proposed adequacy of the interpersonal relation between speaker and listener. The claim to sincerity entails the speaker be genuine.” [Widdershoven 1992, 7]. The third form, called historical hermeneutics, Widdershoven associates with Gadamer. My intention here is not to discuss Widdershoven’s schema as much as to use his categorization to introduce another conceptual opposition between interiority-exteriority. While the two extreme interpretations above may not do justice to Wittgenstein or Habermas (or Widdershoven), they can help us stay in sight of the “between” that Gadamer seems to be pursuing in *Truth and Method*. Through the inter-subjective experience of the real, subjects and their worldviews change. Neither human nature nor ways of life are invariant, according to Gadamer. Likewise a worldview, as the exteriority to which subjects relate, is constantly changing. For subjective consciousness, there is no common “life-world” nor “facts as they are”.

In *Truth and Method* Gadamer seems to be saying that understanding comes from our experience of the real combined with the coming-into-language of that experience. This process, which is intersubjective and temporal, he calls Tradition. Unity, for Gadamer, can be located in what he calls “world”. World can be experienced, although it cannot enter into consciousness and therefore is also essentially nameless. World is both one and many:

- “Thus the world is a common ground, trodden by none and recognized by all, uniting all who talk to one another” [Gadamer, p443].
- “The world is not different from the views in which the world presents itself” [Gadamer, p444].

A particular language is a world-view, which Gadamer describes as an orientation towards world. Particular languages are incommensurate with one another because they emerge from different histories of experience. Because there is no universal vantage point, particular languages do not translate one into another—there is no isomorphism connecting two particular languages. Particular languages, unlike spatiality, do not possess the symmetry of translational invariance. Yet a common understanding between particular languages can obtain because each particular language interpenetrates all other languages. Each worldview “potentially contains every other one within it ... [a worldview] can understand and comprehend, from within itself, the ‘view’ of the world presented in another language” [Gadamer, 445]. “Verbal experience of the world is ‘absolute’. It transcends all the relative ways being is posited because it embraces all being-in-itself, in whatever relationships (relativities) it appears.” [Gadamer, 447]

Does this resolve the question of truth? Perhaps not, but then I don’t think resolution is Gadamer’s intention. There are two significant challenges to Gadamer’s proposal:

- What does Gadamer mean when he says that each worldview potentially contains every other within it? What is the nature of this potentiality? If a worldview *actually* contained all other worldviews within it, would it not then be a universal vantage point? Isn’t the eschaton of Gadamer’s potentiality the very absolutism he denies? This challenge leads us more deeply into the question of language and the mystery of the Word.
- Can we legitimately introduce “world” into the discussion, given its extraordinary properties? Does Gadamer’s proposal *make sense*? This challenge leads us more deeply into the question of finitude and limit. I will return to this question in the last section of the paper.

Gadamer’s approach to truth also contains significant weaknesses. His notion of error or misunderstanding is poorly developed. As Vanhoozer points out, with Gadamer “the interpreting subject is caught up in a process that transcends his or her individual agency” [2006, 16]. The same can be said of any community of tradition. In *Truth and Method*, the rupture that comes from temporal distance plays an important role in the discernment of error because it can bring the prejudices of a present tradition into question. The harmony of co-presence (which is

space-like) also plays a role, at least in written text, in the sense that a text is to be read as a coherent whole. Yet Gadamer does not elaborate very much on the limits and inter-relations of such time-like and space-like intervals.

Gadamer's notion of *negativity* is also poorly developed. In *Truth and Method*, negativity is located in experience:

experience ... inevitably involves many disappointments of one's expectations and only thus is experience acquired. That experience refers chiefly to painful and disagreeable experiences does not mean that we are being especially pessimistic, but can be seen directly from its nature. Only through negative instances do we acquire new experiences, as Bacon saw. Every experience worthy of the name thwarts an expectation. Thus the historical nature of man essentially implies a fundamental negativity that emerges in the relation between experience and insight [350].

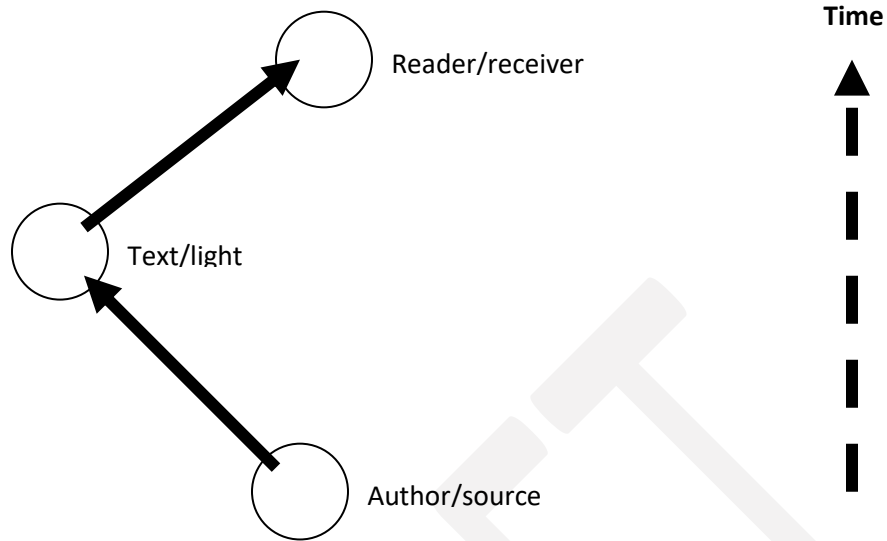
Unlike Kristeva [1984], as a counterexample, Gadamer seems to have a naïve faith that does not question negativity, power and their relationships with error.

Foregrounding and resonance

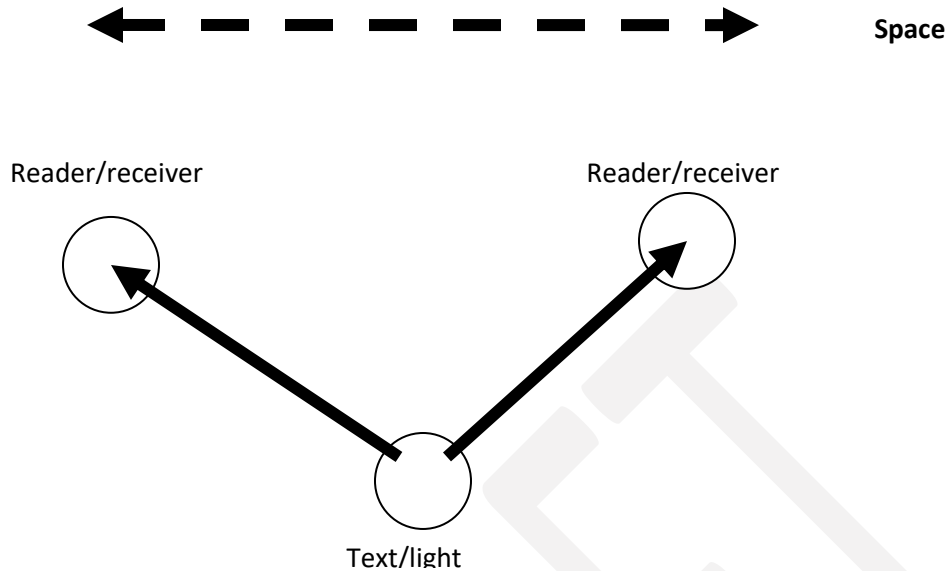
My claim of understanding through *Truth and Method* is the following: language and light are the medium in which *Sache* makes itself known. *Sache* becomes a notion of thingliness that displaces the finite object of classical physics. The limit of *Sache* is *otherwise* than spatiality.

In *Truth and Method*, *Sache* is most carefully articulated as it applies to the written text. Text brings author and reader into an irreducible threefold relatedness that ruptures temporality as shown in the schematic below:

7. Text and Light



This relationship, which Gadamer equates with the fusion of horizons, is *time-like* and is formally the same as the relationship that obtains between source and receiver of light. But now, by referring back to STR, it becomes apparent that there is another possible form of distancing which is not taken up in *Truth and Method*. Light and language can draw two different receivers/readers into a relationship of “resonance” even when there is no temporally-causal path between them. This relationship, shown in the diagram below, is *space-like*:



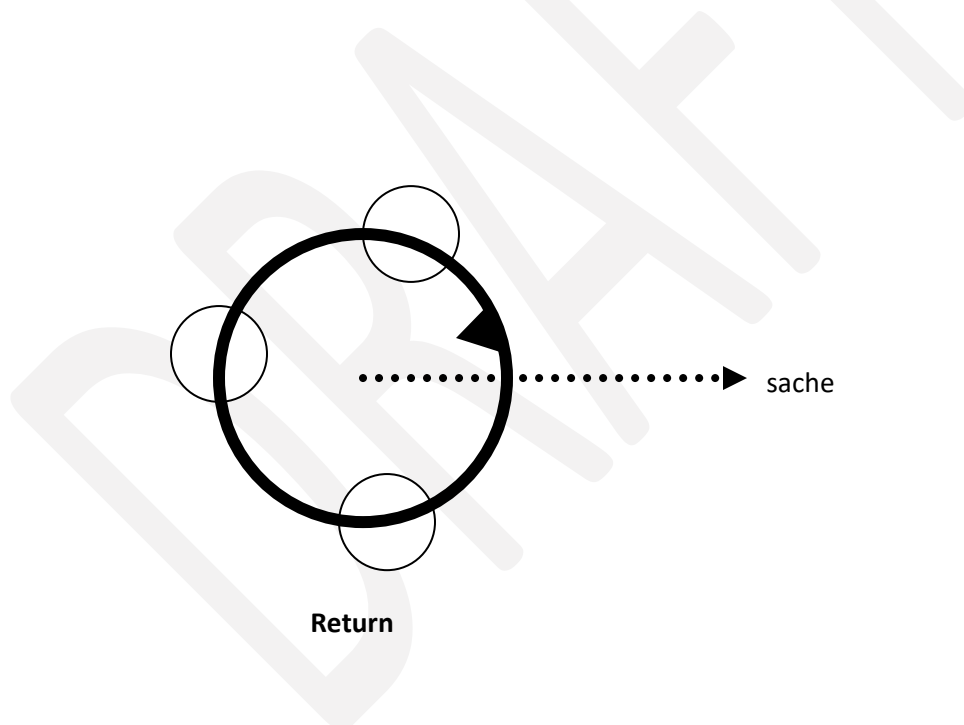
Space-like relationships are fundamental to the establishment of *synchronicity*. However, Gadamer does not question the assumption of synchronicity in *Truth and Method*. It is this assumption that leads to claims of unity for extended things which are taken as “gestalts” presenting as whole. The written text has unity, for example, because of its synchronicity. In STR synchronicity is brought into question and also found to be relative to the situation in which it presents. My claim is that space-like relationships establish *correlation of interiority*. In the case of light, this correlation is seen as the quantum correlation of photon-pairs which bring distant events into synchronicity even though they are causally unconnected. In the case of the written text, correlation would be seen as an inner resonance between two interpretations of the *same text* by authors who have not read one-another’s work.

In *Truth and Method*, Gadamer relies heavily on the way that a written text presents synchronically. The written text maintains a temporally enduring gestalt that allows author and reader to distance themselves from the text. In this respect, the approach of *Truth and Method* falls short in the discussion of living dialogue because there is no synchronically presented gestalt. Written text is like a painting that presents its unity all-at-once (seeing); dialogue is like music in which unity, although never presented, is experienced *in time* (hearing)³.

To resolve the problem of unity in living language, Gadamer appeals to “world”. But is this appeal successful? The term itself already suggests a prejudice towards synchronous co-presence. In order to avoid unintentional connotative prejudice I will use the term ‘*’ to

³ Language/light would ultimate be found in the fusion of hearing/seeing.

designate *world*. According to Gadamer, * is not a concept that can enter into consciousness. Even to name * would seem to violate its proper function. As such, * is not a word among words. * is *an inscription of infinity*; it is pure sign whose referent is null-infinite. Gadamer claims * is unity. Since * is pure sign its name is non-determinate. Therefore * maintains identity across all languages and provides a common ground for understanding. It functions ubiquitously, like a differential operator. As pure sign, * is the abstraction of referencing or pointing itself [Gadamer, 413]. But Gadamer states: “the sign acquires meaning as sign only in relation to the subject who takes it as sign” [Gadamer, 413]. Through *, the subject’s intentionality therefore stands over and against language. Gadamer sees this relation as the subject opening to the truth claim language makes. But doesn’t this also raise the challenge that, through refusal, the subject may also lay claim on language and in so doing stand outside of it and dominate it? I suspect that if we continue this path of deconstructing * we will be led either to a form of Derrida’s *différance* (which would unravel *Truth and Method*) or to a form of modern analysis *à la* Newton (which would crystallize STR) because * *cannot be presented through dualities*. Instead, I propose that through * we can foreground the return that comes from combining space-like and time-like intervals as shown in the figure below:



Return is return to the Same by virtue of the Other and the third person. Return is increase: the Same is expanded through the (endless) cycles of Return. Return is the foregrounding or referencing of Sache from the scintillating, bubbling, almost-differentiated-but-not-quite, “sea” of virtual quasi-states. Return, which is the limit of Sache, is a different kind of “differential operator” that is irreducible threefold. It is the essence of the hermeneutical circle and of the creative potential of substance. Because Gadamer did not question negativity, synchronicity

and holism in *Truth and Method*, the importance of return in allowing Sache to come into being was not disclosed.

Return is the stem of character.
Return is small yet different from external things.
Return leads to self-knowledge. [I Ching, #24]

References

- Bergson, Henri. 1976. *The Creative Mind: an Introduction to Metaphysics*. Transl by Mabelle Andison. New York: Kensington Publishing Co.
- Bohm, David. 1996. *The Special Theory of Relativity*. New York: Routledge.
- Eagleton, Terry. 2008. *Literary Theory: An introduction*. Minneapolis: University of Minnesota Press.
- Echeverria, Eduardo J. 2006. Gadamer's hermeneutics and the question of relativism. In *Hermeneutics at the Crossroads*, ed. Kevin J Vanhoozer, James KA Smith, Bruce Ellis Benson, 51-81. Indianapolis: Indiana University Press.
- Gadamer, Hans-Georg. 2004. *Truth and Method*. Second, Revised Edition, transl by Joel Weinsheimer and Donald G. Marshall. New York: Continuum Publishing Group.
- Grandy, David. 2001. The Otherness of Light: Einstein and Levinas. *Postmodern Culture*. 12 no.6 <http://www.kalpakjian.com/Grandy.html> (accessed January 1, 2010).
- Grondin, Jean. 1990. Hermeneutics and relativism. In *Festivals of Interpretation: Essays on Hans-Georg Gadamer's Work*, ed Kathleen Wright, 42-62. Albany: State University of New York Press.
- Huggett, Nick. 2002. *Space from Zeno to Einstein*. Cambridge: MIT Press.
- I Ching*. 1990. Translated into German by Richard Wilhelm and rendered into English by Cary E Baynes. Princeton: Princeton University Press.
- Kristeva, Julia. 1984. *Revolution in Poetic Language*. Translated by Margaret Waller. New York: Columbia University Press.
- Levinas, Emmanuel. 2002. *Otherwise than Being or Beyond Essence*. Transl by Alfonso Lingis. Pittsburgh: Duquesne University Press.

Shannon, CE. 1948. A Mathematical Theory of Communication. *The Bell System Technical Journal* 27:379-423, 623-56.

Vanhoozer, Kevin J. 2006. Discourse on matter: Hermeneutics and the “miracle” of understanding. In *Hermeneutics at the Crossroads*, ed. Kevin J Vanhoozer, James KA Smith, Bruce Ellis Benson, 3-34. Indianapolis: Indiana University Press.

Widdershoven, Guy AM. 1992. Hermeneutics and relativism: Wittgenstein, Gadamer, Habermas. *Journal of Theoretical & Philosophical Psychology* 12(1):1-11.

DRAFT

8. Identity and paradox in Habermas' approach to critical reflection: metaphor as necessary other to rational discourse

Habermas' theory of communicative action is explored as an orientation to the question of understanding which negotiates a pathway between two opposing (and complementary) theoretical frameworks—namely, hermeneutical-relational and empirical-analytical frameworks. His perspective grounds speech, action and understanding in the ethics of human relations. In his approach, understanding is fixed by particular events or “situations” about which intersubjective agreement must be achieved through the offer and acceptance of reasons that simultaneously orient actors to three worlds: the objective, the social and the personal worlds. This approach raises the question as to whether the process of abstracting from the particular event to the general, through such rational discourse, might create systems of understanding which silence individual expression and “naming”, particularly if such expression involves an identity that is not shared with others in the group. In other words, is the origin of an event or situation necessarily a null point for all actors? As this question is explored, metaphor comes to the fore as a complementary process of “showing” that which cannot be “grounded” in the dominant system of understanding. The pivot role of “naming” in the formal structure of Godel's first incompleteness theorem for number theory demonstrates the challenge to Habermas' theory.

*night windowblack returns
within*

*yet in deeper still come forms
a landscape*

*reflecting penetrating
two lights
two darkneses*

through a pane of glass

eyes
no eyes

Prologue

And the whole earth was of one language, and of one speech.
And it came to pass, as they journeyed from the east, that they found a plain in the land of Shinar, and they dwelt there.
And they said to one another, Go to, let us make bricks, and burn them thoroughly. And they had brick for stone, and slime had they for mortar.
And they said, Go to, let us build us a city and a tower, whose top may reach unto heaven; and let us make us a name, lest we be scattered abroad upon the face of the whole earth.
And the Lord came down to see the city and the tower, which the children of men builded.
And the Lord said, Behold, the people is one and they have all one language; and this they begin to do: and now nothing will be restrained from them, which they have imagined to do.
Go to, let us go down, and there confound their language, that they may not understand one another's speech. [Genesis 11:1-7]

This Biblical story highlights the notion that language is a medium for the social coordination of action. On one level of the narrative, language is related to technology as mastery of the environment. The form of this relationship is condensed into the image of the brick: a making of the earth into lifeless units for manipulation—an action that can be contrasted with God's creating of adam by breathing life into formed adamah (earth) [Genesis 2,7]. On another level, the nature of language, and specifically its unity, is raised as a problem that penetrates to the core of our relationship with God and with one another. The ethical dimension of this problem resonates more fully in recalling the story of Noah, immediately preceding this narrative, in which God said "for the imagination of man's heart is evil from his youth" [Genesis 8:21]. In *The Beginning of Wisdom: Reading Genesis*, Kass provides an insightful interpretation of the significance of the concept of unity for the narrative when he focuses on the meaning of the phrase "of one speech":

The Hebrew words are hard to translate because there is a grammatical paradox regarding number: the plural noun *devariym*, "words", is modified by the general singular adjective "one" (*`achad*), but "one" is *here written as a plural: `achadiym*. A variety of interpretations have been offered: "few words", implying simple thoughts and communication; "many words but one speech", implying a single plan; or "single words" or "one set of words," read as a synonym for a single language. But we wonder whether the strange construction, with the impossible plural of "one", might be a literary hint that the human beings' confidence in their language was somewhat misplaced. It might suggest, in addition, that these people were confused about the being of the one and the many, and in particular about the existence and unity of the highest One. Such

confusion might, in the end, jeopardize the apparent simplicity, singleness of purpose, common understanding, and intelligibility of their thought [Kass 2003, 224].

In this paper, I attempt to explore the problem of unity in language through an interpretative exploration of Habermas' theory of communicative action. His theoretical perspective, which grounds speech, action and understanding in the ethics of human relations, opens to themes which resonate with the Biblical narrative as deep metaphor. This is both the method and the thesis of the paper.

A pathway between the mountains

Habermas' theory of communicative action is concerned with the question of "understanding". His approach can be oriented by first considering two oppositional (complementary) theoretical frameworks between which Habermas attempts to negotiate a pathway: *empirical-analytical* and *hermeneutical-relational*. While the complexities and nuances of these frameworks themselves are beyond the scope of this paper, bringing them into juxtaposition, if only coarsely, provides bearings for situating Habermas' theory. Crudely sketched below, these two frameworks suggest, what appear to be, contradictory notions of a transcendental vantage.

The *empirical-analytical* framework has been archetypal for the natural sciences. In a particularly simplistic, yet illuminating, formulation, an objective world or reality external to individual subjects is posited. In pursuing their individual interests, subjects grasp this reality for the purposes of technical control or mastery. Habermas calls this instrumental or strategic action. The empirical-analytical framework points to the transcendental structure of an individual "cogito" oriented to an objective world; individual (finite) ego-subjects in some sense participate in this transcendental vantage although perhaps only as a horizon that might be collectively constituted. Understanding is metaphorically related to processes of observation and cognition [McCarthy 1978, 64]. The deep metaphor of space rules here. This framework often tends to a correspondence theory of truth, in which linguistic structures "picture" reality, most notably as a grammar of propositions that correspond to "states of affairs". A significant problem with this framework for Habermas is that it fails to adequately address intersubjective relatedness. Individual (finite) subjects are always temporally and spatially embedded in a particular context that is symbolically pre-structured by language. The "myth of objectivity"—that finite subjects have access to a transcendental vantage—masks the prejudices and presuppositions that are implicit in our pre-structured lifeworld. The empirical-analytical framework therefore raises a significant ethical problem in that it tends to orient us to subjectivity as ego-consciousness directed to its own interests and instrumental control, even when interacting with other subjects.

The *hermeneutical-relational* framework recognizes the relational nature of language. The dimension in which understanding occurs is articulated as an intersubjectively experienced tradition of shared meanings, norms and values. This dimension is grounded in symbolic

interactions that are “neither identical with nor reducible to instrumental action” [McCarthy 1978, 69]. Understanding is an intersubjectively achieved process of interpretation, or rather, continual re-interpretation that, according to Gadamer, is never fully completed [Gadamer, 2004]. The deep metaphor of time rules here. In the extreme, language is said to have the (non)structure of symbols pointing to symbols in a continual process of deferred meaning that never escapes the transcendental framework of language itself [Derrida 1982]. Within what I have called the hermeneutical-relational framework (which actually resists the spatial privileging of the label “framework”), language itself becomes the diffuse, holistic, transcendental vantage, within which meaning and understanding occur. A significant problem for Habermas is the totalizing aspect of this approach: there is no describable (or perhaps even nameable) “world” outside of language which might falsify the prejudices and presuppositions of the tradition that language makes possible. Habermas is concerned with the possibility of systemic distortions of language that can neither be manifested nor critiqued by the interpretative processes of hermeneutics. For him, the hermeneutical-relational framework problematizes truth by implicitly orienting us to tradition as infallible.

Habermas’ interest is in sociology, which he argues cannot avoid the divide between these two frameworks. However, rather than treating them as coming from two transcendental vantages, he approaches them as two orientations to reaching understanding that are routed in different systems [McCarthy 1978]. The empirical-analytical framework becomes an orientation to nature in which events or situations can disturb routine interactions. This disturbance is seen as a failure of purposive rational action. The response is to regain pragmatic control of the rules for instrumental action through experiment or testing. In this way, understanding is rooted in systems of action. The hermeneutical-relational framework becomes an orientation to other people in which a disturbance of consensus is seen as lack of agreement regarding reciprocal expectations. The response is to regain pragmatic control of reciprocal expectations through interpretation. In this way, understanding is rooted in systems of interactions mediated by language. Habermas’ theory of communicative action then seeks to connect systems of action and systems of interpersonal interaction. By reclaiming the event-in-the-world (or situation) as formative of meaning that must be worked out intersubjectively through the use of language, he proposes a more fundamental engagement of world and language than is available in many hermeneutical approaches, particularly that of Gadamer. At the same time, he reclaims intersubjectivity as constitutive of knowledge formation by focusing on the role of speech acts in reaching understanding and thereby he moves beyond the prejudice of individual ego-consciousness and cognition implicit in empirical-analytical orientations.

Formal pragmatics: Building on the level plain

In an approach called formal (universal) pragmatics, Habermas directs his attention to the question: *How do we come to understanding through communication?* [Habermas 1979, 1-68]. The intention of formal (universal) pragmatics is “to identify and reconstruct universal conditions for possible understanding” [Habermas 1979, 1]. To begin, Habermas takes

communication to be a form of social action, which he calls *communicative action*, and which he differentiates from other forms of social action, such as instrumental action oriented to achieving personal interests. Communicative action is aimed at the intersubjective definition of a situation (event) in order to coordinate action in the world. It is constituted through speech acts, which are its elemental units. Through communicative action, two or more people seek to “come to an understanding”, which is a process involving intersubjective mutuality of “reciprocal understanding, shared knowledge, mutual trust and accord with one another” [Habermas 1979, 3]. The process of coming to understanding involves using reasons to arrive at an agreement or consensus concerning criticizable validity claims. In idealized communicative action, all participants have the freedom and obligation to take a position—either yes or no—regarding any validity claim, a position that is based on reasons which can be provided if needed. According to Habermas’ theory, this (idealized) process opens a space for mutual critical reflection that is unconstrained and non-coercive, relying solely on the force or strength of rational arguments.

Critical reflection brings the social world of language into relationship with the objective world of action. In so doing, it provides a vantage for unmasking systemic distortions in language, rooted in tradition, that Habermas claims are inaccessible to many hermeneutical-relational approaches. At the same time, it broadens the narrow focus on objective truth-conditions, as articulated in many empirical-analytical approaches, to include validity in social relations. However, more than providing another orientation to the question of understanding, Habermas claims *universality* to formal pragmatics. This paper is a response to that claim. So by way of apology, I admit that I do not adequately address the strengths of Habermas’ theory which I think are significant. Rather I focus on the significance of its possible limitations.

The formal structure of Habermas’ three world-concepts

In the theory of communicative action, understanding is fundamentally experienced as intersubjective. Understanding is achieved when “two or more speaking and acting subjects understand a linguistic expression in the same way” [Habermas 1984, 307]. Rooted in action, the theory of communicative action involves an analysis of the *use* of language in speech acts. Drawing on speech act theory, the analysis is based on the idea that the expression inherent to any speech act simultaneously orients actors (speakers and hearers) to three world-relations. The expression of propositional content orients actors to a relationship with the *objective* world of states of affairs by representing or pre-supposing states and events. The expression of an offer of interpersonal relationship orients actors to the *social* world in which interpersonal relations are established and renewed. The expression of the intention of the speaker manifests experiences (represents oneself) which orient actors to the subjective or *personal* world to which the speaker has privileged access.

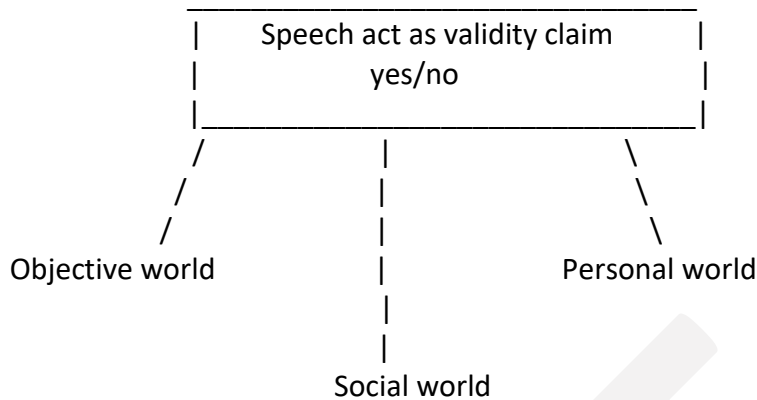
Communicative action has the following formal structure. With every speech act, a speaker establishes the three world-relations by simultaneously taking up a relation to three things:

something in the world of states of affairs (objective world), something in the world of social orders (social world) and something in the speaker's private or subjective world (personal world). Through the speech act, the speaker makes a validity claim that has three aspects or levels corresponding to the three world-relations: a claim to propositional truth (objective world), a claim to normative rightness (social world) and a claim to expressive authenticity (personal world). The hearer(s) can either accept the speech act as a valid claim or reject the speech act. Any other response would not be considered communicative action. When the hearer accepts the speech act, an intersubjective agreement comes about at all three levels of the validity claim. Through shared propositional knowledge, the hearer accepts the knowledge of the speaker and the validity claim is taken as propositionally true. Through normative accord, the intersubjective social relationship is recognized as legitimate and the validity claim is taken as normatively right or authoritative. Through mutual trust the hearer gives credence to what the speaker says and the validity claim is taken as sincere or authentic. Rejecting the speech act means the hearer takes issue with at least one aspect of the validity claim. The rejection of a speech act therefore involves a failure to achieve mutuality in at least one of the three world-relations, which means failure to agree with at least one of the three respective worlds. In rejecting the speech act, the hearer is expressing the fact that the speech act "has not fulfilled its function of securing an interpersonal relationship, or representing states of affairs, or of manifesting experiences" [Habermas 1984, 308].

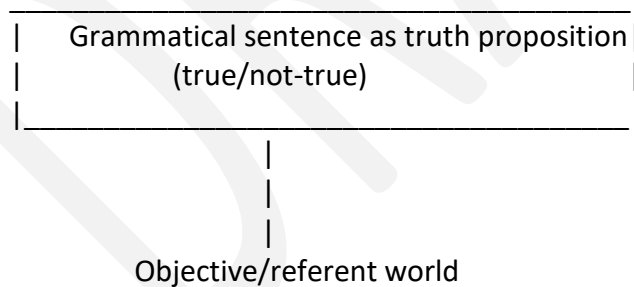
In the theory of communicative action, the intersubjective process of "reaching an understanding" involves bringing about an agreement (Einverständnis) concerning a situation (event) in the "lifeworld". Ideally, the agreement must involve all the actors for whom the situation is relevant. The agreement terminates in intersubjective accord with respect to validity claims. The accord is based on intersubjective recognition of the three aspects of validity. Einverständnis is achieved through the use of reasons. Reaching an understanding occurs through a process of argumentation in which problematic validity claims are thematized, criticized and defended by the actors in communicative action. The meaning of the speech act is "inherently connected to the conditions for redeeming these validity claims". To understand what a speaker intends with a speech act, a hearer must know the conditions under which it can be accepted [Habermas, 1984, 307].

The formal structure of world-relations in communicative action can be represented in the following figure:

8. Identity and paradox



Because there are three independent aspects to validity, the speech act simultaneously establishes relationships with three “world-concepts”. This formal structure provides a shared coordinate system that allows actors to “define a situation in the lifeworld”, where the lifeworld is taken to be a common background that cannot be formalized conceptually, which is to say it cannot be thematized as a “world-concept”. While the speech act has *three* aspects of validity, it has only *two* possible “truth values” (to use the language of propositional logic): the validity of the speech act can be accepted (yes) or rejected (no). This is the formal trope Habermas uses to bring the three world-concepts, as independent coordinate systems, into a unity that *essentially* involves the intersubjective process of agreement. It can be contrasted with the formal structure of world-relations in propositional logic, for example, as shown below:



With propositional logic, the grammar and the formal world-concept are *directly* connected: there is no reflective possibility. In Habermas’ formalism the three world-concepts form a system that is coordinated in the dynamical unfolding of speech acts. Independently, through other forms of action (teleological, dramaturgical, normatively regulated), actors take up direct relations to one or two of the three worlds. This offers the possibility of critical reflection because the three, independent world-concepts can be triangulated through the different systems of action.

8. Identity and paradox

Speakers integrate the three formal world-concepts, which appear in the other models of action either singly or in pairs, into a system and presuppose this system in common as a framework of interpretation within which they reach an understanding. They no longer relate *straightaway* to something in the objective, social, or subjective worlds; instead they relativize their utterances against the possibility that their validity claim will be contested by other actors. [Habermas 1984, 98-99]

Because speakers and hearers, as actors, use a reference system of three worlds as an interpretive framework within which they work out their common situation definitions, communicative action opens up a process for reaching understanding that is not immediate to the interests of actors in their relationships to the separate worlds. By getting beyond or beneath immediate interests, Habermas claims critical reflection is non-coercive, concerned only with understanding for the sake of understanding and driven by the force of the best rational argument.

Lifeworld and Origin

The three formal world-concepts coordinate and, in a sense, overwrite the *lifeworld*, which is a more nebulous (non)concept in Habermas' theory. The lifeworld is intersubjectively shared and forms a diffuse and *unproblematic* background for communicative action [Habermas 1984, 70]. It is present to actors "only in the prereflective form of taken-for-granted background assumptions and naively mastered skills" [Habermas 1984, 335].

The lifeworld is, so to speak, the transcendental site where speaker and hearer meet, where they can reciprocally raise claims that their utterances fit the world (objective, social and subjective), and where they can criticize and confirm those validity claims, settle their disagreements and arrive at agreements [Habermas 1987, 126].

I have called the lifeworld a "(non)concept" to stress that it is categorically different from Habermas' formal world-concepts. According to Habermas, formal world-concepts, along with criticizable validity claims, "form the frame or categorical scaffolding that serves to order problematic situations in a lifeworld that is already substantively interpreted" [Habermas 1987, 125]. Formal world-concepts describe the plain or field, as it were, that is present to communicative actors and within which possible referents for speech acts are "located". The lifeworld, by contrast, is always infused throughout, beneath, behind actors; they cannot refer by it to "something" in the lifeworld. "Communicative actors are always moving within the horizon of their lifeworld; they cannot step out of it" [Habermas 1987, 126]. The lifeworld stores "the interpretive work of preceding generations" [Habermas 1984, 70] and "language and culture are constitutive for the lifeworld itself" [Habermas 1987, 125].

Key to Habermas' treatment of lifeworld is his complementary notion of the *situation* (event). The situation (event) troubles the otherwise unproblematic background of the lifeworld and

brings about the need for communicative action in order to restore accord. Through communicative action, actors attempt to mutually *define* the situation in terms of criticizable validity claims and the reasons or grounds for accepting them. The situation (event) itself becomes “a segment of *lifeworld contexts of relevance* that is thrown into relief by themes and articulated through goals and plans of action.” The situation (event) forms, as it were, an *origin* for the actors in the lifeworld as the “null point of a spatiotemporal and social reference frame” [Habermas 1987, 123]. Around this origin, “contexts of relevance are concentrically ordered and become increasingly anonymous and diffused as the spatiotemporal and social distance grows” [Habermas 1987, 123]. For the actors involved, the actual situation (event) is “the centre of their lifeworld” [Habermas 1987, 123]. It should be noted that the situation is always particular.

In discussing the relationship *lifeworld-situation* we are entering into, what I will call, the *deep metaphor* of Habermas’ theory. By deep metaphor I mean, among other things, the quasi-transcendental orientation of the theory. The deep metaphor reaches into the pre-structured and presupposed background aspects of the theory which enable the theory to be formulated, or structured, but are not part of the formulation. It does this by drawing attention to how the “transcendental” is imaged, where transcendental is taken as a term that functions by pointing to or hinting at or suggesting “a beyond” of the theoretical foundations in the way that the term “lifeworld” functions within Habermas’ theory. In the exploration of the deep metaphor above, an important tentative inference emerges that cuts to the core of what it might mean to take Habermas’ theory as universal. Namely: *the vantage of critical reflection always originates in a particular event.*

Bringing into view the deep metaphor of communicative action theory, articulated in the dual image *lifeworld-situation*, also allows us to relate Habermas’ theory to other theories or approaches to the question of meaning or understanding. For example, we can relate *lifeworld-situation* to the following images: *tradition-language* in Gadamer’s hermeneutical approach [Gadamer 2004], *chora-symbolic* in Kristeva’s embodied approach [Kristeva 1984], and *saying-said* in Levinas’ ethical approach [Levinas 2002]. In all four cases, the first term of the duality points to a diffuse, holistic background within which understanding or meaning occurs. This background infuses all subjects and never directly comes into view, although it is indirectly inferred by virtue of the complementary component of the dual image. This second component of the image functions as the source or origin or enabler of the structure in which meaning and understanding occur. While it is beyond the scope of this paper to develop a formal comparison of these deep metaphors, it is important to note that the same conclusion is drawn by Gadamer, Kristeva and Levinas in their explorations: *the deep metaphor is heterogeneous in a significant way.* For example, for Gadamer the heterogeneity is manifested in the multiplicity of languages and the discontinuity of temporal separation; for Kristeva the heterogeneity is manifested in the eruption of the chora into the structures of the symbolic; for Levinas the heterogeneity is manifested in the betrayal of saying through the structures of “the said”. Because Habermas’ treatment of language is different than these three other authors, it is difficult to make any direct conclusion. However, Habermas does *explicitly* rely on the assumption that reaching an

understanding through communicative action occurs within the background of a common and unproblematized lifeworld.

In everyday life we start from a background consensus pertaining to those interpretations taken for granted among participants. As soon as this consensus is shaken, and the presuppositions that certain validity claims are satisfied (or could be vindicated) is suspended, the task of mutual interpretation is to achieve a new definition of the situation which all participants can share. If their attempt fails, communicative action cannot be continued [Habermas 1979, 3].

Alterity may bring particular situations into troubled focus, but it does not penetrate the lifeworld with deep, epistemic fault lines.

The potential failure of communicative action may be more problematic than Habermas acknowledges. Using the language of Levinas, Habermas seems to assume that reaching understanding occurs in a homogeneous background that reduces to the *same* and excludes the rupture of alterity. Based on the work of Gadamer, Kristeva, Levinas and others, we might have reasonable grounds to *question* that assumption. We can locate the tension of this question in the *origin* of the situation. Habermas assumes the origin, *as origin*, is the same for all situations, which is to say it is universal and therefore stripped of the identity that comes with the particularity of a given situation. It is this quality that ensures a particular situation can be assumed into generalized discourse. This brings to mind the Newtonian notion of spatiality, in which origins are embedded in absolute passivity. Perhaps another path open to us is to see in the origin of the situation a *brokenness* of identity. With this view, universality is not found in the sameness of the origin, but rather in the singularity of the absolute event which, through its brokenness, enables actors to originate situations in critical reflection. In the absence of Habermas' assumption of homogeneity or sameness, then, the conceit of *universal* formal pragmatics might be said to point towards, or identify, the Other as an absolutely singular event in the (historical) lifeworld, an event of brokenness around which all human reasoning originates or comes into definition. Poetically attuned, might we say: As the horizon of the empirical-analytical orientation suggests the transcendence of God the Father and the horizon of the hermeneutical-relational orientation suggests the illumination of the Holy Spirit, so the horizon of the critical-reflective orientation suggests the incarnation of the person of Jesus?

Authenticity and Identity

Communicative action is based on the notion of criticizable validity claims. Validity claims have three aspects—truth, rightness and authenticity—which relate to three worlds—objective, social and personal. Reaching an understanding comes about by grounding validity claims in reasons, such that to understand what a speaker intends with a speech act means that the hearer knows the essential conditions under which he could be motivated by the speaker to accept the speech act as a valid claim [Habermas 1984, 298]. It is remarkable, therefore, that

8. Identity and paradox

Habermas also claims that authenticity cannot be criticized [Habermas 1984, 41]. This raises the question: To what extent, if at all, does expressive authenticity play a role in the process of coming to an understanding?

Habermas uses the term expressive speech act, or expression, to define a speech act in which the speaker's *primary* intention is to establish a relationship with the personal world. Expressive speech acts contain elementary experiential sentences in the first person, such as "I am in pain" [Habermas 1984, 309-13]. Habermas develops a nuanced notion of authenticity (or sincerity) that distinguishes the propositional validity of what is expressed from the guarantee or warrant of sincerity in the intention of the speaker. Thus, if a speaker says "I am in pain", there is a difference between the propositional aspect of the validity claim and its aspect of authenticity. To critique the propositional aspect of validity, the utterance might be taken as: I, as a person in the objective world, am experiencing the inner state of pain. The speaker, as "I", is thereby objectified and brought into a relationship of the same with other persons in the objective world. The authenticity aspect of the utterance, however, relates to whether or not the speaker means what s/he is saying, that is to say it relates to the speaker's attitude. For example, I may make this utterance when I am not in pain, in which case my speech act is not authentic or sincere. Authenticity, therefore, is primarily concerned with *trust* in the relationship or bond between speaker and hearer(s) that is established in the offering of and the response to a speech act. From this treatment, an important tentative inference emerges that might bring into view the limits of Habermas' analytic approach: *Authenticity is concerned with an attitude towards the other; it is a quality of relatedness itself.*

Habermas' discussion of authenticity as an aspect of validity is revealing in that he moves from the notion of "grounding" validity claims in reasons to the notion of "showing".

The sincerity [authenticity] of expressions cannot be grounded but only shown; insincerity can be revealed by the lack of consistency between an utterance and the past or future actions internally connected with it [Habermas 1984, 41].

Here authenticity (sincerity) is said to be "shown" through consistency in actions, which presumably also includes speech acts. How might *showing* be different from *grounding*? For Habermas, the grounding of validity claims in reasons leads to a process of argumentation or discourse. In this process actors work through the (in)formal logic of theoretical or legal frameworks, for example, in which reasons are embedded or systematized. They come to experience the frameworks from within, as it were, and therefore come to know the conditions under which a validity claim can be accepted. Through this process, validity claims become *grounded* in reasons. A clue to how showing might be a different process from grounding comes from Habermas' reference to consistency as instrumental to the judgement of authenticity. Consistency is a property of a complex when viewed as a whole. To perceive consistency is to see a series of elements as an interconnected unity or gestalt. To show, then, involves bringing a complex form or gestalt into presence such that the relationship of parts and whole is manifested. In the case of expressions, the unifying aspect is the identity of the

speaker. However, Habermas also acknowledges that the notion of showing might be more generally extended to aesthetics, since it is a process of leading another to the possibility of an experience. In discussing aesthetic criticism, for example, he claims “the peculiar role of arguments in [the case of aesthetic criticism] is to open the eyes of participants, to *lead* them to an authenticating aesthetic experience” [Habermas 1984, 42]. Nonetheless Habermas dismisses *showing* as potentially constitutive for communicative action because it is always particular to a context and does not admit “universal validity claims that can be tested in discourse” [Habermas 1984, 42]. As a result, his notions of authenticity and the nature of the personal (subjective) world-concept are not well developed.

The dismissal or subversion of *showing* may be more problematic for the theory of communicative action than Habermas expects. Showing and grounding, as Habermas develops the notions, involve two different takes on unity. Grounding means grounding separate validity claims in systems of reasons. It is an analytic orientation to understanding, rooted in the notion of elementary speech acts. More complex structures are built from the elementary units as towers are built from bricks. As Habermas argues, higher level validity claims, relating to higher level cultural systems of action like science, law or art, are built from elementary speech acts and their corresponding validity claims through a process of institutional stabilization of arguments. These higher level validity claims “are attached not to individual communicative utterances, but to cultural objectivations—to works of art, to moral and legal norms, to theories.” [Habermas 1984, 40]. The key assumption here is that nothing is lost or gained in the process: “no validity claim appears at the level of cultural objectivations that would not also be contained in communicative utterances” [Habermas 1984, 40]. The notion of authenticity troubles this assumption because it relates to validity in relations themselves, over and beyond the validity of the elementary units. Showing, by contrast to grounding, presents a gestalt in which parts are in relationship to a whole. The act of showing draws attention to the patterns of relations as the essential aspect to be understood. Showing can bring two systems, as gestalts, into relatedness by pointing to their similar (and dissimilar) interior patterns of connectivity in a process that foregrounds unity as identity. With grounding, thingliness is privileged over relatedness; with showing relatedness is privileged over thingliness.

In his theory of communicative action, Habermas needs a notion like showing because cultural objectivations and their corresponding higher level validity claims can be discrete systems. If actors do not share enough common knowledge of these systems as they relate to a situation, then they cannot engage in mutual argumentation.

The background of communicative utterances is thus formed by situation definitions that, as measured against the actual need for mutual understanding, have to overlap to a sufficient extent. If this commonality cannot be presupposed, the actors have to draw upon the means of strategic action, with an orientation toward coming to understanding so as to bring about a common definition of the situation or to negotiate one directly—which occurs in everyday communicative action in the form of “repair work” [Habermas 1987, 121].

Habermas' concepts of communicative action and discourse seem to work *within* systems of understanding. These concepts do not appear to provide a reliable mechanism for moving between discrete systems; movement which may be neither rule-bound nor amenable to argumentation except *after the fact of its having been understood*. It is this type of movement which particularly concerns Gadamer, Kristeva and Levinas, for example. In another part of his text, Habermas addresses the resolution of this disconnect using the notion of strategic *elements*. Strategic elements have perlocutionary effects whereby "the speaker gives the hearer something to understand which he cannot (yet) directly communicate" [Habermas 1984, 331]. Strategic elements fit within the same category as speech acts aimed at showing.

These strategic elements within a use of language oriented to reaching an understanding can be distinguished from strategic actions through the fact that the entire sequence of a stretch of talk stands—on the part of all participants—under the presuppositions of communicative action [Habermas 1984, 331].

Thus Habermas appears to assimilate *showing* into his theory as a strategic element that can be used within the larger framework of communicative action. If Habermas' assumption about the homogeneity or sameness of lifeworld is valid, then his approach is grounded. However, if alterity is constitutive for lifeworld, as I will discuss in the next section, Habermas' theory falters in that it doesn't address the potential violence to identity that might occur if actors do not recognize and accept strategic elements *as* strategic elements, rather than as arguments, for example. My claim is that grounding and showing should be given the same epistemic status in theorizing about reaching an understanding.

Discourse and Totality

The process of argumentation is a constitutive component of the theory of communicative action. Understanding is based on "acceptability conditions" through a formalism that is loosely connected to the formal account of "truth conditions" as the basis of the meaning of sentences in representational semantics [Bohman and Rehg 2001].

We understand a speech act when we know the kinds of reasons that a speaker could provide in order to convince a hearer that he is entitled in the given circumstances to claim validity for his utterance—in short, when we know *what makes it acceptable* [Habermas as quoted by Bohman and Rehg 2001].

However, for Habermas argumentation is not a logical formalism that aims at absolute certainty. Rather, argumentation provides plausibility for acceptance of validity claims which depends on multiple factors such as how well all the relevant information is accounted for and how well possible objections have been addressed. Plausibility is not a truth condition, rather it is a qualitative feature which Habermas calls the *strength* of an argument. There is always a fallibilistic character to the redemption of validity claims [Habermas 1984, 318].

8. Identity and paradox

The logic of argumentation does not refer to deductive connections between semantic units (sentences) as does formal logic, but to nondeductive relations between the pragmatic units (speech acts) of which arguments are composed [Habermas 1984, 22].

Like formal logic, argumentation connects reasons in a systematic way to contested validity claims. However, unlike formal logic, argumentation is an intersubjectively achieved form of (ideal) communication. Argumentative speech, or *discourse*, has three inter-related aspects [Habermas 1984, 25]:

- a process of “reflective continuation, with different means, of action oriented to reaching understanding”;
- a procedure that is “subject to special rules”;
- a production of cogent arguments that are “convincing in virtue of their intrinsic properties”.

Discourse is normatively regulated. Through discourse, participants thematize a problematic validity claim and “test with reasons, and only reasons, whether or not the claim defended by proponents rightfully stands or not” [Habermas 1984, 25]. Key to the notion of discourse is the requirement that participants assume a performative, hypothetical attitude. Through this attitude, participants remain open to mutual criticism of their positions with respect to the validity claim and the discursive redemption of that claim. “The same structures that make it possible to reach an understanding also provide for the possibility of a reflective self-control of this process” [Habermas 1984, 121]. In the reflective attitude, a subject turns back on itself as an object:

I argue for the following thesis: the predicative self-identification that a person undertakes is in certain respects a presupposition of others being able to identify with him generically and numerically [Habermas 1987, 102].

Habermas’ hypothetical attitude transposes the identity of the subject in order to effectuate the reflective moment of return. To whom is this identity transposed? Because Habermas does not develop a clear notion of “you” as a form of interpersonal relatedness that is different from a generic third person, my claim is that his theory relinquishes the identity of subjectivity and the authenticity of expressive speech entirely. In discourse, the subject makes of itself (and others) a generic identity, an identity that is given over to systems of argumentation. From this normative regulation, an important tentative inference emerges that impinges on the ethical foundations of Habermas’ theory: *The hypothetical attitudes of participants engaging in discourse are not necessarily authentic*. From earlier explorations, I was led to the tentative claim that authenticity is about relatedness itself. If this claim is also accepted, we are led to the question: *If the attitudes of participants engaging in discourse are not necessarily authentic, is the intersubjective relationship itself authentic?*

The problem of authenticity is crucial in discourse theory because, unlike communicative action that originates in a situation-in-the-world (event), in discourse subjects give themselves over *to the strength of argumentation*. As Habermas recognizes, through cultural systems of action,

arguments can become “institutionally stabilized and professionally organized” [Habermas 1984, 40]. These entrenched systems, through cultural objectivations such as theories, gain argumentative power and can impinge back upon the identity of subjects. The entrenched systems orient subjects to what counts as significant. When cultural systems are transgressed, the strength of argumentation may become a matter of aesthetic criticism, like the critique of value standards, because a particular cultural system in which an argument is embedded has no grounding.

The ‘strength’ of an argument is measured in a given context by the soundness of the reasons; that can be seen in, among other things, whether or not an argument is able to convince the participants in a discourse, that is, to motivate them to accept the validity claim in question. Against this background we can also judge the rationality of a speaking and acting subject by how he behaves as a participant in an argumentation, should the situation arise [Habermas 1984, 18].

What happens if subjects are entrenched in different systems of cultural objectivations and these systems are incommensurate or lack “sufficient overlap”? When communicative action is directed to the surface level of validity claims, an appeal to the situation (event) as origin is always possible. But as deeper levels of discourse are entered, which focus on the grounds of reasons, there is no longer common origin. Won’t the systems of cultural objectivations begin to compete to become the dominant origin? This movement towards totality is not the same as domination through personal interest. Subjective identity itself is dependent on systems of cultural objectivations and is pulled into the system, as it were. Those who resist are *silenced*. The potential incommensurability of “cultural objectivations”, such as theories, is taken up by Kuhn in his theory of scientific paradigms [Kuhn 1962]. Habermas does not seriously address this issue of non-analyticity because he works from the assumption that the background consensus is unproblematic, that identity is ultimately grounded in the same, and perhaps also, that rationality is absolutely uniform. He seems to struggle hardest against the problem when discussing interpretation. In the end, he imposes a “unity” through yet another deployment of the metaphor of world:

A definition of the situation by another party that prima facie diverges from one’s own presents a problem of a peculiar sort; for in cooperative processes of interpretation no participant has a monopoly on correct interpretation. For both parties the interpretive task consists in incorporating the other’s interpretation of the situation into one’s own in such a way that in the revised version “his” external world and “my” external world can—against the background of “our” lifeworld—be relativized in relation to “the” world, and the divergent situation definitions can be brought to coincide sufficiently” [Habermas 1984, 100].

From my perspective, this is a serious weakness to his theory. Moreover, I fear that Habermas does not fully appreciate the violence to identity that the totalizing movement of discourse can cause.

By way of analogy, I will attempt to show the problem that appears to be sublimated if Habermas' theory is taken as *universal*. In the theory of mathematical logic, axiomatic systems can be created to formally deduce the truth of theorems that are validity claims about the relations of the natural numbers. An axiomatic system provides a powerful, rule-governed procedure for proving the truth of a theorem, that is to say, for grounding the validity claim of a theorem in reasons. However, for any such system in number theory, there will always be validity claims about the natural numbers that are true but are unprovable within the system [Hofstadter 1980]. That is to say, the validity claim is *undecidable* within the system and so neither a position of "yes" nor "no" can be taken with regard to the validity claim within the system. This is known as Godel's first incompleteness theorem. What is illuminating about this result, for the purposes of this discussion is how Godel's theorem is formed. The proof of Godel's theorem involves a demonstration that its identity, its *name*, lies beyond the infinite horizon of accessible discourse within the logical system [Hofstadter 1980]. The trick Godel used in his proof was to give names to each true theorem about numbers, where the names were themselves numbers. This reflective move then allowed him to look for something similar to "the name that names itself". The Godel theorem (validity claim) that can be named but not proven within the formal system has the *self-referential* form: "This theorem cannot be proven within the formal axiomatic system." Godel's reflective move pulls the interpretation of the theorem out of the formal axiomatic system—because it can be proven by the system that the Godel's theorem cannot be proven by the system, the theorem must be true. The observation I want to draw attention to in this example is the following: *The turning point for Godel's reflective move comes from the identity of a name. Yet the formalized system excludes this name because its truthfulness is undecidable.*

How might the totalizing movement of formal logical systems be relevant to Habermas' theory of communicative action? In Habermas' theory, participants in communicative action must take a position of yes or no with respect to each validity claim. This ensures that participants are required to ground their positions in reasons that are in turn criticizable. The notion of "proof" from formal logic is superseded by the notion of "conviction":

Agreement rests on common *convictions*. The speech act of one person succeeds only if the other accepts the offer contained in it by taking (however implicitly) a "yes" or "no" position on a validity claim that is in principle criticizable [Habermas 1984, 287].

Binary values for validity claims (yes/no) also play a crucial role in uniting the three formal world-concepts as discussed earlier. Undecidability of validity claims poses a significant problem that could undermine the formal structure of Habermas' universal pragmatics, similar to the way that undecidability undermines the formal axiomatic structure of mathematics. Here we are pushing at the limits of binary thought. More profoundly, what is at stake is the nature of ethical intersubjectivity. In the hypothetical attitude, participants are assuming their identities are interchangeable. Assent to validity claims means agreement to this interchangeability. Agreement, or *Einverständnis*, thereby becomes rooted in denial. Habermas

8. Identity and paradox

writes: “any explicit agreement thereby has something of the nature of a disagreement that has been avoided, excluded” [Habermas 1987, 73-4]. Beyond this background of implicit agreement, *participants can only engage in communicative action by rejecting the validity claims of the other.*

The binding effect of illocutionary forces comes about, ironically, through the fact that participants can say “no” to speech-act offers. The critical character of this saying “no” distinguishes taking a position in this way from a reaction based solely on caprice [Habermas 1987, 74].

There is no offer of hospitality to the stranger. There is no notion that the other has something to *say*, something that must be heard in its particularity in order to be understood and brought into dialogue with reasons. Reaching an understanding through communicative action has the form of rejecting the alterity of the other unless s/he provides reasons, reasons that can be grounded in argumentation, argumentation that can be considered strong, strong in the sense of whether or not s/he can convince us, we who are entrenched in institutionalized discourses which normatively orient us to what ought to count as convincing. Those who are excluded are *silenced* by the insignificance of their claims to validity, claims that can never be embedded in argumentation because the speaker “can only give the hearer something to understand which he cannot (yet) directly communicate.” The other can only resort to strategic elements which must be received in openness, in a gesture of affirmation. Yes, yes. They must be *heard*. “Gestalts don’t *have* reasons; they announce themselves ... There is, however, no simple recipe of communicating gestalts; or, rather, there is only the roughest and readiest: point and hope” [Zwick 2003, 92].

And so, it would seem, *the modern world understanding totalizes from within the system.* The totalizing movement that Habermas ultimately locates in the material colonization of the lifeworld is also already epistemically embedded in his theory of communicative action. What is apparently missing from Habermas’ theory of discourse is the movement or process that allows a return to an authentic attitude towards the other. My claim is that this movement is a return to personal identity. This type of movement is manifested, for example, in metaphor. It is beyond the scope of this paper to show how formal inclusion of this movement might impact Habermas’ theory. However, by way of motivation, I believe that Levinas’ approach to subjectivity offers important insights. The connection to Habermas’ theory comes about through Levinas’ treatment of the “third party”, who is the other of the other who is also another to me. In a sense, the third party constitutionally embodies paradox, or undecidability, through an irreducible three fold relatedness. Habermas’ three formal world-concepts might then be related to three relationships of Levinas’ subjectivity in the presence of the third person, which then might be related to the three conjugations of person in language: I, thou, they. Habermas’ objective world becomes the world of the third person. The social world becomes the world of the second person. The personal world becomes the world of the first person. But each of these is different in kind, and the metaphor of world would no longer be apt.

Metaphor and Attunement

[Fragments from Zwicky's *Wisdom & Metaphor*]

Metaphor is one way of showing how patterns of meaning in the world intersect and echo one another.

Strictly speaking, 'x is y' is not a metaphorical claim unless 'x is not y' is true. In the general case, an expression is not metaphorical unless it implies—or insinuates—a claim of the form 'x is y' where 'x is not y' is true.

The implied 'is not' in a metaphor points to a gap in language through which we glimpse the world. That which we glimpse is what the 'is' in a metaphor points to.

We may say: a metaphor is the result of seeing the role of a word or concept in one language-game as that of the role of another word or concept in a different language-game.

The 'experience' of truth is always the experience of resonance, that is, of the attunement of various distinct components of a whole.

That is not to say that everything that is true is also resonant. The sorts of truths pursued in analysis, for example, generally lack resonance.

To say that an utterance is not resonant is not to say that it is not true. Rather, it is to say that it has no phenomenology.

The explicit 'is' of metaphor is its lyric aspect. For this reason, a metaphor is true to the degree that it is resonant.

Reference is the gesture that paradigmatically attempts to establish distinctness.

To be distinct, however, is not the same thing as to lack resonance. A thing that is distinct may or may not be, itself, a resonant whole.

And, of course, there are different forms and different degrees of distinctness. Just as there are different forms and degrees of resonance.

In a metaphor, a gesture that takes its life from one context is suddenly manifested as a gesture in a context in which we had not noticed its possibility before.

That is: there is what Wittgenstein would have called an internal relation between the two contexts.

Reductionism says connectedness is sameness; the contemporary academic version says further that sameness is revealed through analysis. Metaphor understands connectedness as resonance, revealed in the shift of gestalts.

Epilogue

And when the day of Pentecost was fully come, they were all with one accord in one place.

And suddenly there came a sound from heaven as of a rushing mighty wind, and it filled all the house where they were sitting.

And there appeared unto them cloven tongues like as of fire, and it sat upon each of them.

And they were all filled with the Holy Ghost, and began to speak with other tongues, as the Spirit gave them utterance.

And there were dwelling in Jerusalem Jews, devout men, out of every nation under heaven.

Now when this noise was raised abroad, the multitude came together, and were confounded, because that every man heard them speak in his own language.

Acts 2.1-6

References

- Bohman, James and Rehg, William. 2001. Jürgen Habermas. IN *The Stanford Encyclopedia of Philosophy (Winter 2011 Edition)*. Edward N. Zalta (ed.)
URL = <<http://plato.stanford.edu/archives/win2011/entries/habermas/>>.
- Derrida, Jacques. 1982. *Margins of Philosophy*. Translated by Alan Bass. Chicago: University of Chicago Press.
- Gadamer, Hans-Georg. 2004. *Truth and Method*. Second, Revised Edition, transl by Joel Weinsheimer and Donald G. Marshall. New York: Continuum Publishing Group.
- Habermas, Jurgen. 1984. *The Theory of Communicative Action. Volume 1: Reason and the rationalization of society*. Translated by Thomas McCarthy. Boston: Beacon Press.
- Habermas, Jurgen. 1987. *The Theory of Communicative Action. Volume 2: Lifeworld and system: a critique of functionalist reason*. Translated by Thomas McCarthy. Boston: Beacon Press.
- Habermas, Jurgen. 1979. *Communication and the Evolution of Society*. Translated by Thomas McCarthy. Boston: Beacon Press.
- Hofstadter, Douglas R. 1980. *Godel, Escher, Bach: An eternal golden braid*. New York: Random House.
- Kass, Leon R. 2003. *The Beginning of Wisdom: Reading Genesis*. Chicago: University of Chicago Press.
- Kristeva, Julia. 1984. *Revolution in Poetic Language*. Translated by Margaret Waller. New York: Columbia University Press.
- Kuhn Thomas. 1962. *The Structure of Scientific Revolutions*. Chicago: Chicago University Press.
- Levinas, Emmanuel. 2002. *Otherwise than Being or Beyond Essence*. Transl by Alfonso Lingis. Pittsburgh: Duquesne University Press.
- McCarthy, Thomas. 1978. *The Critical Theory of Jurgen Habermas*. Cambridge: MIT Press.
- Zwicky Jan. 2003. *Wisdom & Metaphor*. Kentville NS: Gaspereau Press.

9. Beyond space and time: unity and form in Augustine's *Confessions*

An exploration of Augustine's approach to unity through three inter-related formal "aspects", namely monadic, dyad and triadic forms. Augustine's formalism is used to interrogate the concepts of space, time, light and void (nothingness) in modern physics.

Hear O Israel, the Lord our God is one Lord
—Mark 12.29

One is ineffable. Whenever we speak about unity we speak provisionally. Images and formalisms can help us, but if they become too inculcated they may become hindrances or even barriers to understanding. We may be thrown off course or lose our way. Systems of thought, formed from false images of unity, may perpetuate the dis-course. With Augustine as a guide, this paper is an investigation of such entrenched habits of thinking about unity. It is particularly concerned with habits of thinking in the field of physics that have been problematic for me.

The method for the investigation is suggested by Augustine's observation of traces or "vestiges" of Trinity in creation. In this paper, unity will be considered as if it had three formal aspects, namely: monadic, dyadic and triadic forms. By the term *aspects* I do not mean properties or characteristics. Unity is simple and indivisible. Rather, aspects are perspectives or points of view that are consequent from our own finitude as creatures¹. Aspects refer to unity as we experience it in creation and are therefore not absolute, although collectively they may tell us something about the One. Aspects are not separable or independent, although they are distinguishable. Aspects are progressive and cyclical. This approach is similar to that of Peirce [Robinson], although the way in which the aspects work themselves out will follow Augustine's *Confessions*². It also has similarities to Hegel's approach to unity in *Phenomenology of Spirit*, except that I expressly do not assume or expect that the formal aspects of unity explored here can be extrapolated to an "absolute knowing"—the mystery of Trinity is beyond the scope of this paper³.

¹ Aspects say more about our finitude than they do about God.

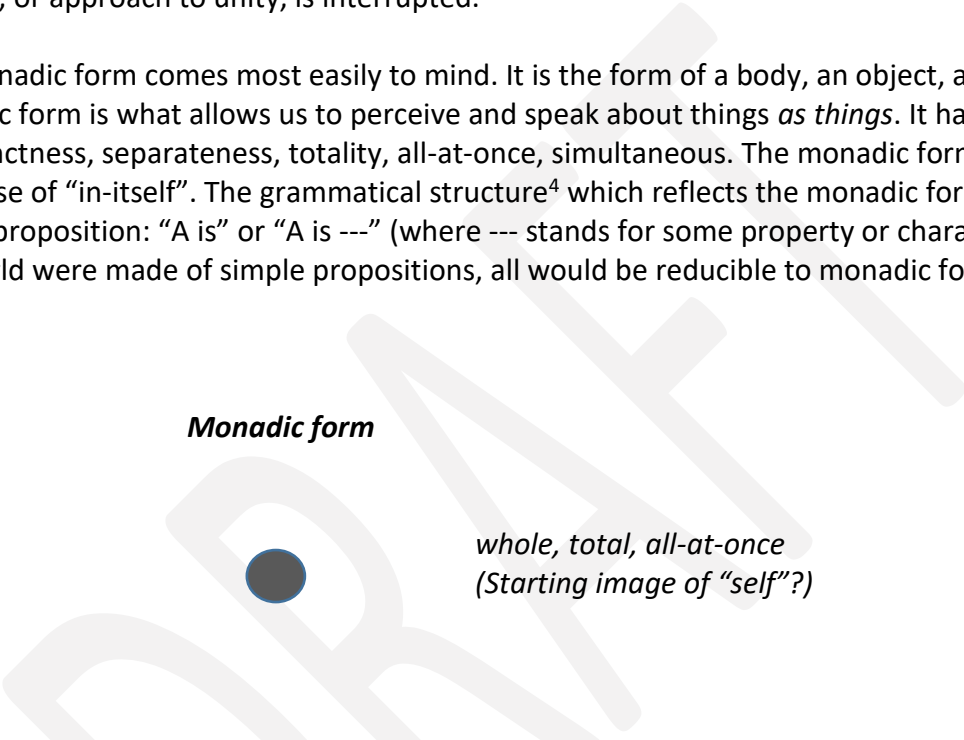
² Roughly speaking, the monadic form belongs to Peirce's category of "thirdness"; the dyadic form belongs to his category of "secondness" and the triadic form belongs to his category of "firstness".

³ Most attempts to speak of Trinity use triadic images as likenesses. Here, I hope to explore a *movement of the mind* or 'logic' that has a triadic form. This 'logic' is different from the more common binary or bivalent form of logic, such as propositional logic, syllogistic logic, computational logic, etc. (See *Logic* in Wikipedia).

By way of introduction, I will start by attempting to briefly sketch the three aspects. However, this sketch is necessarily tentative and will progressively develop through ongoing engagement with Augustine's text. So the whole paper may also be seen as a tentative sketch of which the introduction is a pro-type. Throughout the process, the movement of thinking is as meaningful as what is thought. And in relation to this, the tendency to take each form as a separate entity should be held in check—one form leads to the next and both are fulfilled in the third which then returns to the first form although at a 'higher level' of hermeneutic. My attention in this investigation is on the nature of errors in thinking that may occur if this process, or approach to unity, is interrupted.

The monadic form comes most easily to mind. It is the form of a body, an object, a *thing*. The monadic form is what allows us to perceive and speak about things *as things*. It has the quality of distinctness, separateness, totality, all-at-once, simultaneous. The monadic form provides the sense of "in-itself". The grammatical structure⁴ which reflects the monadic form is the simple proposition: "A is" or "A is ---" (where --- stands for some property or characteristic). If the world were made of simple propositions, all would be reducible to monadic forms.

Monadic form



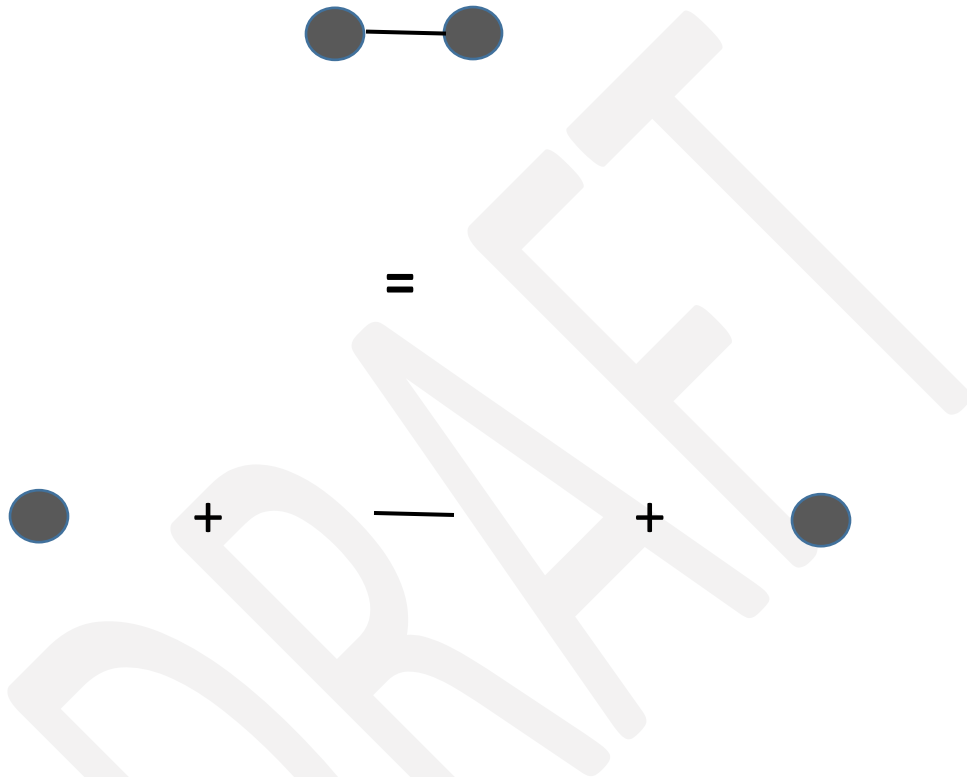
*whole, total, all-at-once
(Starting image of "self"?)*

However, things do not merely exist; they exist *in relation* to other things. The dyadic form is the form of relatedness. It has the grammatical form: "A loves B", through which attention is on the dynamics or "verbalness" of the verb (in this case: "loves"). Instinctively, there is a tendency to reduce the dyadic form to a combination of monadic forms. For example, we might reduce the statement "A loves B" to: "A is", "B is" and "love is". As a result, we might tend to think of "love" as a thing among things. Any named verb, by virtue of being named, can assume the form of a thing, which is to say a monadic form. What is lost in this reduction is the way in which the verb affects the being of A and B. The pure dynamism of the verb is only apparent through the dyadic form. The tendency to reduce the world to monadic forms results in a vision of eternity as timeless or *spatial*. I will call this kind of error an error of the first kind. The

⁴ The grammatical structures of the monadic, dyadic and triadic forms are taken from Raposa's discussion of Peirce's semiotics [Raposa, 1989].

biblical name for an error of the first kind is an idol: the monadic form *in-itself* is the form of an idol or graven image.

Combination of Monadic Forms is also a Monadic Form



Instead, the monadic form, through the dyadic form, overflows to reference beyond “self”. So-called existence in-itself, which we might call being, *lives for another*⁵. The dyadic form, which is the relatedness, tends to elude direct perception by the mind which is much more comfortable with monadic forms (although Augustine seems to suggest it is more directly perceptible through the heart). Following Levinas, it might be thought of as *relation without relation* [Levinas 2002]. Time is an exemplar of this form which I will discuss later in the paper. The dyadic form is found in the *passing of time* where each moment substitutes itself for the next

⁵ For Augustine, “being” and “life” are different categories that are united in God. For example, Augustine writes: “In you [God] it is not one thing to be and another to live: the supreme degree of being and the supreme degree of life are one and the same thing” [p8]. This is one of many examples where I am reading significance into the way Augustine differentiates static, spatial concepts (eg. Being) from dynamic, temporal concepts (eg. Life).

without ever achieving co-presence. Metaphor is another example of this form, in which two things are said *to be and not to be* the same. The dyadic form in metaphor has to do with the way in which the mind responds to the paradox—a kind of energy or enlightenment in the back-and-forth movement between the two images of the metaphor [see, for example, Frye or Zwicky]. The way in which a word (signifier) refers to a meaning (signified) is a third example. The form is found in the *process* of reference as “pointing beyond”. As discussed later in the paper, the dyadic form is *intentional*. Levinas has written extensively about this form which he claims is the basis of ethics [Levinas 2002].

Dyadic Form



one moment (an incomplete monadic form) substitutes itself for the next proximate moment in time



The dyadic form reveals the incompleteness or brokenness or openness of the monadic form.

What about the tendency to reduce the world to combinations of monadic and dyadic forms? In my reading of *Confessions*, this is a central concern for Augustine. I will call this an error of the second kind. Early in the book, using beauty as an indicator of unity, Augustine writes: "... in bodies one should distinguish the beauty which is a kind of totality and for that reason beautiful, and another kind which is fitting because it is well adapted to some other thing, just as a part of the body is adapted to the whole to which it belongs as a shoe to a foot and like instances" [*Confessions*: IV; p65]. Here I take the beauty in "totality" to be indicative of the monadic form and the beauty in "fittingness" to be indicative of the dyadic form. An error of the second kind comes about, following Augustine, from taking bodily forms as the model for understanding unity: "my mind moved within the confines of corporeal forms. I proposed a definition and distinction between the beautiful as that which is pleasing in itself and the fitting as that which pleases because it fits well with something else. I supported this distinction by examples drawn from the body. Moreover I turned to them to examine the nature of the mind, but the false opinion which I held about spiritual entities did not allow me to perceive the truth" [*Confessions*: IV; p67].

Augustine locates the source of an error of the second kind in the intentionality of the mind. "Just as crimes occur when the mind's motive force, which gives the impetus for action, is corrupt and asserts itself in an insolent and disturbed way ... so also *errors and false opinions contaminate life if the reasoning mind is itself flawed*. That was my condition at the time. For I did not know that the soul needs to be enlightened by *light from outside itself*, so that it can participate in the truth, because it is not itself the nature of truth" [*Confessions*: IV; p68 italics added]. The biblical term for an error of the second kind is sin.

In this paper I attempt to trace Augustine's movement beyond monadic and dyadic forms to arrive at a triadic form which is their origin and fulfilment. This exploration involves thinking through and beyond the deeply entrenched categories of space (monadic formalisms) and time (dyadic formalisms) that condition our perceptions of the world. One of Augustine's first encounters of the triadic form in *Confessions* comes through the feminine image of a mother or nurse feeding her child, in which the body becomes food and life for the infant:

For by an impulse which you [God] control, [my mother's and nurse's] instinctive wish was to give me the milk which they had in abundance from you. For the good which came to me from them was a good for them; yet it was not from them but through them. Indeed all good things come from you, O God, and from my God is all salvation [*Confessions*: IV; p7]

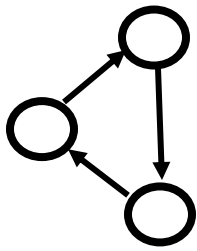
The triadic form is that of a gift, or rather gift-*ing*, and has the grammatical structure: "A gives C to B". The third—in this case the gift "C"—is not merely another monadic form brought into relationship with the other two (namely, A and B), it conditions and affects the *being* of A and B *and their relatedness*. Gifting involves a self-emptying which is completed in the return to the source.

9. Beyond space and time

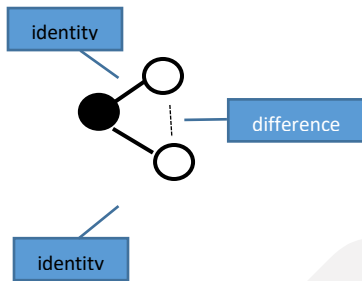
Whereas the monadic form has the nature of “sameness” and the dyadic form brings into play the irreducible “Other”, the triadic form introduces the “other of the other who is also another to me” [Levinas, 2002]. In the situation cited above, God might be taken as “Other” for Augustine (who is a man) and women are other of the “Other” who are also another to men. Within the triadic form comes the possibility of *agape* and *return*—a transcendental movement that is not reducible to monadic and dyadic forms. An archetypal image for this form, used often by Augustine, is *light*.

DRAFT

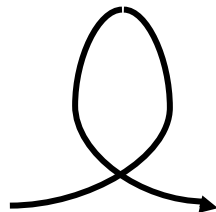
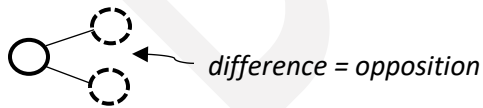
Triadic Form



- Three incomplete monadic forms
- Each substitutes itself for the other
- The movement **returns**



- Taking one of the three monadic forms as an index:
- it is **identical** to the two others because of proximity and substitution
 - the proximity of the two others—from the vantage of the index—is an inaccessible **difference**



Triadic form

In relation to physics, the following conjecture may help to orient the exploration in this paper. If we consider the monadic form to be abstractly represented by whole numbers and correspond to the form of discrete things, then dyadic form might be abstractly represented by real numbers and correspond to the form of the continuum. As a result of this consideration, complex numbers might provide an indication of the triadic form and correspond to the form of light. And for each of these forms there is a corresponding habit of thinking to be overcome.

Space and synchronicity

Lets return to the monadic form through which things are perceived (or conceived) as existing in-themselves. This is the form of bodies and also, through metaphorical extension, the form of ideas as things-in-themselves. What easily fades from view when considering the monadic form is the matrix of relatedness in which monadic forms are embedded (which may include dyadic or triadic forms). A common image for this background is the *world* through which things live and move and have their being. An error of the first kind involves assuming that this background also reduces to monadic forms. For example, to take the world as merely the totality of all things present. Such an image of *world* is what Augustine refers to as “corporeal”, in part because it comes from our experience of physical bodies. What is lost or missed in the corporeal image of world is the *dynamical, relational* nature of the dyadic form and the *creative—receptive* nature of the triadic form (these aspects will be explored more fully later in the paper).

Theories of physics are particularly prone to errors of the first kind as I have discussed elsewhere. Their interpretation tends to become dominated by a concept of “absolute space” as an empty, inert and *immutable*⁶ container in which reality is inscribed. The container itself, which is a formed image of what would remain if the world were emptied of all “things”, is described by a particular mathematical system of geo-metry. In Newtonian physics, this container is Euclidean space, and in modern physics, this container is Riemannian spacetime. Augustine locates similar images of absolute space—*nothingness*—through a type of *via negativa* that uses corporeal bodies as a guide:

Although you [God] were not in the shape of the human body, I nevertheless felt forced to imagine something physical occupying space diffused either through the world or even through infinite space outside the world. Admittedly I thought of this as incorruptible and inviolable and unchangeable, which I set above what is corruptible violable, and changeable. But I thought that anything from which space was abstracted was non-existent, indeed absolutely nothing, not even a vacuum, as when a body is

⁶ Throughout Confessions, Augustine insists that the term “immutable” only refers to God. Therefore, for him, space cannot be immutable because it is not God (even though it might be “timeless”). The way that Augustine uses the term immutable—particularly by disengaging it from temporality—is key to his take on *nihil* or nothing.

removed from a place, and the space remains evacuated of anything physical, whether earthly, watery, airy or heavenly, but is an empty space—like a mathematical concept of space without content [*Confessions*: VII; p111].

Here we might locate the Newtonian concept of space (Euclidean geometry) in what Augustine calls the “mathematical concept of space without content”. The Riemannian concept of spacetime comes from assuming that “anything from which [spacetime] is abstracted” is *absolute* in its nothingness.

To see why Augustine calls these approaches to truth errors, it is helpful to note that he gives the word nothing or *nihil* special status as a word. In the dialogue *Concerning the Teacher*, Augustine’s son asks him: “What does nihil [nothing] signify except that which is not?” Augustine’s reply penetrates to the heart of his concept of error and sin: “Perhaps you are right. But I cannot agree with you because of your recent admission, namely, that a sign is not a sign unless it signifies something. And that which is not cannot in any way be something.” He goes on to say of *nihil*: “What shall we do? Since the mind does not see the thing and yet finds, or thinks that it finds, that it does not exist, can we not say that *a certain affection of the mind is signified rather than a thing which is not?*” [*Teacher*: II; p363-4 italics added].

Nihil or nothing, for Augustine, is not a substance that has being; it is neither a thing among things nor an idea among ideas. Rather, *nihil* is related to the affection or condition or state of the mind that perceives things and thinks ideas. The problematic “affection of the mind” that Augustine calls into question in *Confessions* mistakes *nihil* as an origin or source of order in creation. It might be seen to come from the assumption that “our thoughts are God’s thoughts” without due consideration of the mutability of the created mind that thinks (the “interpreter”).

As it applies to theories of physics, this type of error leads us to mistake the nature of simultaneity or *co-presence*. It leads us to assume the simultaneity we experience in the here-and-now—our experience of the present world—has the same form as eternal presence. That is to say, the assumption that we are ideal observers who can see creation laid bare all-at-once in the same way that God might “see”⁷ it. For Augustine, and for modern physics, simultaneity in creation is actually a relative state of synchronization. In physics the synchronization is indexed to a particular frame of reference. The frame has the form of space and the origin has the form of “nothingness”. For Augustine, the synchronization is indexed to a particular “interpreter” (as origin) and it is necessary to consider the formal aspects of the interpreter as part of the synchronization process⁸. Augustine sharply contrasts the relative and mutable simultaneity we call the “present” from God’s eternal present:

⁷ The concept of simultaneity is deeply connected with vision. We see the simultaneous co-presence of things in our world. The “field of vision” is like spatiality. Hearing, by contrast, is very temporal.

⁸ Augustine does not use the concept of “interpreter” which I am actually loosely borrowing from Peirce’s concept of “interpretant”. In *Confessions*, Augustine is undertaking an interior exploration of his own mind, so “mind” is the

How many of our days and the days of our fathers have passed away during your [God's] Today, and have derived from it the measure and condition of their existence? And others too will pass away and from the same source derive the condition of their existence. But you are the same, and all tomorrow and hereafter, and indeed all yesterday and further back, you will make a Today, you have made a Today. If anyone finds your simultaneity beyond his understanding, it is not for me to explain [Confessions: I; p8].

The problem of simultaneity is also one of the core insights of modern physics which raises important metaphysical issues. There is the tendency in physics to assume that an *external* vantage exists through which spacetime is totalized as a “block universe” existing all-at-once and that this external vantage has the same form as the vantage of an observer *within* creation. Augustine rejects this assumption because it turns *nihil* into a substance. Modern theories of physics, on the other hand, tend to circumscribe a geo-metry of spatio-temporal being that is formed with nothingness as origin. Such attempts treat *nihil* (which Augustine identifies as an affection of the mind) as absolute monadic form. My claim, drawing from Augustine, is that monadic form cannot be separated from dyadic and triadic form in this way. Accordingly, the way in which we come to synchronize our world as a co-presence of beings (which involves intentionality) must be factored into any understanding of spacetime. Intentionality may also play a role in the way other beings in creation come to synchronize a world for themselves, such as other forms of life [see, for example, Robinson].

In order to overcome the tendency of the mind to interpret reality as embedded in inert space (or spacetime)—a tendency that comes from the contemplation of physical bodies—Augustine turns inward. He focuses attention on *memoria* (memory), where he finds “some interior place—which is not a place” [Confessions: X; p188]. Although *memoria* might be translated as memory, in this exploration I will leave the term untranslated in order to open up the possibility that what Augustine means by *memoria* is both richer and less ego-centred than the modern concept of memory (roughly in the way that Jung's concept of the unconscious is different from Freud's). *Memoria* offers Augustine a different take on unity—with different figures and images—than come from his contemplation of the physical or corporeal world.

Augustine makes an important distinction between *memoria* and mind. The mind, for Augustine, is the plenitude of present awareness that is temporally conditioned. The modern term “consciousness” probably gets close to this meaning. *Memoria* is the much larger background from which the “stuff” of mind or consciousness emerges. The objects in *memoria* include stored images of perceived physical bodies, acquired skills, ideas, and affections of the mind. While these objects may be monadic forms, *memoria* also has a dynamic aspect of

interpreter. However, using Peirce's theory of signs, Robinson has developed a concept of “interpretant” that includes biological organisms [Robinson, 2010].

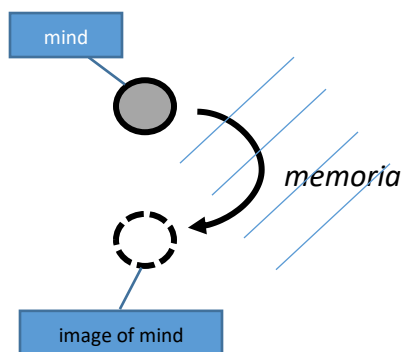
relatedness through which the processes of the mind, such as thinking, occur. This is a dyadic form which gathers together the objects of *memoria* into present awareness. For example, he describes learning in the following way: “by thinking we, as it were, gather together ideas which the memory contains in a dispersed and disordered way, and by concentrating our attention we arrange them in order as if ready to hand, stored in the very memory where previously they lay hidden, scattered and neglected” [*Confessions*: X; p189]. Unity through such temporally conditioned ordering has the nature of “fittingness” which is associated with dyadic form.

Following the Platonists, Augustine progressively ascends the types of objects in *memoria* in order to arrive at the light which illuminates them. During this ascent, his attention is fixed on Truth. He takes ideas as superior to images that come through bodily senses because *memoria* contains the reality of ideas rather than images of them. Ideas are monadic forms that come from the questions: Does A exist? What is A? What kind of thing is A? [*Confessions*: X; p188]. Truth is the light by which the mind recognizes true ideas and stores them in *memoria*:

How did [ideas] enter my memory. I do not know how. For when I learnt them, I did not believe what someone else was telling me, but within myself I *recognized* them and *assented to their truth*. I entrusted them to my mind as if storing them up to be produced when required. So they were there even before I had learnt them, but were not in my memory [*Confessions*: X; p189, italics added].

Unlike the Platonists, however, Augustine does *not* concern himself with *where* the ideas exist before they were learned. What is meant by the term “where” is spatially conditioned and this question could easily lead back to contemplation of a *world* in which ideas are embedded—an image that Augustine has already rejected as coming from bodily or corporeal images. Instead, Augustine considers the affections of the mind. By an affection he means a feeling, such as sadness, that fills the totality of momentary awareness or present state of mind. He notes that *memoria* can contain images of past affections. Since these images are imprints of the mind itself, through *memoria* the mind can become present to itself [*Confessions*: X; p191]. This form of return in which consciousness becomes self-conscious is a triadic form [see, for example, Hegel].

Memoria



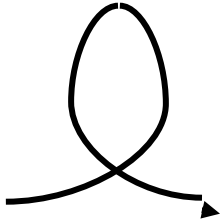
Through memoria mind stores an image of itself which it can encounter in remembering

Augustine identifies this form as linguistic. An affection of the mind can be stored as an image in *memoria*. The image, which is not the affection itself, can be recalled and named. Repeated recall of the named image implies a notion:

Who would willingly speak of such matters if, every time we mentioned sadness or fear, we were compelled to experience grief or terror. Yet we would not speak about them at all unless in our memory we could find not only the sounds of the names attaching to the images imprinted by the physical senses, but also the notions themselves. These notions we do not receive through any bodily entrance. The mind itself perceives them through the experience of its passions and entrusts them to memory; or the memory itself retains them without any conscious act of commitment [*Confessions*: X; p192].

Having identified the triadic form, Augustine then applies it to *memoria* itself. “I mention memory and I recognize what I am speaking about. Where is my recognition located but in memory itself? *Surely memory is present to itself through itself, and not through its own image*” [*Confessions*: X; p192 italics added]. Here Augustine comes close to isolating the triadic form which cannot be reduced to monadic or dyadic forms: namely, the reflexive movement of self-return—*memoria* is present to itself and through itself. I will borrow the term “Return” from *I Ching* in order to refer to this reflexive movement as a “pure” form. According to *I Ching*: “Return is small yet different from external things”, to which is added “Return leads to self knowledge”.

Return



External to mind:

*reflexive movement of return exists
in memoria yet is not mind*

Different from external things:

*reflexive movement cannot be found
in corporeal bodies*

*Transcendental movement = **light***

Through Return, Augustine arrives at a new take on nihil. If it were the case that when I remember memory, memory is available to itself through itself, what would it mean to remember forgetfulness? If forgetfulness is loss of memory, how can it be remembered? Notice that this apparent aporia has a similar form to the question we encountered earlier: What does *nihil* signify? Augustine's solution to the problem is that there is a kind of unity in *memoria* which makes it aware of what has been forgotten as if it were missing a part of itself and it seeks the return of the missing element. This is a transcendental movement which draws the mind beyond itself, so that it is never wholly known to itself. Ultimately, the forgotten element for Augustine is the authentic happy life in God:

the happy life is joy based on truth, my illumination, the salvation of my face, my God. This happy life everyone desires; joy in truth everyone wants ... they love the truth because they have no wish to be deceived, and when they love the happy life (which is none other than joy grounded in truth) they are unquestionably loving the truth. And they would have no love for it unless there were some knowledge of it in their memory [*Confessions*: X; p199].

Where does this exploration through space leave us with regard to theories of physics? When theorizing about the physical world or universe there is a tendency to consider the monadic form as constitutive. For example, we might assume that the "universe" is made of "elementary particles" or "fundamental states" (all three concepts being monadic forms). Instead of arriving at true knowledge of unity, this tendency risks turning nothing (for example, the zero or null state) into a substance and taking its status to be an absolute original form. The tendency might

be overcome by identifying the dyadic and triadic forms through which the monadic form is sustained. The dyadic form is dynamic and the triadic form is reflexive. By bringing an image of totality (such as the mind) back into contact with itself (for example through self-reflection) the image overcomes itself. In this way the image becomes *intentional*; it becomes a transcendental form. The process can be stabilized through naming. The name points through the intentionality of the image to the notion which is formed by the repeated instances of the self-overcoming image. The notion becomes the sustained monadic form. Naming draws the image to the notion. An example of the application of this approach is renormalization group theory in which a “bare electron” is postulated as a seed image which interacts back upon itself through the electromagnetic field which it creates. The (infinite) process of return results in a “renormalization” of the bare electron and its field towards a fixed state which represents the properties of the “real” electron.

Time and intentionality

Through *memoria* we discovered with Augustine that an affection of the mind, although seemingly a totality of present awareness, overcomes itself. The process of a present state being overcome and flowing into another present state discloses the dyadic form. The dyadic form is movement—a perpetual restlessness which resists resting in any monadic form. Levinas has written extensively about this form which might be glimpsed by considering a given subjectivity (the “same”) coming into proximity with and then substituting itself for another subjectivity (the “Other”), such as one’s own encounter with the face of a neighbour [Levinas, 2002]. The dyadic form refers to the process of continual substitution—such as giving my food, my sustenance to the Other—in which relatedness is a priori and the subjectivities are ephemeral, never achieving full actuality. It is like the process of becoming. The dyadic form *resists totalization into the same*. The Other remains other and is never absorbed into the same, like the giving of a gift with no expectation of return in which the gift is myself. Here, the “same” is to be taken indexically, like the term I; the dyadic form lacks an origin of indexicality. It is like movement through an unbroken chain of linear succession.

Substitution



Whereas space is an exemplar of the monadic form, time is an exemplar of the dyadic form. Not unlike modern theories of physics, Augustine takes time to be a part of creation. Since time was created with heaven and earth, “there was therefore no time when you had not made

something, because you made time itself" [*Confessions*: XI; p230]. Therefore time is not co-eternal with God who is immutable. There are two powerful consequences to this conclusion for Augustine. First, eternity is not the same as timelessness. Second, time is not the same as mutability. In the previous section, we identified space, also an aspect of creation, as the complement of time and the essence of timelessness. In the next section we will encounter mutability as formlessness (whereas both time and space are formed).

Through his interior journey, Augustine first encounters the fleetingness of time. Taking present state of mind as an index, he concludes the past does not exist because it is no longer present. Likewise, the future does not exist because it is not yet present. But the present state itself also eludes our grasp because it is always *passing*:

"If we can think of some bit of time which cannot be divided into even the smallest instantaneous moments, that alone is what we can call 'present'. And this time flies so quickly from the future into the past that it is an interval with no duration. If it has duration, it is divisible into past and future. But the present occupies no space"
[*Confessions*: XI; p232]

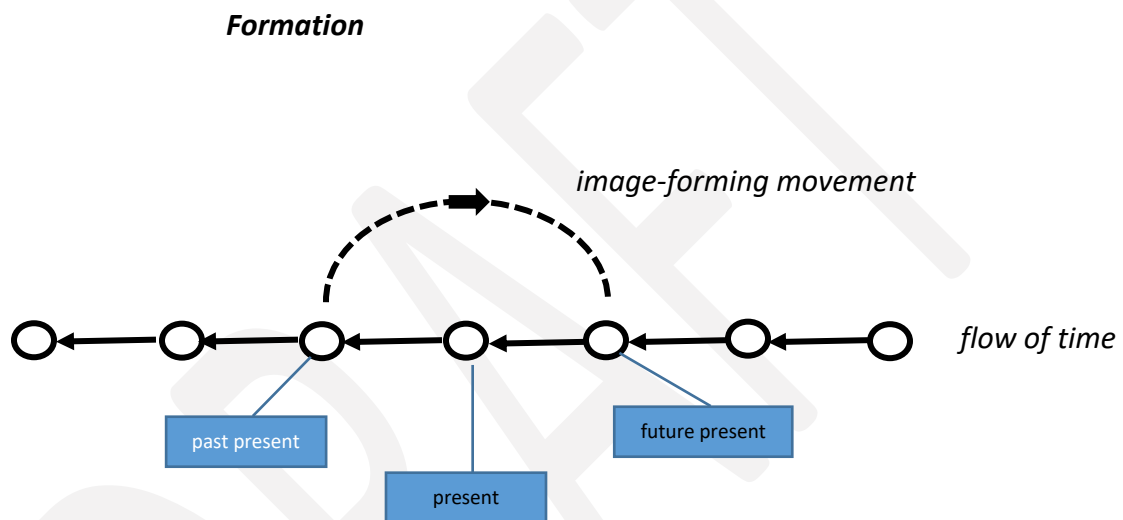
Augustine concludes that "we cannot truly say that time exists except in the sense that it tends towards non-existence" [*Confessions*: XI; p231]. Recall, however, that in our exploration of space we identified the affection or state of mind as the totality of present awareness. From the exploration of time we now find that this totality has no being *in-itself* and rather tends towards non-existence. Therefore, no time is wholly present [*Confessions*: XI; 228].

Augustine then identifies a triadic form in time, namely: the present past, the present present, and the present future. The present past is the memory of past events. It is shaped into images and found in *memoria*. The present future is the expectation of events to come. The present present is immediate awareness. The triadic form overcomes the tendency of the mind to be distended into the flow of time and ultimately is seen to be the origin of its freedom. Through anticipation and memory, the mind can shape events into images in the memory roughly in the way that speech is shaped into words.

When a true narrative of the *past* is related, the memory produces not the actual events which have passed away but words conceived from images of them, which they fixed in the mind like imprints as the passed through the senses ... [*Confessions*: XI; p234].

When therefore people speak of knowing the future, what is seen is not events which do not exist (that is, they really are future), but perhaps their causes or signs which already exist. In this way, to those who see them they are not future but present, and that is the basis on which the future can be conceived in the mind and made the subject of prediction ... [*Confessions*: XI; p234].

An interesting shift has happened here which has implications for theories of physics. The objects of discourse—events—can no longer be thought of as purely spatial as we might have done when speaking of “things” in our discussion of space. They no longer have a “being-in-themselves”. Rather they are *created* images of spatio-temporal events and they only exist in relation to other created images of spatio-temporal events. This is similar to the movement in discourse in modern physics away from timeless elementary “particles” or “states” to spatio-temporally conditioned “events” and “changes in state” as the appropriate subject of inquiry. The triadic form (which in physics would be associated with light) mixes together space and time.



Augustine’s next step is surprising. He discovers that, as a result of the triadic form in time, his attention can be divided. Through reciting from heart, he can bring into awareness a psalm as a successive flow of words through time and *at the same time* he can reflect on the passing words as *speech*. The combination of anticipation, awareness and memory sustains a holistic movement which allows this reflexive return. As a result the spoken words take shape on multiple levels which all work together—syllables, words, phrases and so on:

Suppose I am about to recite a psalm which I know. Before I begin, my expectation is directed towards the whole. But when I have begun, the versus from it which I take into the past become the object of my memory. The life of this act of mine is stretched in two ways, into my memory because of the words I have already said and into my expectation because of those which I am about to say. But my attention is on what is present: by that the future is transferred to become the past. As the action advances further and further, the shorter the expectation and the longer the memory, until all expectation is consumed, the entire action is finished, and it has passed into the memory. What occurs in the psalm as a whole occurs in its particular pieces and its

individual syllables. The same is true of a longer action in which perhaps that psalm is a part. It is also valid of the entire life of an individual person, where all the actions are parts of a whole, and of the total history of the “sons of men” where all human lives are but parts [*Confessions*: XI; p243].

The triadic form sustains monadic forms (syllables, words, psalms, ...) and their dyadic relatedness.

But what about the divided attention which is held in unity? This division-held-in-unity is related to *intentionality* and also *will*. Recall intentionality comes from the affection of the mind. However, through sin, Augustine claims, the mind—whose true affection is love—becomes distorted by passion or concupiscence. “By servitude to passion, habit is formed, and habit to which there is no resistance becomes necessity” [*Confessions*: VIII; p140]. The mind loses its freedom and becomes distended into the succession of time because, through unchecked concupiscence, the intentional mind forgoes the capacity to return to itself. “The law of sin is the violence of habit by which even the unwilling mind is dragged down and held, as it deserves to be, since by its own choice it slipped into the habit” [*Confessions*: VIII; p141]. This is the form of the mind distended in time as a deterministic flow of affection, much like time is a deterministic succession or *chain* of moments.

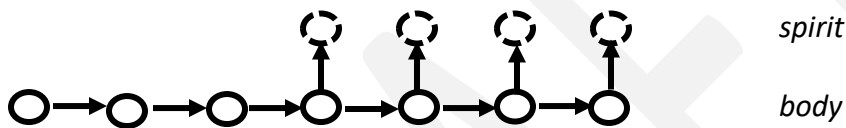
Augustine’s analysis of sin is quite remarkable. When it comes to commanding the mind, the nature of a sinful mind is to have a divided will. He arrives at this conclusion starting from the mind’s command of the body as a model. Augustine notes that when the mind commands the body it is instantly obeyed, such a will he calls *wholehearted*. With wholeheartedness there is no resistance to the command—what is willed is immediately done. However, reflecting on his own experience, Augustine observes that when the mind commands itself (to obey God’s law, for example), it may meet with resistance. “For that which I do I allow not: for what I would do that I do not; but what I hate, that I do” [Romans 8.15]. In such a case, even though the recipient of the order is itself, it is not obeyed. Augustine says that the willing is not wholehearted and that the will is not complete:

The strength of the command lies in the strength of the will, and the degree to which the command is not performed lies in the degree to which the will is not engaged. For it is the will that commands the will to exist, and it commands not another will but itself. So the will that commands is incomplete [if it meets with resistance and is not obeyed], and therefore what it commands does not happen [*Confessions*: VIII; p148].

As a result, according to Augustine, there are two wills in the mind. “Neither of them is complete, and what is present to the one is lacking in the other” [*Confessions*: VIII; p148]. Human will, as a result of original sin, is divided into two incomplete and complementary wills—the body and the spirit. Human will, therefore, is not like God’s will which is complete and undivided.

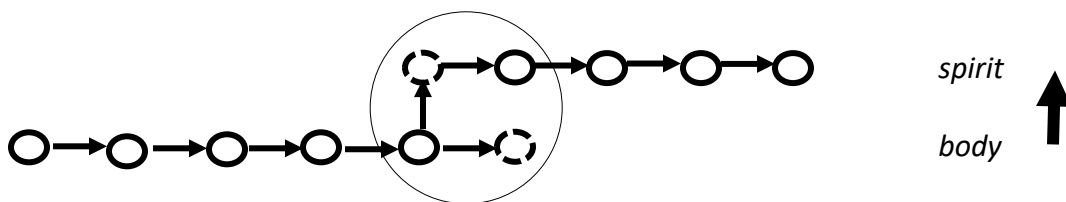
This analysis of sin reconfigures how we might conceptualize the dyadic form. We began by talking about the form as a type of temporal passing in which each moment substitutes itself for the next. In such a description, the moments lie on the same temporal plane, as it were, each giving itself up to the next in a deterministic succession, like a chain (which is one of Augustine’s favourite metaphors for sin). But now, through an analysis of sin, Augustine unpacks a “transcendental movement” of the dyadic form where the original unity of the will is divided into two wills—one acting towards a superior level (the level of the spirit) and the other acting on an inferior level (the level of the body). Yet they are each *in-themselves* incomplete and only become unified through their complementarity.

Divided Will



This movement is an uplifting movement in that the united will of the mind with respect to the body, through knowledge of sin, becomes incomplete in itself and can only be unified by virtue of the spiritual will which complements it. The completion, however, lies outside the mind in a union with the will of God. An opposition of sinful will is overcome by re-unification at a higher level, similar to Hegel’s concept of “aufhebung” [Hegel, 1977].

Overcoming Divided Will



What I am suggesting is that you imagine an originally united Divine will emptying itself in order to unite with the divided human will and draw it up into its original unity. This is a triadic form which I will call “Increase”, again drawing from terminology of *I Ching*:

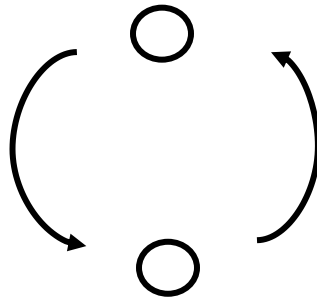
*Increase. Decreasing what is above
And increasing what is below;
Then the joy of the people is boundless.
What is above places itself under what is below:
This is the way of the great light. [I Ching: 42. Increase]*

In *Confessions*, Augustine recounts his experience of this movement as his moment of conversion under the fig tree. During his struggle with sin, he first tries to overcome the resistance of the divided wills through his own efforts. He is not able to accomplish this because the unity of the divided wills cannot be found in the sinful mind. In fact, he says that the dissociation of the wills came about *against his own will*. He writes: “and so it was ‘**not I**’ that brought this about but sin which dwelt in me [*Confessions*: VIII; p149, bolding added]. In struggling on his own to unite the divided wills, he makes “not I” —which has no existence—into an ordering principle for his mind and this effort repeatedly fails. Only when he turns to God *wholeheartedly* for help is the struggle overcome. At this point a feminine figure arrives who asks: “Why are you relying on yourself, only to find yourself unreliable? Cast yourself upon him, do not be afraid. He will not withdraw from himself so that you fall. Make the leap without anxiety; he will catch you and heal you” [*Confessions*: VIII: p151].

And his new insight comes from the *external voice* of a child who says: “*Pick up and read, pick up and read.*”

What Augustine then picks up and reads is of enormous significance for the narrative of *Confessions* which I will not discuss here. Instead I want to draw attention to the more general implications of the command “pick up and read”. Augustine started his interior journey in order to move beyond corporeal images of God. And what is shown to him and us is that it is of the nature of the corporeal world *to be read*. The uplifting transcendental movement opens up the bodily forms of the world into *text*. Although in themselves they are empty (like text that is not recognized as text), through the uplifting of “light” they reference meaning for the mind whose will is directed to a higher level of spiritual significance. Can we not recognize this as a form of word?

Transcending



Triadic form as “transcending” temporal plane

In light of the triadic form we might interpret Augustine’s responses to the Platonists and the Manichees. By reflecting on the monadic forms first of the corporeal world then of the ideas in the mind, the Platonists were able to fleetingly glimpse the “light” of Truth. But, not recognizing the sinful nature of the mind, they erred in thinking the forms they saw by that light were complete in-themselves and that the mind could approach Truth on by its own efforts. They could see a vision of eternity but did not know that the “way” to get there was not through the “pure mind” but rather by virtue of the incarnation of the Word. The Manichees, on the other hand, remained encased in an interpreted world that was perpetually divided by a dyadic opposition of good and evil because they projected the sinful state of their own minds onto God’s creation. Here “Platonists” and “Manichees”, of course, are not actual persons but rather false systems of knowledge which also bear relevance for our time.

Genesis and Word

Having located interior light as an uplifting movement exterior to mind, Augustine then looks outward to creation and (re)-turns to the opening of the book of Genesis:

In the beginning God created the heaven and the earth [Gen 1.1]

Since he already identified time as a creature, he seeks an interpretation of “in the beginning” that is not temporal—the *formal* beginning. However, to enter into a formal interpretation, care must be taken about how words are used. For example, care must be taken not to inadvertently reduce the meaning of words to monadic forms (which would be an error of the

first kind.) So particular attention must be paid to how we think about “heaven” and “earth”. Augustine overcomes this challenge by setting up a hierarchy of terminology:

“Heaven of Heavens”

Heaven

Earth

Formlessness

“Nihil”

“Heaven of heavens” is a transcendental pointer to the formal origin of phenomena which always remains beyond our horizon of vision or knowledge. “But in comparison with ‘heaven of heavens’, even the heaven of our earth is earth” [*Confessions*: XII; p246]. (Notice that Augustine anticipates that the visible universe might be corporeal, but uniting heaven and earth in this corporeal way, as Newton did more than a millennium later, merely pushes the horizon for heaven “up” into a new spiritual level.)

“Formlessness”—*tohu wa bohu* or the *abyss* in Genesis—is mutability of changeable things. It is not the same as *nihil*, however. Formlessness stands between form and nothing, “neither endowed with form nor nothing, but formlessness and so almost nothing” [*Confessions*: XII; p248]. Augustine goes on to say:

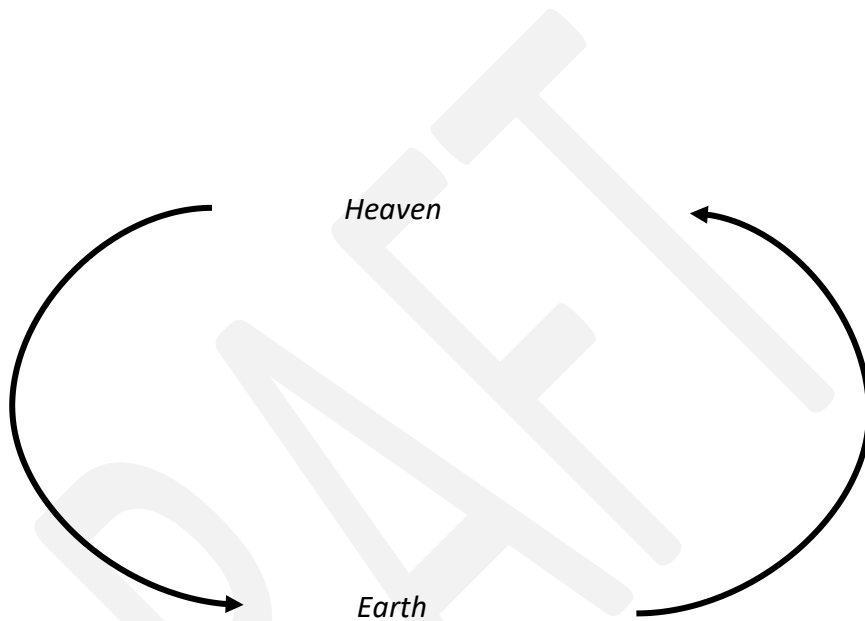
For the mutability of changeable things is itself capable of receiving all forms into which mutable things can be changed. But what is this mutability? Surely not mind? Surely not body? Surely not the appearances of mind and body? If one could speak of a ‘nothing something’ or ‘a being which is non-being’, that is what I would say. Nevertheless it must have had some kind of prior existence to be able to receive the visible and ordered forms. Where could this capacity come from except from you, from whom everything has being insofar as it has being? But the further away from you things are, the more unlike you they become—though this distance is not spatial [*Confessions*: XII; p249].

The triadic movement becomes a descending movement from heaven to earth. This movement is a self-emptying that places what is superior below what is inferior and then draws it back up into itself. It is the movement of the incarnate Word who empties himself in order to take the form of a servant, to die to death, to be resurrected and return to the One:

9. Beyond space and time

So formless things are dependent on your Word. It is only by that same Word that they are recalled to your Oneness and receive form.

[*Confessions*: XIII; p274]



9. Beyond space and time

Drawing from our journey in this paper, and following Augustine, might we think of “heaven” as like the anticipation of future we experience temporally? And “earth” as like *memoria*? And the triadic movement as playing out on an indefinitely grand scale? Does heaven become the creative source of phenomena? Is it like speech? And does “earth” or the visible “universe” become the receptive vehicle through which phenomena are given form? Is it like text? Does light have a triadic form? Is it as if God empties himself in a downward movement, creating heaven and earth, which are then drawn back up into himself in an upward movement? Is this the movement of Word?

Starting from space, time and nothingness as original forms of creation, we seem to have arrived, with Augustine’s help, at text, speech and light. And along the way we have discovered a formative significance to word.



References

Augustine. *Confessions*. Transl. by H Chadwick. Oxford: Oxford University Press, 2008. [Referred to as *Confessions*: Book Number; page number].

Augustine. Concerning the Teacher. In *Basic Writings of Saint Augustine, Volume One*. Ed. Whitney Jones. Transl. by G.C Leckie. New York: Random House, 1948. [Referred to as *Teacher*: Book Number; page number].

Frye, Northrop. *Words with Power: Being a Second Study of "The Bible and Literature"*. Toronto: Penguin Books, 1990.

Hegel, GWF. *Phenomenology of Spirit*. Trans. by AV Miller. Oxford: Oxford University Press, 1977.

I Ching. Trans. Richard Wilhelm and rendered into English by Cary Baynes. Princeton: Princeton University Press, 1990.

Levinas, Emmanuel. *Otherwise than Being or Beyond Essence*. Trans. Alfonso Lingis. Pittsburgh: Duquesne University Press, 2002.

Raposa, Michael. *Peirce's Philosophy of Religion*. Bloomington: Indiana University Press, 1989.

Robinson, Andrew. *God and the World of Signs: Trinity, evolution and the metaphysical semiotics of CS Peirce*. Leiden: Brill, 2010.

Zwicky, Jan. *Wisdom & Metaphor*. Kentville NS: Gaspereau Press, 2003.

Relations and Limits

DRAFT

10. A practical guide to relational ontology in modern physics with an annotated bibliography

Introduction

Relational Ontology, in the context of physics, is a metaphysical or philosophical position that takes *relations* to be more fundamental than particular objects, physical entities or physical states. Relational ontology presents a radically different way to think about physical theories and their interpretations compared with Classical Ontology (such as the ontology of Newton's classical mechanics or the ontology of Euclidean geometry) which takes objects to be more fundamental than their relationships to one another. With Classical Ontology, objects are self-identical and timelessly formed. With Relational Ontology, the so-called "objects" of physics are taken to be temporally contingent on relational systems in which they are embedded in such a way that the relational systems and the objects are interdependent. Relational Ontology is dynamic, weaving spatiotemporal processes that are sustained reflexively as "objects" affect "systems" that, in turn, impinge back upon the "objects" in a circular process of (self-) return.

Well, this is sort of true—it *is true in a way*. For physicists, what relational ontology offers is a meta-physical vantage that forces us to recognize that relations are fundamental to the very being of physical objects and it is this fundamental reflexive *logic* that likely underwrites modern physical theories (i.e. quantum mechanics and relativity theory). From the vantage of relational ontology, modern theories may begin to *make more sense* than is the case when the meta-physical assumptions of classical ontology are operative, because these modern theories are relational theories. It is my hope that relational ontology can help us probe three inter-related questions:

- What is a *quantum* and how is it relational?
- How are quanta created and sustained in a *relativistic worldview*?
- What is the underlying *logic* that unites quantum mechanics and relativity theory?

One can only come to an understanding of relational ontology by reading about it and thinking through its forms and principles. Therefore, I thought it might be helpful to provide a list of readings that I have found useful to wrap my head around the metaphysical vantage of relational ontology. I thought it also might be helpful to provide some guidance and practical tips for use when reading these texts. These tips are intended to help "undo" entrenched ways of thinking—grounded in the ontology of classical mechanics—that are ingrained through many physics curricula and texts. My experience has been that this step of "unfixing" thought patterns is necessary before one can fully appreciate what relational ontology is all about.

The practical tips come first as an orientation, then the readings.

Guidance and Practical Tips for Philosophical Readings on Relational Ontology

Staring into the abyss

In order to make the shift to thinking relationally, it will likely become necessary to stare into the abyss to some degree because it is necessary to undo the grounding upon which analytical thought stands. Below are some tips about that encounter.

With relational ontology, relations are more fundamental than objects. At first encounter, this will likely seem patently absurd. How can a relation exist in absence of the things that it relates (the relata)? The answer is that it can't. When philosophers speak of relations being more fundamental than objects what they mean is that nothing can exist or be defined in isolation. It is just as wrong to think of an isolated relation (eg. a dyad) as an isolated object (eg. a monad). Everything exists in context and relation.

By taking relations to be more fundamental than objects, the very idea of an object becomes problematic. What sustains an object as a thing-in-itself? If objects don't exist as pure entities or abstractions, then how do they exist at all? This problem has many levels. For example:

- Identity and difference can no longer be assumed or taken for granted. How does a thing come to be a thing that can be differentiated from other things? How does a thing come to have an identity such that it remains the same thing?
- It is no longer possible to rest on the notion of a finite Self. This one is big for physics. In relational ontology, there are no elementary particles, no universal states, no analytical spacetime points. The concept of "whole" or "total" is also radicalized creating a stumbling stone for analysis and the analytically-grounded thinking that currently defines physics. For example, in relational ontology there is no universe (as an externalized totality) and there is no fundamental geometry (as an absolute analytical ground).
- Whatever unity is, it does not have the form of a finite monad. A finite monad is an abstract image of a finite Self or finite whole which cannot be taken for granted as discussed in the previous bullet. Challenging the (finite) notion of monadic unity calls into question the way in which we understand numbers and mathematics. It is no longer possible to think of numbers as merely placeholders for counting or ordering of finite. The challenge involves grappling with relations between the discrete (eg. natural numbers), the continuous (eg. real numbers) and the reflexive (eg. complex numbers).
- The infinite cannot be cut off from the finite. The finite can only be spoken about in relation to the infinite. This always holds even though relations may be obscured by the way in which a physical theory is represented. Therefore, any theory in physics must have an orientation to the Infinite that is prior to the theory and that conditions the theory. This orientation is what allows a given context to be *transcended* into a higher level of abstraction.

In relational ontology, the vantage is always context bound. There is no perspective of an "ideal observer" who can exist in relation to creation yet external and unaffected. Therefore, any attempt to represent an absolute totality will lead down a false path, however compelling it

may seem. Instead, a vantage begins in *embodiment*. Embodiment blurs the distinction between the physical and the abstract. This should no longer be thought of as a distinction between “body” and “mind”. Rather, relational ontology is concerned with a dynamic whereby physical bodies are abstracted as physical bodies because they have an *interpretable meaning* to other physical bodies. It is possible to abstract things from a vantage of embodiment because any body, as an index, will exist in relation to other bodies that in turn relate back to the indexed body. The circle of return is the keystone that allows for iteration and pattern formation. It also allows a given vantage to be transcended into a higher level view where the “bodies” at one level of abstraction are contained within and sustained by the “Bodies” at a higher level. Therefore, with relational ontology, some notion of *transcendence* is dynamically operative through hierarchy.

Thinking about relational ontology involves explicitly thinking relationally. This may seem quite foreign for people who have been trained in the type of analytical thinking that tends to define physics. Analytical thinking usually starts with postulates and definitions that are taken to be true in-themselves. From these “givens” and their rules of relationship, one builds up an understanding of physical systems. Relational thinking usually involves entering first into the flow and movement of thinking and only subsequently allowing provisional definitions and systems to come into view as abstract generalizations that follow patterns. Twentieth century philosophers have tended to divide these two modes of thinking into distinct methods of philosophy called Analytical Philosophy and Continental Philosophy. The divide between the two is quite sharp. Analytical philosophers tend to build and study systems that continental philosophers delight in deconstructing by showing that a particular analytical system rests on a logical contradiction or paradox that cannot be overcome by the system. It can be helpful to enter into this discourse but beware of becoming caught up or distracted by any particular philosopher or philosophical system. Relational ontology involves recognizing that these two modes of thinking are complementary and work together. Therefore, in reading twentieth century philosophy it is particularly important to be attuned to what is happening *between* philosophers—both the continuities and the disruptions. This attunement to harmony in relationships between different, even mutually exclusive, positions is the key to grasping the nature of relational ontology. What is happening intellectually in that process of thinking is an example or analogy or metaphor for the type of information processing that underwrites all relational ontology, even in the absence of humans.

Basic Principles

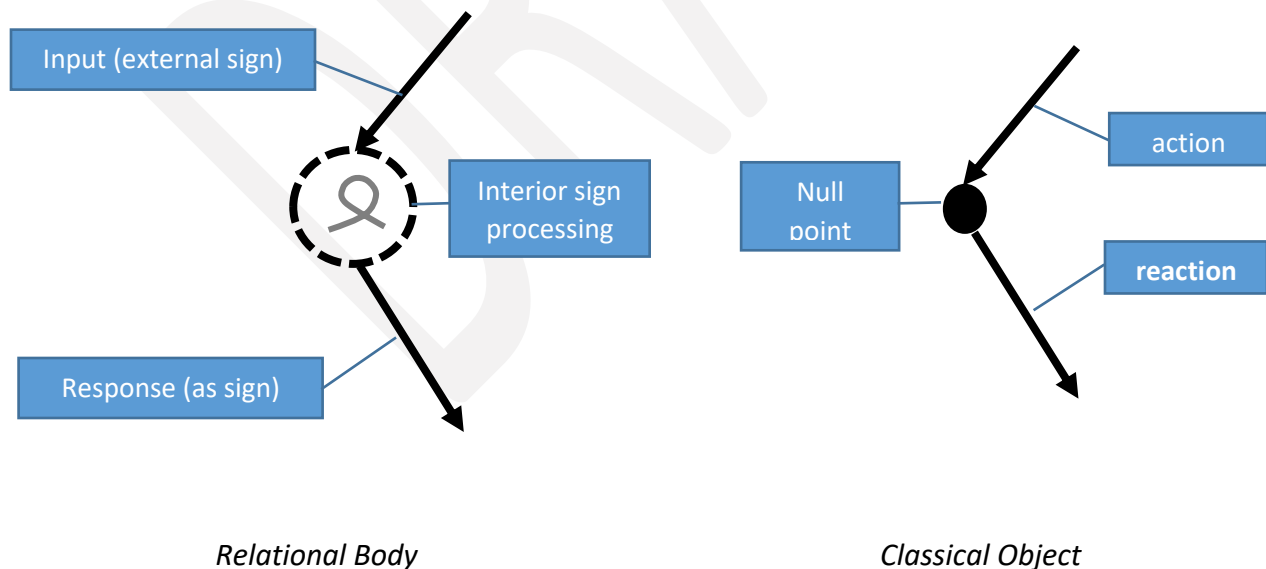
These principles are not laws or fundamentals or anything like that. They are patterns of thinking about the world that might be important for getting to the heart of what relational ontology is all about. They also might prove helpful in overcoming entrenched ways of thinking that are incompatible with or obscure relational ontology. Overcoming false modes of thought is key to understanding relational ontology.

Bodies

Relational ontology involves *bodies*. Bodies are different from objects. A body has both *interiority* and *exteriority* and bodily processes mediate between these two domains. The interior of a body processes information from the exterior world. The exterior of the body presents information to the exterior world. A body might be an electron, or an amoeba, or a person.

Bodies exist in relation to one another through the mediation of signs. A body is an interpreter of signs in the sense that it responds to inputs which are signs or signals from the exterior world; it processes those signals internally as information about the exterior world; and then it responds by re-acting to the processed input from the external world. This is the interior processing of a body. At the same time, a body is a sign-vehicle for other bodies to interpret inasmuch as its response or reaction *signifies* its internal processing, which is to say its response signifies its interpretation of the input from the external world. Because bodies have interior processes that are mediated by exterior signs, there is a delay, a gap, a rupture, between the input and the output; therefore there is also a need to *synchronize* signs among bodies to form a system for interpretation. The processual aspects of sign-bearing bodies frustrate any attempt to fully externalize or totalize the system. By contrast, classical interpretations of physics work within a fully externalized mechanical determinism—action causing reaction without delay or interior processing or the need for synchronization as shown in figure 1.

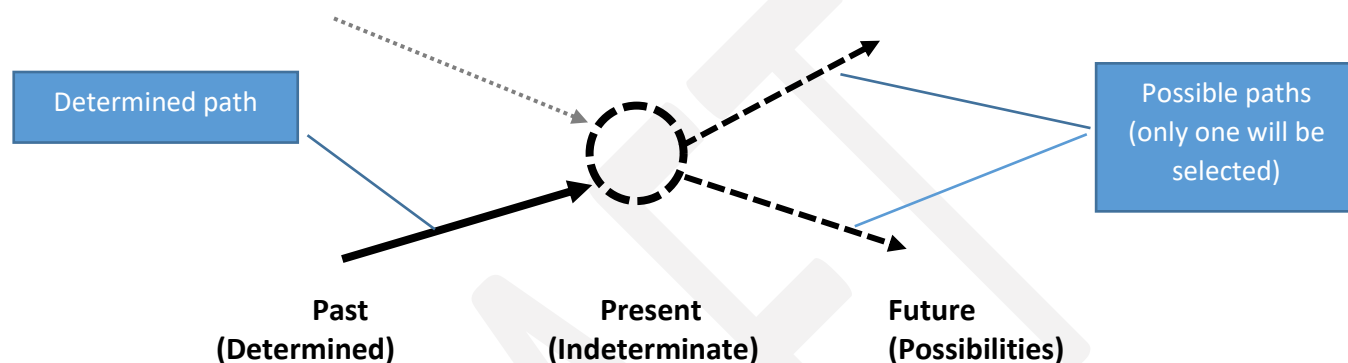
Figure 1: Comparison of relational bodies and classical objects



Selection (temporality)

Bodies exist within structural systems which are collectively realized over time. A structural system is an open interpretative framework (semiotic scaffolding) of general forms that is realized through iteration and repetition such that bodies follow general laws or habits in order to sustain existence within a wholistic environment with which they are entangled. A structural framework of general laws or habits limits the future possibilities or paths *for a particular body at a particular time* according to past determinations as illustrated in figure 2.

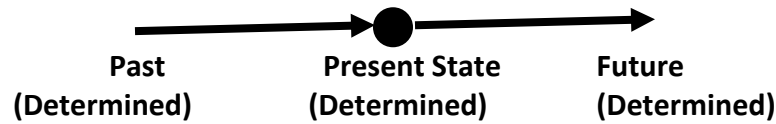
Figure 2: Temporally embedded nature of “bodies” in Peirce’s metaphysical framework¹



A particular body comes to the present moment through past determinations that are informed by the system of bodies embedded in a whole environment. In the present moment, the body has an indeterminate interiority that can “select” possible future paths (as general forms) according to the structural framework or semiotic scaffolding. The laws or habits determine or *delimit* the possible future paths. Once a path has been selected, it becomes determined (collapses) for the whole system of bodies and a new present moment opens up for the particular body with new future possibilities delimited by the system. In this way, the system constrains the *exterior* of the body while the *interior* of the body has “freedom” to impact the system within specific formal or general limits of randomness or stochasticity. This form of temporality can be contrasted with the mechanistic determination that characterizes Newtonian physics as shown in figure 2. In the Newtonian framework, the “present state” is ultimately reducible to a “null point”, effectively erasing all trace of interiority, creativity and freedom.

¹ It should be noted that in this figurative treatment of time I have also partly borrowed from Wallace’s formal logic of future contingents [Wallace, 2011].

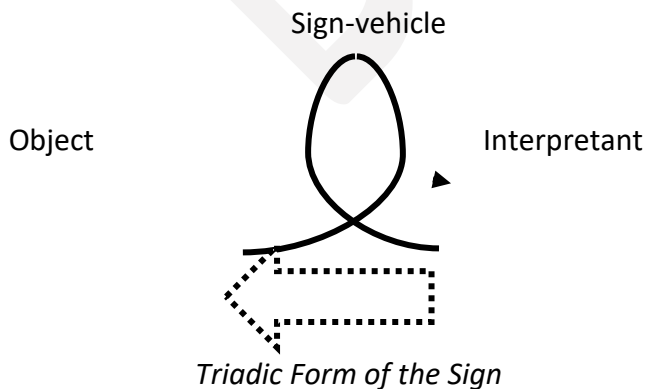
Figure 3: “Timeless” nature of mechanistic determination in Newtonian physics



Bodies are formed by systems and systems are constituted by bodies. This is a progressive, evolutionary process that is mediated by “communication” or the flow of information. Bodies may grow in complexity over time and higher order systems may emerge from lower order systems. Systems are ordered hierarchically such that the bodies at one level of order are formed into wholes which constitute the bodies of the next level. (For example, single cells at one level form into multicellular organisms at the next level of the hierarchy). Through this process there is a deepening of interior responsiveness and an expansion of capacity to process information from the external world to inform responses or re-*actions*.

Signs

Bodies are signs and follow the *logic of signs*. The logic of signs is triadic. This is very important and makes relational ontology radically different from the classical ontology of mechanistic physics which is based on binary logic. The three elements of a sign are: the *sign-vehicle* (also called representamen or simply “sign”) which stands for an *object* to which a response can be made by an *interpretant*. The sign-vehicle does not signify anything in itself. Rather it is able to signify because it is affected by or determined in some way by the object and, in turn, it is able to affect the interpretant. The interpretant is a change of state that allows the sign to mediate between the object and an interpreting entity. Through the sign, the relationship between the object and the interpretant is *asymmetrical*. The sign vehicle mediates (forward) a relationship between object and interpretant which then allows for a direct representational connection (backward) between interpretant and object. An interpretant may then serve as a sign for another interpretant and this process may continue indefinitely.



Objects

Bodies interpret their world *collectively* forming *systems*. The exterior of a body presents information to other bodies in the form of signs. This exterior signaling is the surface, or *face* of the body. It might also be called an *image*. It is not the case that the whole body is a sign, rather exterior aspects of the body are potential signs for other bodies, for example orientation of spin, or biochemicals on the cell surface, or gestures like walking. The body is always infinitely more than the signs it presents.

Bodies respond to their environment by reacting or responding to signs from other bodies. First the sign is *recognized* by the body, then the sign is *processed* internally, then the body *responds* forming, in turn, a sign that is available for recognition by other bodies (these latter two may be concurrent). Because bodies are infinitely more complex than signs, the processing of signs is a stochastic process, where the randomness comes from aspects of bodies that are not meaningful or *significant* for the process.

Therefore, signs establish a “coarse grained” picture of the world that is significant for the body. The body does not recognize an infinite continuum of information from the world; it only recognizes formal patterns, in the form of signs, that are significant for its own formal processing of those patterns. The degree of coarse-graining or digitalization depends on the cycle of return whereby a body presents a sign to another body of the same kind which then presents the same sign back to the original body. The degree of coarse-graining is related to the level of “noise” in the communication channel that connects a chain of object-interpretant re/actions.

The recognition of signs is a triadic process involving iteration and overlap. It is in the redundancy of information from multiple iterations that *sameness* is recognized; that is to say, bodies are established and sustained through a process of *pattern recognition*. The pattern is what remains identical through the iterations. The pattern is formal. It is the exterior form of the object. This means that different types of bodies may interpret different objects in their worlds, and they may interpret the same object differently too.

Systems (spatiality)

The interpretation of formal patterns through signs to create a world or *Umwelt* for a particular body is a collective process. Through the processing of inputs and responding with some action or output, a body represents the external world by signs that lock onto coarse-grained patterns in the world that are significant for the body. However, this is not a process that a particular body can carry out in isolation. Signs are created and sustained by a community of interacting interpreters which are bodies of the same kind. Signs are signs because they represent repeated patterns. The repeated patterns are worked out by the community of interpreters as rules, or habits or laws. These rules sustain a formal system for interpretation. While bodies are always particular and infinitely complex, rules are always general, involving a coarse-grained

level of “digitalization” within which the bodies are bodies with enduring formal “selfhood”. Bodies are bound together into communities through such systems, through which the bodies are continually processing their world, learning and adapting to old and new patterns of recognition.

Systems are based on true narrative representations (TNRs)—a term coined by Oller. TNRs are the underlying principle for the formation of “structure” in dynamical, sign-processing systems. The external world is infinitely more complex than its interpretations. Therefore sign processing is, by its very nature, a stochastic process. The randomness comes from the un-interpreted and uninterpretable for the given system. This randomness is creative because it opens up the possibility for new signs and new interpretations. At the same time, however, randomness threatens the stability of the system. TNRs are selected for by communities of interpreters because they provide the best match to the external world. TNRs enable adaptation and learning in a continually changing environment.

Equality

Relations in relational ontology are asymmetrical. One body is the source of a sign and another body is the receiver of the sign. The receiver can process the sign and then become the source of another sign for another body. However, the roles or functions of source and receiver are disjoint. Sources relate interior to exterior and receivers relate exterior to interior.

If the body were fully synchronized so that there were no interior processing of signs at all, then the system would be classical and deterministic. It would not even be necessary to speak of signs, which would merely become placeholders for deterministic relationships of equality. However, relational ontology, like modern physics, involves systems that are not externally nor instantaneously synchronized. It is concerned with how it is that bodies synchronize their signaling processes through mediation. In physics mediation is borne by light.

As a result, equality becomes an enacted process and self-identity is formed through the system of interpretation. The central trope for self-identity is reflection. A body is a sign for another body which then becomes a sign for the original or indexed body. If these bodies are of like kind, then the sign exchange mutually determines aspects of a formal self that is shared by both in their generality although the two bodies remain different in their particularity. Generality occurs at a digitalized or coarse-grained level of interpreted representation and refers to surface or exterior image. Particularity occurs at an infinitely deeper level of being.

Classical ontology assumes infinitely fast synchronization of sign processing at all levels of reality. It is completely inconsistent with the postulate of a finite limit to the speed of light.

Categories

Relational ontology involves three interwoven categories, which Peirce has called Firstness, Secondness and Thirdness. These categories animate and sustain a continuous evolutionary process that takes the form of growth or progressive *learning*. The three categories are not fully

individuated nor mutually exclusive. They flow in and through one another. They are not further reducible (for example, to a combination of unitary and/or binary categories). Because the three categories are not reducible, they are not individuated *per se*. They relate as a whole such that their identities and their differences are brought into play synchronously. The more we speak and work with the categories, the more clearly they might come into view.

Firstness is that which is present simply in its being without referring to anything. It is potential that is not yet actual—pure indeterminacy that is dynamic and self-othering. It is the creative, that which draws the process onward and upward. Firstness only appears in and through Secondness and Thirdness. It is fresh, spontaneous, whole.

Secondness involves a process of encounter with an Other that remains irreducibly *other*. It is that which is by way of something to which it is second. It is effect, event, otherness, compulsion. It is the realm of pure experience or “brute actuality”.

Thirdness is that which is by way of mediation. It brings things into relation with one another. Thirdness is laws, habits, generality. It is the realm of what is recognized, or known, or understood in some way. The Third connects the First and the Second by “weaving concrete reasonableness” into systems of interpretation. The Third relates bodies to generalized systems from which Firstness re-emerges.

In the context of physics, Thirdness is law, generality, symmetry, form; it is *spatial*. Secondness is embodiment, particularity, experience, experiment; it is *temporal*. Firstness is the generative origin; it is *light*.

Individuality

Relational ontology requires us to parse out different aspects of individuality in a way that is not necessary in classical ontology.

When speaking about a particular body as an existing, embodied individual, that body in its particularity is infinitely complex and entangled with the world in which it is embedded. The body, as a whole body, is individuated to the extent that it is a locus or centre or agent for responding to the world through sign processes. This pure *given-ness* of the particular body is unique and unknowable. Givenness belongs to the category of Firstness.

When speaking about the body as a body among bodies, the body is differentiated or individuated according to its form. Form is general. The body receives its form because it is constitutionally entangled with other bodies of the same kind through a system of sign processing. The form does not belong to the particular body, it belongs to the collective community of interpreters. Form belongs to the category of Thirdness.

Therefore, when bodies encounter one another they encounter identity of general form and difference of particular agency *at the same time*. In this encounter there is recognition of the

same (as objects) but there is also an experience of Otherness. This happens because bodies only process external form, while the complex entangled aspects of interiority *exceed* the exterior form as uninterpreted randomness. The uninterpreted excess—Otherness—involves agency that opposes and limits the particular body at the same time that it draws out the body's expression of its own general forms. Otherness belongs to the category of Secondness.

Likewise, other foundational concepts can be parsed into different aspects. For example, causality takes the categorical aspects of generative cause (Firstness), efficient cause (Secondness) and formal cause (Thirdness).

Subjectivity and Objectivity

By taking bodies to be sign-vehicles, the interiority of a body becomes disjointed from the exteriority. Signaling between bodies involves the exterior surface or face or image of the body and presents at a particular level of digitalization or coarse-graining that is defined by the reflexive system by which a body interacts with other bodies in the community which in turn interact with the given body. Objectivity is formal and presents at the coarse-graining level of the system (as images, for example). Interiority is particular and presents as a stochastic processes that are constrained by the forms of the system. Consequently, it is necessary to differentiate subjectivity, as interiority, from objectivity, as exteriority. A subject is a particular that assumes external form as constrained indeterminacy, and becomes the locus or *index* for meaning formation. An object is general, formal and interpreted.

Please note that subjectivity does not mean consciousness. It refers to the particular body that possesses an interior that is capable of responding to the world through processing of general forms that are mediated by signs. Subjectivity or interiority can never be fully externalized because externalization only captures the digitalized level of experience (eg. images). Likewise, objectivity does not mean determined. Objectivity parses out coarse-grained, general forms that can be recognized and processed by the community of interpreters. Objectivity discloses a partial determination that remains obscured because objects are general whereas bodies are particular. What remains obscured in objectivity is the subjectivity of a given body, its interiority.

This has very important implications for interpreting physics. Namely, it is important to explicitly locate the subjective vantage of the description of any experiment or any system.

For example, only one subject can be operative in the description of an experiment or event. That subject forms the *origin* for the frame of reference to which all other bodies are indexed. However, it is only the exterior, interpreted form of the other bodies that manifests in the frame of reference. The interiority of other bodies remains *Other* to the indexed subject; it remains obscured and presents as a formal image that possesses some form of indeterminateness, freedom or choice. Two subjects cannot be fully present in a single frame of reference. One is the subject, the other must be treated as an interpreted object. Therefore, when looking at the relationship between two frames of reference, it is necessary to account

for the way in which two different subjects synchronize their interpretations with one another through a mutual signaling process that exceeds the limits of the reference frames. This is what is meant by a light cone in relativity theory. There is no universal reference frame in which all bodies are fully externalized.

In a similar way, when interpreting the outcomes of experiments that involve quantum mechanical processes, it is necessary to explicitly locate the indexed observer who forms the subject for the description. This observer is the interpreter of the experiment (Firstness). Consequently, there is always a semiotic or interpretative cut between the subjective frame of reference of the observer and the other bodies under observation (Secondness). In the case of measurements at a distance, only one frame can be considered the subject, the other measurement is interpreted *with respect to the given frame*. The classical system (Thirdness) belongs to the Umwelt of the community that have developed an interpretative system for similar experiments; it provides the generalizing forms through which interpretation comes about. The classical system is instantiated through the named subject.

Transcending

Bodies always remain embedded in their world or *Umwelt*. The interpreting system(s) provide form to bodies as constrained indeterminacy and communications channels that iteratively abstract formal object patterns in that world. The world is always more than what is interpreted and the systems of interpretation are always incomplete and open to change. Unlike Classical Ontology, Relational Ontology is *creative*. The forms of bodies and their laws of interaction can evolve because of the inherent randomness and openness of the interpreted world. Unity is sustained “from within” rather than through external general form as is the case in classical mechanics. Unity involves reflexivity or renormalization of the iterative cycle of return as a subject—the First person perspective—encounters an Other who remains an unintegrated other to that subject—the Second person perspective. But the Other is in relationship to yet others who are also Other to the subject. In the relationship of the Other with the other-of-the-Other who is also another to the same (the Subject), the general or Third person perspective is mediated as general, interpretable form.

The threefold cycle of return sustains identity as a closed circle of iteration. However, it also opens to the possibility of *transcending*. This hidden potential manifests when the unexpressed depth of the circle of return opens up to a helical spiraling form. In order for this transcendental movement to happen, the world or Umwelt must be overcome for and by the subject. In the context of physics, this means overcoming “geometry” as a synthetic ground.

The transcending process involves the subject coming to “recognize” that the synthesis that sustains the unity of the Umwelt is itself a Subjective vantage that is opposed by an irreducible Other beyond the general rules and forms of the interpreters (eg. the system of geometry). There is an opposition at play that cannot enter into the synthesis in any interpretable way, which also means that it is beyond the world itself because the synthesis is the ground or foundation of the world. This opposition gives form to the synthesis as synthesis and thereby

the synthesis becomes finite, limited, determined and no longer all encompassing—it becomes a thesis in opposition to something that cannot enter into the thesis. The recognizing subject experiences this process as paradox—something that is logically impossible within the synthesis. That is to say, it is experienced as undecidable, free, beyond. The paradox is overcome, not by reconciling the logic of the synthesis, but by recognizing that the system of interpretation itself, as synthesis, is context-bound and limited. Therefore, there must be other contexts to which the system is in relation. In this recognition the subject also recognizes that the freedom is both external and within themselves. The interiority of the subject is deepened and the subject’s responsivity takes on new, emergent forms that were not possible within the (now overcome) synthesis.

The relational being of transcending is Love.

Reading List on Relational Ontology

Here is a tentative reading list to get you started. This list is quirky and particular to the journey I have taken in coming to an understanding of relational ontology. I’ve tried to keep it short and focused on philosophical questions. Please don’t take this list too seriously; there are many more excellent books out there.

John Deely, [Purely Objective Reality](#) – Start here. This is a very solid and grounded presentation that goes into the history and philosophical underpinnings of relational ontology. If you want to go further down this path, try Adrian Pabst, [Metaphysics and the Creation of Hierarchy](#).

Charles Sanders Peirce, [The Collected Papers of Charles Sanders Peirce](#). Peirce is the master, especially for physicists. You must read Peirce. The problem is that he was very prolific, so you will have to choose what to read. I’ve only read a fraction of his papers so far. There are many, many interpreters of Peirce. Unfortunately, some people don’t really get him and, of those who do, many don’t appreciate the depth of his mastery of issues in mathematics and physics. I suggest you first read [Creation of the Relevant Next: How living systems capture the power of the adjacent possible through sign use](#). This article lays the groundwork for understanding how Peircean semiotics applies to “non-human” entities. I also found Michael Raposa’s, [Peirce’s Philosophy of Religion](#) to be good at explaining the underlying “logical form” of Peirce’s semiotics. See also sources below that draw from Peirce.

Kalevi Kull et al. [Towards a Semiotic Biology: Life is the Action of Signs](#). Donald Favareau. [An Evolutionary History of Biosemiotics](#) in *Essential Readings in Biosemiotics*, 2010. Biosemiotics is an exploding field of research and this book can provide an introduction. I would recommend reading up further in this area because it is very helpful to see how signs work in non-human contexts in order to appreciate how they might work in physics. Andrew Robinson, [God and the World of Signs: Trinity, evolution and the metaphysical semiotics of CS Peirce](#) also covers some

basic concepts very well, although I would prefer it if his speculative theology were more grounded in tradition.

John W Oller Jr. [The Antithesis of Entropy: Biosemiotic communication from genetics to human language with special emphasis on the immune system](#). In this article, Oller introduces the concept of true narrative representations.

GWF Hegel. [Phenomenology of Spirit](#). Hegel is tricky. He is also dangerous insofar as he seeks to totalize the logic of relational ontology. Be careful with him. I would recommend that you find someone to guide you because he is also very hard to read. While the content may be interesting and even disturbing, pay explicit attention to form and the way his logic moves and progresses. I haven't read his books on Logic, but given his intentions I don't really want to either. (See Levinas for more on this concern.)

Thomas Torrance. [Space, Time and Incarnation](#). While this book is explicitly theological and Christian, Torrance does a great job of articulating the problems with classical ontology and the need for relational ontology. See also [Christian Theology and Scientific Culture](#).

Emmanuel Levinas. [Otherwise than Being or Beyond Essence](#). Brilliant! Brilliant! Brilliant! But who can say what he said?

Christos Yannaras. [Relational Ontology](#). (Translated by Norman Russell). A careful articulation of relational ontology and the constitution of the person as read through Orthodox Christianity. Yannaras writes: "What does it mean that relation *transcends* nature? It means that relation is differentiated existentially from nature, that it constitutes a different mode of existence. The existential mode of the relation—even though it is activated by the energies, or powers, of nature—contains potentialities for freedom from predeterminations, or necessities, of nature."

11. An introduction to the metaphysics of relation with application to the physics of quantum mechanics and relativity theory

The debate between Bergson and Einstein regarding the nature of time [Canales 2016] presents an opportunity to investigate the Logic of Three as the underlying logic that relates quantum mechanics to relativity theory. The Logic of Three is the formative principle of “relational objects” or images.

Introduction

In this investigation I attempt to imaginatively enter into a debate on the nature of time [Canales 2016] between Bergson and Einstein. My entrance is not a re-enactment. Rather, it is a tentative narrative that seeks to *relate a disjuncture* between Einstein’s insights about time and those of Bergson. In taking Einstein’s part, I depend upon a common understanding of Special Relativity Theory, such as the one articulated by David Bohm [1996]. In taking Bergson’s part, I draw from Bergson’s text [Bergson 1965]. The reason for these choices is that I intend to situate Einstein within a General or common framework and Bergson within a Particular understanding.

The method of the investigation involves alternating between the two sides of the disjuncture while at the same time attempting to thread them together by focusing on an implicit question that each interlocutor asks of the other. The question asked of Einstein is *How does the General become embodied?* Of Bergson, *How is the Particular communicated?*

The intended outcome of the investigation is an illustration of Aufheben [Birchell 1981] whereby the disjuncture is synthesized at a “higher level” of interpretation. The illustration discloses the Logic of Three and suggests a pathway to the synthesis of quantum mechanics with relativity theory.

Origin, Rest, and Light

The coherence and trajectory of the investigation depends on the way in which the terms of reference are established. I begin by introducing the core notions of *Origin*, *Rest* and *Light*. These terms are introduced in a way that will hopefully allow us to move between Einstein and Bergson; consequently, the way that I speak about them may seem foreign at first¹.

Special Relativity Theory is built upon the notion of an Inertial Frame of Reference. An Inertial Frame of Reference points to, or locates, an Origin where an Origin is a local here-and-now within the unfolding of creation. An Origin calls out, “*Here I am*”, so to speak. The spatiotemporal unfolding of creation—the dynamics of the embodied Universe—is then indexed to the chosen Origin. That is to say, everything else in the Universe *is related back to the Origin*, while the Origin is taken to rest in itself. One cannot speak descriptively of the embodied Universe without naming an Origin.

The Origin is *particular*, it refers to a particular here-and-now within creation. Yet the Origin is *not unique*. Another Origin might be chosen as the indexical centre for a different Inertial Frame of Reference. This would result in a different description of the embodied Universe. However, only one Origin can be operative for any given description. To that Origin corresponds its Inertial Frame of Reference. A particular Origin cannot be co-present *bodily* with another Origin, nor can a particular Inertial Frame of Reference be co-present *bodily* with another Inertial Frame of Reference. The Origin is like the *Subject* as discussed in section 2. The rest of the Universe is objective for that Subject.

For an Inertial Frame of Reference, the Origin is said to be at Rest and an Inertial Frame of Reference is a Rest Frame. What does it mean to say “at Rest”? *Rest is a Special relationship with the Infinite*. In Special Relativity Theory the mediator of this relationship is Light. There are two aspects to this special relationship. First, an Inertial Frame of Reference is not accelerating which is to say that it does not experience the non-inertial forces that result from acceleration; this means that the embodied universe does not disturb the Origin. Rest is an equipoise that allows a direct relationship with the Infinite that is not disrupted by other bodies in the universe². Second, the speed of Light is a universal constant for any Inertial Frame of Reference. This means that Light mediates finitude.

¹ For additional clarification and rationale regarding the way I am using the terms *Origin*, *Rest*, and *Light*, see [On the Embodiment of Space and Time: Triadic logic, quantum indeterminacy and the metaphysics of relativity](#) or [The Proximity of Light: a deconstruction of space](#).

² This notion of Rest can be traced back to Newton. For Newton, Rest was a relation to the Absolute that is not defined by other bodies. For him, there was no direct physical access to this Absolute. Rather, it is an asymptotic ideal that is the result of an iterative process that starts with an assumed inertial frame and then successively incorporates non-inertial discrepancies to move to a more accurate inertial frame. [Christopher Smeck, “Newtonian Time”, oral presentation at *Time: A conference in the history of metaphysics*, Toronto, April 30, 2017].

The mediation of Light is *immediate proximity*—a null measure that overcomes spatiotemporal difference (the relevant metric of Special Relativity Theory). When the Origin is at Rest, the Light cone brings it into immediate proximity with the Infinite³. Light additionally generates and sustains relationality for an Inertial Frame of Reference through the process of synchronization. Synchronization involves signaling between Frames of Reference. In Special Relativity Theory all Inertial Frames of Reference are equivalent. Light is the mediator that brings different Inertial Frames of Reference into relationships of equality; it brings them into sameness or unity. The relationship of equality is Rest.

What might Einstein say?

An Inertial Frame of Reference can be mapped out like a Cartesian coordinate system to create a Minkowski Diagram⁴ as shown in Figure 1.

³ This is another way of saying that the metric *for the entire light cone* is null. Unlike the case with the Euclidean geometry of Newton's spacetime, with Special Relativity Theory the "infinitesimal neighbourhood" around the Origin is a grain (not a Euclidean point) that extends to Infinity along the Light cone. For additional explanation, see [The Proximity of Light: a deconstruction of space](#).

⁴ See also [The Proximity of Light: a deconstruction of space](#) (Figure 5).

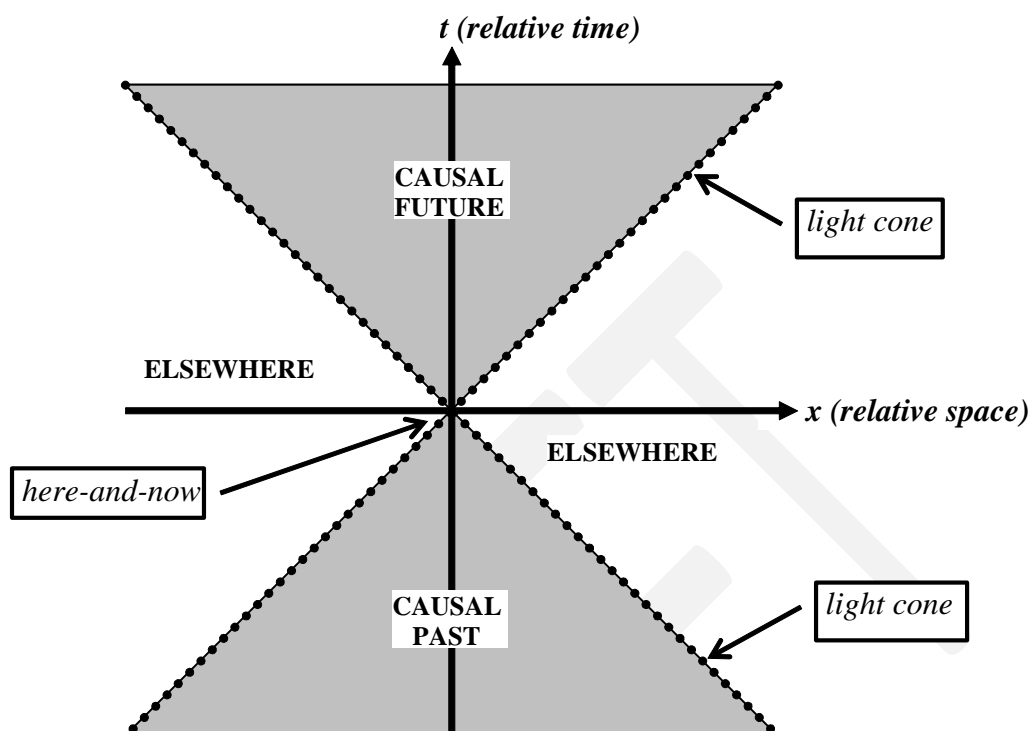


Figure 1 : Minkowski Diagram of an Inertial Frame of Reference

In this diagram, the Origin is the centre of the Inertial Frame of Reference—the local *here-and-now*. The vertical and horizontal lines represent locally constructed time and space coordinates that are mutually orthogonal in the Inertial Frame of Reference. The diagonal lines represent the invariant speed of Light. The figure they form is called the *Light cone*. The Light cone is absolute in the sense that it is independent of any particular Inertial Frame of Reference. The shaded area within the Light cone corresponds to all events that are causally⁵ connected to the Origin or the local here-and-now. The domain of such events is divided, by the Light cone, into the *causal past* and the *causal future* of the local here-and-now. All events that impact the local here-and-now (events in the causal past) and all events that the local here-and-now can impact (events in the causal future) must lie within the Light cone. There is also a domain of causal indeterminacy—labelled *Elsewhere* in the diagram—which is not accessible to the local here-and-now. It is not accessible in the sense that there is no causal signal that can link events in Elsewhere with the Origin of the Reference Frame. No event in Elsewhere can causally affect the local here-and-now. Such events are non-causal events that can only impact the causal

⁵ In this context, the term “cause” refers to *efficient* cause. Efficient causes sequence events into prior causes and subsequent effects, resulting in an irreversible chain of action-reaction relations.

future of the frame, if at all. The local here-and-now cannot causally impact any event in Elsewhere.

The Minkowski Diagram represents the vantage of an Inertial Frame of Reference on the embodied Universe. It is a system of coordination in which space and time are the coordinates. In Special Relativity Theory, this coordination is particular and relative to the given Inertial Frame of Reference. That means that each Inertial Frame of Reference has its own proper time and relative space. The coordination of time and space happens through the mediation of Light. Unlike with Newton's theory in which (absolute) Time and Space are absolutely "given", with Einstein's theory it is the process of mediation or synchronization of coordinates by Light that is absolute. Special Relativity Theory describes a *relational ontology* and therefore it is necessary to consider the manner in which different Inertial Frames of Reference are brought into relationships of *Synchronicity*.

For Einstein, synchronization happens through the exchange of signals of Light in accordance with the premise that Light is an absolute mediator. To speak of synchronization, we need to consider two Inertial Frames of Reference that are exchanging Light signals between one another as shown in Figure 2. (For simplicity, I refer to an Inertial Frame of Reference as simply a "Frame").

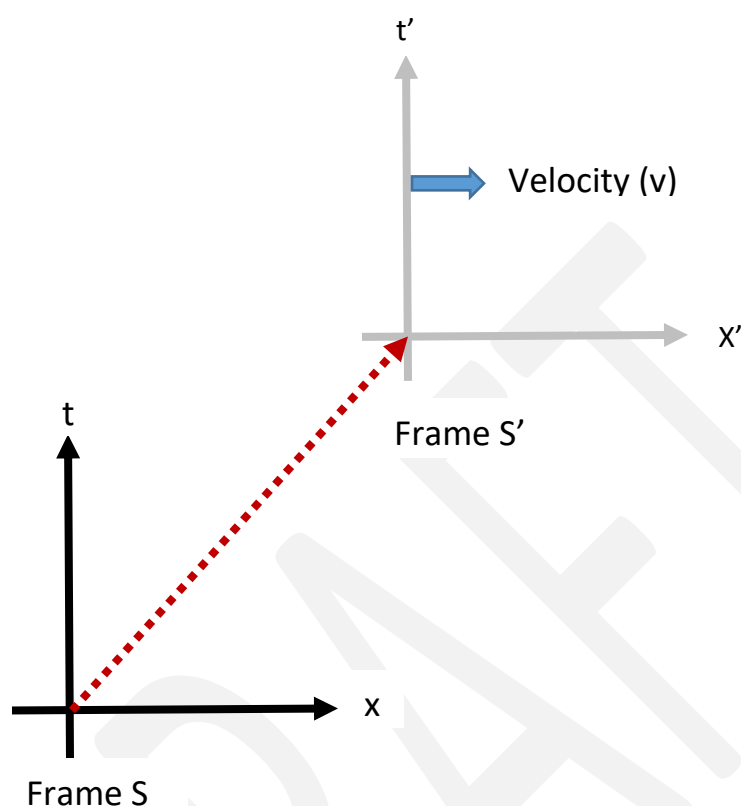


Figure 2: Inertial Frames of Reference (S and S') connected by a Signal of Light (Dashed Arrow)

Considering the Frame S in Figure 2 as an index, it is then possible to coordinate points (x', t') in the Frame S' with points (x, t) in the Frame S. If the Frame S' is not moving with respect to the Frame S, then the coordination is taken to be a form of identity because each point in S' rests upon an equivalent point in S. In this case, spatial and temporal intervals are the same for the two Frames. However, if the Frame S' is moving at a (nonzero) velocity v with respect to S, then the coordination of spatiotemporal points results in a contraction of space in the direction of motion and dilation of time in the Frame S' as measured in the Frame S. This transformation is a consequence of the uniform and finite speed of Light c , as measured in either Frame. Constant velocity—a finite image of the constant speed of Light—*equalizes* relationships such that all Inertial Frames of Reference move at a constant velocity with respect to one another and form an equivalence group.

For Einstein, the transformational relation of space and time between the Frames (the Lorentz transformation) is a real consequence of the relative motion between the two Inertial Frames of Reference. *Time slows down in Frame S' according to Frame S.*

What might Bergson say?

An Inertial Frame of Reference cannot simply be taken to “rest in itself”. The Origin of the Frame—the assumed still point—is more elusive and circumspect. It is misleading to use the Euclidean point as an image of absolute rest in the way that Einstein does. His “implicit notion of absolute rest confuses the interpretation of reciprocity” [Bergson 1965, 34]. A Frame of Reference is the ground of an observer’s perspective where the observer is always embodied and constitutionally related to what is observed. The Origin discloses this *interiority*.

Rest should be defined with respect to the placement of the observer. When we speak of Frame S as the indexical Frame, we mentally take our place within this Frame. We are able to imagine a second, doubled Frame S’ in motion because we relate it back to the Frame S in which we have imaginatively placed ourselves. We can then speak about changes to space (x’) and time (t’) in the second Frame S’. That is to say, we can *interpret* the spatial and temporal intervals in the second Frame *according to our indexical Frame S*. However, our interpretation is not the same as the experience of an observer that is placed within the second Frame S’. The changes we interpret for the Frame S’ according to the Frame S would “escape the observer who is part of the moving system. Only the stationary observer is aware of them” [Bergson 1965, 22].

Once we acknowledge that observers are constitutionally related to what they observe, then we need to be aware of our own vantage for observation. We might choose Frame S as our vantage. We might choose Frame S’. But we cannot choose both Frames at once. Only one Frame of Reference can be the Subject; all other Frames become objective in relation to the chosen Subject. The way in which we interpret Frame S’ (the Objective frame) from the indexical Frame S (the Subjective frame) is not the same as the embodied experience of an observer in Frame S’. Something escapes our interpretation. Namely, the embodied experience of the Subject in their own Frame S’. It is the *particularity* of the Subject in Frame S’, the way in which the Subject is a locus of meaning in relation to themselves that cannot be subsumed into the description according to Frame S. We might call this the Subject’s *interiority*.

Why does the particularity of the Subject matter? Isn’t everything laid bare in a universal objective perspective? Don’t we just need to find the right Frame of Reference that provides God’s Eye View on all possible Frames of Reference? Can’t we just transcend embodiment to see the world as pure objectivity?

In fact, *Special Relativity Theory explicitly denies the possibility of such a “universal vantage”*. As shown in Figure 1, an Inertial Frame of Reference always has an elusive “Elsewhere” that is a domain of indeterminateness for that Frame. Universal totality cannot be accessed from a single Inertial Frame of Reference; it is a deferred construction or interpretation made possible through the synchronization of the observations from all possible Frames of Reference. As Bohm writes: “projections from our absolute past to our absolute elsewhere are necessarily incomplete. There is ... always much that is unknown in our absolute elsewhere; and, for this

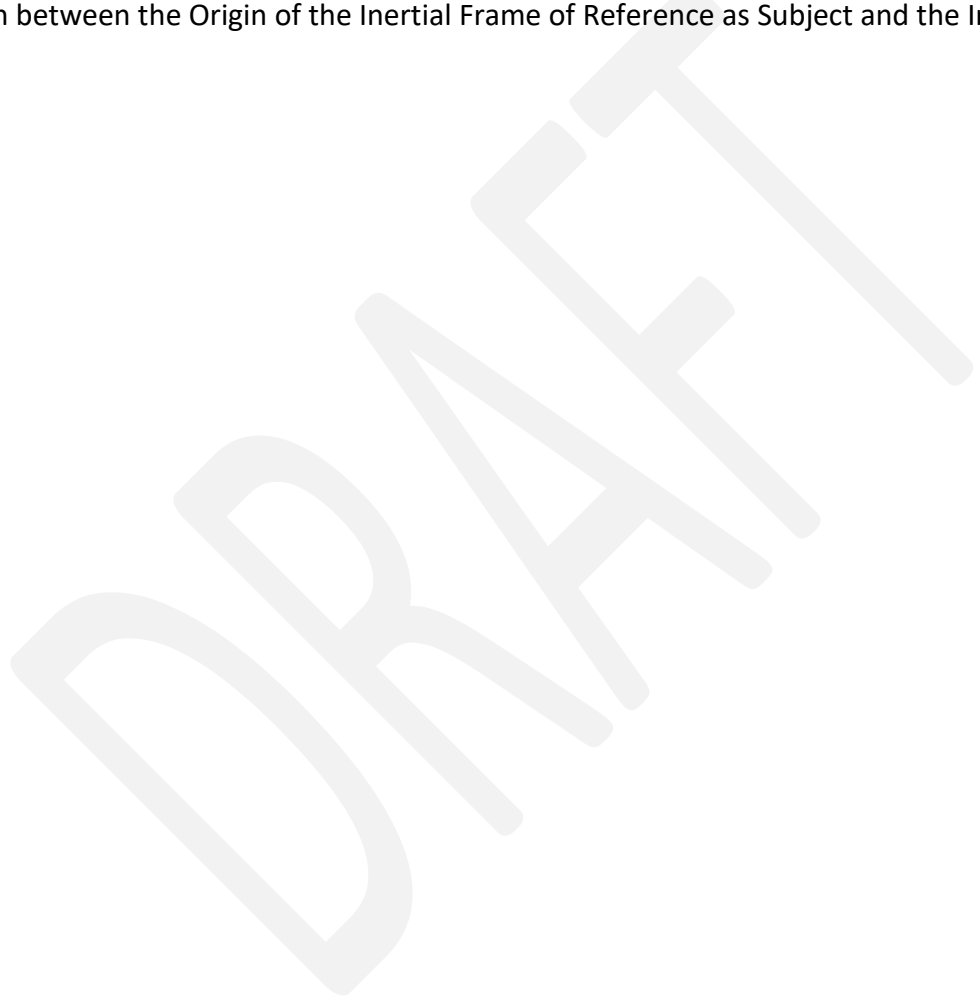
reason alone, predictions concerning the future will be subject to contingencies, arising from what is unknown at the moment when the prediction is made. Of course, we may come to know about these later (when they will have become a part of our absolute past), but then there will be a new absolute elsewhere, not known at the moment in question. So there will always be that which is unknown ... It can be seen that all these considerations arise out of the need to take into account the important fact that the observer is part of the universe ... As a result, because of the very form these laws of physics, which imply that no physical action can be transmitted faster than light, there are certain limitations on what can be known by such an observer at a given moment" [Bohm 1996, 117].

What happens if we try to transcend our embodied vantage? Suppose we begin by taking Frame S as "at rest"—the Subjective frame—and then imagine the perspective of Frame S' that is in motion with respect to Frame S. We might then turn back and imagine Frame S as the one in motion with respect to Frame S' which we now take to be "at rest". That is to say, we might change our perspective so that Frame S' is the Subjective frame. In considering this dynamical change of indexical relation between two Frames, we don't need to place ourselves in a third objective Frame of Reference to index our thoughts or interpretations. Instead, suppose our imagination "oscillates between the two, immobilizing them by turns through goings and comings so rapid that it entertains the illusion of leaving them both in motion. It is in this precise sense that we speak of a 'system of references'" [Bergson 1965, 41]. A gap of indeterminacy remains in the oscillation back-and-forth and this gap *is temporality*. Origins can no longer be said to rest in-themselves. Instead "nodes" are formed in the repeated movement of our imagination as it differentiates the *Other* Frame and returns back to the *Same*. These nodes are images for which *we are the subject*. The system of references is held in synchronicity by our oscillating movement from one Frame S to the other Frame S' and back again. This oscillating movement is what is meant by *Reciprocity*. Reciprocity is not equality; it is the process of equalization that happens in repeated differentiation and return to the Origin. Reciprocity involves an interior, Subjective dynamic of oscillation between the Origins of two Frames which through expression becomes external or Objective.

What differentiates a Frame of Reference as *Subject* from a Frame of Reference as *Object*? The Subject possesses *interiority* and has *duration*. Interiority holds together or sustains Reciprocity as repeated differentiation and return to the same. Duration is the Subject's experience of temporal passing and is always particular. It is a continuation of what no longer exists in the local here-and-now into what does exist. Duration creates a self-image for the Subject in the back-and-forth of oscillation. In the simple example of the spatiotemporal Reference Frames that we are considering, this "self-image" is *extension*. The self-image is given to the Subject, as it were, through its constitutional relationship to other Frames of Reference. This self-image can then be projected onto another exterior or Objective Frame of Reference as an image of its Origin. In this way, the Subject can *interpret* other Frames of Reference as images or doubles or repetitions of itself. The other Frames of Reference, according to the Subject, are external and Objective. However, this Objectivity is incomplete. The *Otherness* of the other Frames of Reference eludes complete determination by the Subject. What is elusive is the particularity of

the Other as Other, its indexicality as a locus of relations, its Origin or here-and-now. This particularity is the formal basis of proper time.

Figure 3 diagrammatically represents the “stilling” of two Frames of Reference in Reciprocity by a Third. In the back-and-forth movement, the two Frames of Reference (S and S' in figure 2) become external Objects for the Third. The interiority of the Third—the *Subject*—forms the image of the Origin which can then be projected back onto the two (external or Objective) Frames of Reference. This Origin might be interpreted as the vacuum state or ground state and has the extensive form of vibration. The ground state is the state of Rest which is a Special relation between the Origin of the Inertial Frame of Reference as Subject and the Infinite.



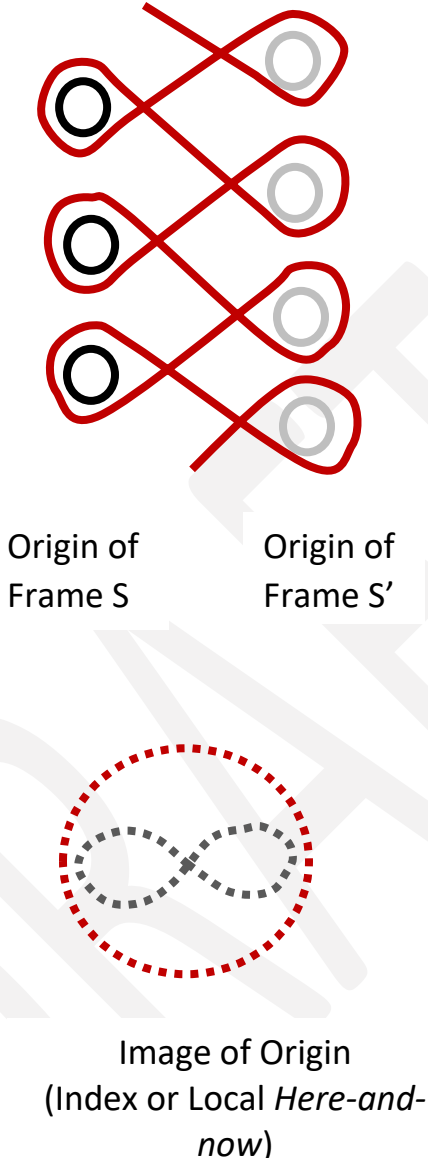


Figure 3: Reciprocity as dynamical relation: Exterior and Interior Forms

How might Bergson provide an opening to Einstein?

Embodiment is always experienced as Particular and Subjective. The Subject's Frame of Reference is unique. It sustains the index or locus to which everything else in the universe is related. This index or locus of relationality is what is meant by the notion of Origin.

When Einstein speaks of a second Frame of Reference moving with respect to a given Frame of Reference, the two Frames cannot be assumed as either equivalent or reciprocal *in themselves*. One Frame is taken as the Subject, either explicitly or implicitly. The other Frame then becomes the Object. The Subject has duration, acts, and experiences events. The Object, however, is merely an image that is formed by the Subject. It is a projection onto the Other of the experience of the Subject. It is an *interpretation* of another potential Subject that is like me.

Interpretations are always incomplete. They are incomplete because it is impossible to fully enter into the Subjectivity of another Subject. An interpretation eludes full determination *in principle* because of the particularity of every Subject as an embodied entity that forms a unique index or locus of relationality within Creation.

In speaking of "observation" as if it were universal and independent of the Frame of Reference of the Subject, Einstein underestimates the radicalness of *relationality* in Special Relativity Theory. Objects are interpreted entities that enter into determination and observation by way of their relationships.

The problem posed to Einstein by the radicalness of relationality in Special Relativity Theory is evident when we consider the Origin of an Inertial Frame of Reference. *The Origin cannot have the form of a Euclidean point*. A Euclidean point is the (spatialized) image of infinitely fast synchronization and therefore it is not consistent with the premise of Special Relativity Theory that the speed of Light is universal and finite. The Origin must involve a spatio-temporal process. It must have *duration*.

If the Origin cannot be taken to have the form of a Euclidean point, then neither can any other location in the spacetime manifold because each of these locations must be an image of the Origin. Each must be an original image because the Origin is the indexical reference for anything that might be taken to "rest in itself" in the manifold. The Origin is the source of Rest. Through this indexical pro-type, the spacetime manifold becomes an interpretational framework of the universe as a relational matrix of images of the Origin.

At the Origin is the Subject's interior experience of duration. Duration is universal. Time is. Time is for all Subjects.

How might Einstein enter into this opening?

Suppose we accept Bergson's challenge that the Origin to a Frame of Reference is more elusive than we have supposed until now. Special Relativity Theory tells us that Time is always particular. If the Origin is an origin by virtue of its temporality, then there can be no generality, there can be no form, there can be no interpretation. How could anything be communicated?

In Special Relativity Theory, it doesn't make sense for us to take Time to be the mediator of universality as Bergson seems to do. But we can also see that Bergson takes experience as primary and we know *from experience* that the speed of Light is constant for Inertial Frames of Reference. Light presents itself to us as the mediator of universality, that is to say, the mediator of the *General*.

Suppose we try to think with Bergson, but we consider *Light* as primordial (an image of Arche) rather than *Time*.

In Figure 2, we considered two Frames of Reference in reciprocal relation. We unified this reciprocity by assuming their Origins could be brought together under a unifying gaze as identical in form. The form we chose was based on the assumption that we could spatialize the Origin as a Euclidean point and represent the two Frames of Reference as related *spatially*. Bergson says that this is not legitimate because it violates the principles of relativity theory. Namely, we would be required to assume infinitely fast synchronization between the two Frames when, in fact, synchronization happens through the exchange of Light whose speed is finite.

Bergson isolated the elusive back-and-forth of Reciprocity as the image of an Origin, a form of Subjectivity. Let's call this back-and-forth of reciprocity *Resonance*. An Origin *resonates*. Bergson locates Resonance within our Subjectivity; *we* are the interpreters who are imaginatively moving back and forth between two disjointed Frames of Reference.

Suppose instead of locating Resonance within our Subjectivity, we think of it as a form of interiority that might be located elsewhere. And instead of focusing on *where* it might be located, we ask *how* it might be located.

Figure 3 re-presents the mediated process of Resonance whereby the index of Subjectivity shifts between the Origin of Frame S and the Origin of Frame S'. Let's re-interpret this figure such that it is Light that mediates the process and it is the interior of something which has yet to be determined that is resonating. In other words, let's shift our focus from objects to mediation and see if it tells us something about what it is that is mediated.

In Figure 2, we represented a Subjective Frame of Reference (S) for which a moving Frame of Reference becomes its Objective *Other* (S'). The Other Frame is an image of the Subjective Frame (the Same in relation to the Other). If we imagine one Frame is moving with respect to

the Other, then the velocity breaks the symmetry of the two Frames, it differentiates the two Frames such that the Same is stationary and the Other-to-the-same is moving. The reason why we identify with the stationary Frame, as Bergson notes, is because we are the arbitrators of difference.

But what about the case where the velocity is zero. Then the two Frames are identical and the separation of their Origins is purely spatial. In this special case, the reciprocal dynamic represented in Figure 3 is a back-and-forth process of exchange between two identical forms for which there is no manifest differentiation. Let this vantage be the vantage of Light. Light is the infinite mediation of the relation between the two identical original forms. The relation is one of Proximity because there is no spatiotemporal separation for light (i.e. the metric is null). What is identical is form and form is general. The identity of Form is symmetry. What is different is the particularity or indexicality of form when it is the embodied Origin of a Frame of Reference. Light mediates this relation between particulars and their common form. This mediation involves the breaking of symmetry.

Light creates and breaks symmetry.

To illustrate how Light both creates general form and also breaks its symmetry, let's we consider created Light in the image of spinning photon. This image combines spatiality and temporality, such that the spinning photon has the potential to differentiate and return as it spins in a circular motion. To be sure, in itself this image is meaningless because there is nothing by which the spinning might differentiate or return—there is no indexicality or Frame of Reference. However, suppose we bring two spinning photons into Resonance. Now we have two Origins in Resonance, like the representation in Figure 3.

Next, instead of imagining that the Resonance is a back-and-forth of our subjective gaze as we move between the two Frames of Reference, suppose we take the back-and-forth to be an indeterminate exchange between two spinning photons such that their spins are always in opposition. The opposition is what allows the spins to be differentiated: if one is +, then the other is - where the names + and - reference the poles of an opposition that has yet to be determined. In the opposition is the potential for differentiation by means of orientation—a breaking of the symmetry—but that differentiation remains unexpressed.

Finally, suppose we synchronize the Resonance by means of a Third such that cycles of oppositional exchange repeat themselves in synchronicity with the Third, creating the rhythm of back-and-forth in Bergson's discussion of Reciprocity.

What results is a Three-form, a *relational object with interiority*. The lastly named synchronizing Third opens the possibility for the embodied resonance of two coupled photons in opposition or complementarity and brings the coupled photons into external relationships of general form. The Third sustains the interior form of the relational object. The indeterminate exchange of opposition for the coupled photons is the interiority of the object. This object might be called

an electron. The object does not rest *in-itself*. The object is sustained in and through the relational integrity of the *Three as a whole*. This relational integrity is interior to the object. The object is an image of the Original spinning photon. This image might be thought of as a folding back upon itself of the photon to create a spatiotemporal knot.

The Three-form becomes the starting image of an Origin to a Frame of Reference, where the Three-form possesses an indeterminate interiority that has the potential to come into determination with exteriority. But in order to come into determination, the Three-form must be related to other Three-forms. Just like the image of a spinning photon is meaningless in itself, so too the image of a knotted Origin is meaningless in itself. As a relational object, a Three-form must also be in *external* relation with images of itself.

Like internal relations, external relations are also mediated by Light. A given electron exists in Resonance with other electrons and the totality of electrons forms the external system of which they are a part. The system, as system, holds together the external relations between electrons as relational objects. The interior form of the relational object—its in-formation—reflects the exterior form of the relational object—its spatiotemporal image or signification, and the Third mediates between interiority (the Same) and exteriority (Other-to-the-same).

What would result is a system of entanglement in which Light mediates relationships of interiority in synchronicity with the mediation of relationships of exteriority. This system of entanglement would be a semiotic system of signal exchange in which the signs (external images) point to external manifestations of interior formation. It would be a system of binary differentiation between $+$ and $-$ that manifests *orientation* as broken symmetry.

The Three-form of Special Relativity Theory has spatial extension by virtue of the back-and-forth of exchange of the Same and the Other-to-the-same held in reflective relation by the Third, as represented in Figure 3. Spatial extension differentiates identical forms as potential particulars in time (images) and manifests as vibrational modes. The Three-form also has duration or temporality by virtue of the synchronization of the Three—the Same, the Other-to-the-same and the Third. Temporality *orients* the Three-form towards exteriority and is the substrate for image formation. The Three-form of Special Relativity Theory is a simple example of a relational object.

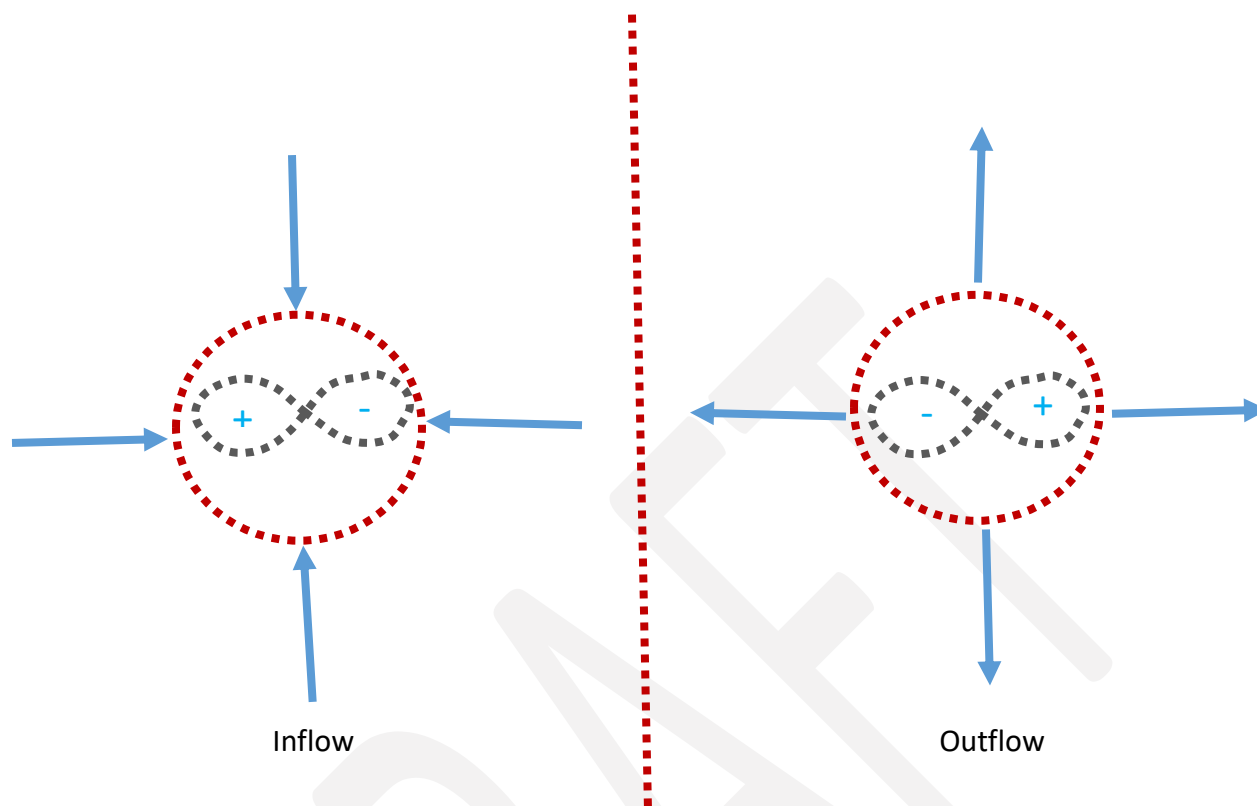


Figure 4: Original Three-form of Special Relativity Theory

The coupled photons (encircled lemniscate) are formally held in unity by the inflow and outflow of the Third which also brings them into relationship with exteriority. The alternation between inflow and outflow happens in synchronicity with the exchange of spin or orientation between the coupled photons, where the polarities of orientation are represented by + and -. Figure 4 re-presents the synchronization of Figure 3 by Light. It can be interpreted as the Origin of an Inertial Frame of Reference (see Figure 1) in which the Third (blue arrows in Figure 4) is the Light Cone. The Third is an asymmetric relationship (an oriented relationship) whose image is velocity as represented in Figure 2.

Re-solving Einstein and Bergson

Einstein begins with the assumption of an exterior Origin of general form that can be taken to rest in itself (a Euclidean point) and then derives a geometry of Being as a system of relational equality whose foundational spacetime points are perfectly synchronized *a priori*. All is Space.

From the experience of Subjectivity, Bergson deconstructs Einstein's original form by showing that it can never be located within a system of relations because it has no relation outside of itself. Yet it is only by relating beyond itself that the Origin can signify a particular location in a Frame of Reference. The *ad absurdum* result is that the original form cannot be taken to rest in itself because it is not related to itself. Bergson concludes that we must begin in the particularity of Time.

In Special Relativity Theory, Light embraces this paradox. Light has a threefold logic that:

- sustains the interiority or duration of the particular as unique *stasis*.
- relates the particular reflexively to other particulars of the same kind—as internal image to external image—such that other particulars are *paradigmatic manifestations* of interiority.
- brings a system of particulars into *communion as indwelling* such that particulars become the fulfilling of a general or common form

The general or common form is enacted by each particular through its relationships. The general or common form belongs to the community of particulars as mutually interacting interpreters. The common form bears the interior indeterminate form (impression or seed) of a particular and brings that interiority into relations of significance with the external determinate form (expression or body) of other particulars in the community.

Particulars are interpreters in communion. Each particular has its own Frame of Reference that has significance for that particular and only represents part of Creation. The significance comes from the process of creating generalizing forms that occurs as particulars interact in communion. The generalizing forms are constituted and sustained through the community.

References

Bergson, Henri. *Duration and Simultaneity*. Transl by Leon Jacobson. New York: The Bobbs-Merrill Company Inc., 1965.

Birchell, B.C. Hegel's Notion of Aufheben. *Inquiry* 24(1):75-102,1981.

Bohm, David. *The Special Theory of Relativity*. New York: Routledge, 1996.

Canales, Jimena. *The Physicist and the Philosopher: Einstein, Bergson and the debate that changed our understanding of time*. Princeton University Press, 2016.

12. On the embodiment of space and time: triadic logic, quantum indeterminacy, and the metaphysics of relativity

Triadic (systemical) logic can provide an interpretive paradigm for understanding how quantum indeterminacy is a consequence of the formal nature of light in relativity theory. This interpretive paradigm is coherent and constitutionally open to ethical and theological interests.

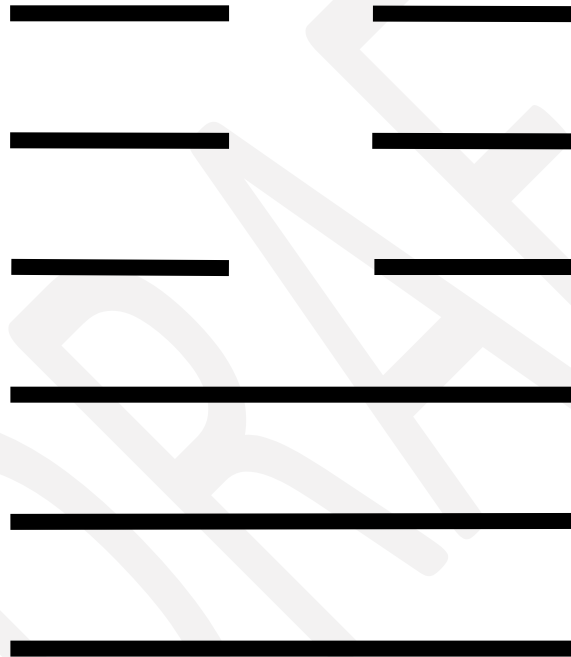
In this statement:

- *Triadic logic* refers to a formal pattern that describes systemic (collaborative) processes involving signs that mediate between interiority (individuation) and exteriority (generalized worldview or Umwelt). It is also called systemical logic or the logic of relatives. The term "triadic logic" emphasizes that this logic involves mediation of dualities through an irreducibly triadic formalism. The term "systemical logic" emphasizes that this logic applies to systems in contrast to traditional binary logic which applies to classes. The term "logic of relatives" emphasizes that this logic is background independent (in the sense discussed by Smolin¹)
- An *interpretive paradigm* refers to a way of thinking that generates an understanding through concepts, their inter-relationships and their connections with experience.
- *Coherence* refers to holistic integrity or continuity in the meaning of concepts that form an interpretation or understanding.
- *Constitutionally open* refers to an inherent dependence in principle of an interpretation or understanding on something outside of a specific discipline's discourse or domain of inquiry (epistemic system). Interpretations that are constitutionally open are incomplete in themselves and open to responsive, interdisciplinary discourse and collaborative learning.

¹ Lee Smolin, *The trouble with physics: The rise of string theory, the fall of a science, what comes next*. (Boston: Houghton Mifflin, 2006)

Peace I leave with you, my peace I give unto you

[John 14.27]



Peace means union, interrelation

[I Ching, 11]

For whatsoever doth make manifest is light.
[Ephesians 6.13]

1.0 Prologue

This paper involves a poetically attuned² reflection on *light* and *word* as that which forms *in the beginning* [Genesis 1.1-4; John 1.1-4]. The goal of the writing is to explore manifest interrelations of physics (and mathematics), philosophy and theology in order to come to an understanding of the formative role of light for space, time, embodiment, exteriority (objectivity) and interiority (towards subjectivity).

The core problem, to which this paper is a response, is the totalizing construct of Absolute Space. This problem is to be understood both literally, in the case of physics, and metaphorically, in the case of philosophy. Absolute Space is the presumptive theatre in which a deterministic worldview unfolds in lawful regularity without creation or surprise or freedom. It is Newtown's *Globe*—the stage for Principia Mathematica. The audience for Absolute Space is the Ideal Observer—an individual ego alone with himself³, disengaged from the drama of life and its ethical calling, able to capture the totality of “being” all-at-once, as if heaven and earth were one and his thoughts were God's thoughts.

The course of the response comes from deeply troubling the *aloneness* of man⁴ [Genesis 2.18]. The abstract indefinite for the exploration—the star to steer our journey—is the notion of One [Deuteronomy 6.4-5; Mark 12.29-13]. Methodologically, “Unity” plays the role that is played by “the Absolute” or “Being” or “Essence” in other philosophical investigations. If the course is well steered, it should remain momentarily perched on the edge of the horizon, guiding us forward in our thinking yet always just beyond our grasp.

The exploration unfolds within three interwoven and resonant levels or harmonies, which loosely might be characterized as *ontological*, *ethical* and *theological*. It grows out of and refers back to a series of *études* on light and word that I have engaged with over two decades. The full bodied resonance of this paper with source material—from the domains of science, philosophy and theology—reverberates and is documented in these previous undertakings.

² The characterization of a “poetically attuned” reflection comes from Jan Zwicky, *Wisdom & Metaphor* (Kentville, Nova Scotia: Gaspereau Press. 2003).

³ The Ideal Observer presents as male insofar as he has no bodily knowledge of the mystery of birth.

⁴ That is to say, man cut off from the Other which, in the story of Genesis, is woman. The term “man” in this context refers to an image of individuality or humanity that is self-contained and sterile in-itself.

1.1 Ontology (Thirdness)

The ontological level is concerned with the “stuff” of our world. It is the place where we might seek an answer to the question: What do the terms in our theories of physics refer to *in the world out there*? The ontological level is external, lawful and deceptively familiar. It is the level that is engaged most often in the philosophy of physics, and it is also the most readily apparent level of discourse in the current exploration.

The focal insight that I hope to illuminate is that we need to *break through* the ontological level in order to appreciate the significance or *meaning* of relativity theory and that, if we are successful in making this breakthrough, we will discover that quantum mechanics is its proper ontological form. Pragmatically, this insight comes from relinquishing Newton’s presumption of Absolute Space as a closed theoretical ground and redirecting our gaze towards light as an open window to the Infinite.

In this paper, I attempt to use the formalism of number theory to enact the breakthrough. I take mathematical form to be an abstract expression of ontological form. Natural numbers express the form of discrete *things in-themselves*. Real Numbers express the background continuum from which discrete things-in-themselves are abducted or brought into view. Complex numbers express the reflexive form of light which creatively enables and sustains the formative principles of Natural and Real numbers. Section 2 of the paper successively explores these three mathematical forms. Section 3 then applies what is learned in Section 2 to the question of the ontological form of matter in relativity theory.

The breakthrough is seen to involve a change in perspective. The Newtonian or *classical* worldview rests upon the postulation of a timeless, **finite** Self as the abstract foundational form; for example, the form of elementary particles or Euclidean points. The finite Self is the formal basis of analyticity. However, this postulation is self-contradicting in the sense that *the finite Self is the violation of the law of the excluded middle of binary logic*⁵. The contradiction—

⁵ An example of the formal problem of self-contradiction that I intend here can be found in Whitehead and Russell’s *Principia Mathematica*. Somers-Hall provides a very accessible discussion of self-contradiction and the formal role of “systematic ambiguity” as a formal underwriting of the logic of *Principia Mathematica*. Systematic ambiguity arises from the possibility of self-referentiality and introduces logical (binary) paradoxes, such as Russell’s paradox. Quoting Whitehead and Russell, Somers-Hall writes “The vicious circles [of self-reference] in question arise from supposing that a collection of objects may contain members which can only be defined by means of the **collection as a whole**” [Bolding added]. As a result of this formal circularity, the logic under question is not able to include a notion of totality—it is incomplete in principle. This logical incompleteness of Number theory is also disclosed through Gödel’s incompleteness theorem which is similarly based on self-referential circularity. The “whole” as a form of “self” is incomplete or “open” and, by extension, the parts that reflect the whole are open. As Somers-Hall discusses, Russell attempts to circumvent the incompleteness through the development of a totalizing hierarchical ordering, but this ordering is itself incomplete and cannot be ascended to the highest level. The totalizing move Russell makes is the type of move that I am trying to challenge or oppose in this investigation. Gödel, by contrast, sees incompleteness as an opening and he enters into this opening by

the formative principle of the finite Self—can be overcome in recognizing that the finite Self is neither timeless nor context-independent. Rather, it is a *sign* that is nothing *in-itself*, yet the bearer of signification *in-itself-for-another*. The triadic logic of the sign—*semiotics*—brings into play asymmetry or *agapé* as an opening towards “patterned resonances in the world”⁶. It provides a new perspective on ontology that is evolutionary and emergent.

But the perspective is not entirely new. It is the hidden depth that is obscured in the classical worldview precisely to the extent that the worldview is intended to reflect a closed totality that is cut off from the Divine.

1.2 Ethics (Secondness)

The ethical level is experience, action and re-action. It is concerned with engagement, relationship and belonging. The ethical level is *intentional*.

In this paper I enter into the ethical level by exploring the *phenomenology* of triadic logic⁷. By phenomenology I mean an exploration of the direct conscious experience of triadic logic. This exploration involves first tracing the internal form of the logic in Section 2. Section 3 then involves an interpretation of the *grammar* of light in the theory of relativity as a particular articulation of triadic logic. By grammar I mean the system, structures and processes of the theoretical form as manifested in reflective tracings of the phenomenon as figures. It involves the external form of the logic.

Attunement to the ethical level requires particular attention to process and form. The strategy used in this paper to maintain such attention is to attempt to reflexively enter into *the narrative of thinking that is number theory*. This strategy involves differentiating the structural aspects of number theory (the spatial aspects) from the processional aspects (the temporal aspects). It also involves differentiating the author from the reader. Having enacted this differentiation, it then becomes possible to explore the gap between space and time by exploring the gap

explicitly invoking the triadic logic of the sign. Henry Somers-Hall, “Heidegger, Ontotheology and the Foundations of Formal Logic” [draft]. Accessed September 28, 2016

https://www.academia.edu/28442778/Heidegger_Ontotheology_and_The_Foundations_of_Formal_Logic .

⁶ “One might say: ontological understanding is rooted in the perception of patterned resonances in the world”, Zwicky, *Wisdom & Metaphor*, 7.

⁷ Bitbol provides a cogent argument for a phenomenological approach to formal logic in which he takes formal logic to be the “doctrine of the object”. He argues that because logic has a reflexive orientation, the connection between logical grammar and reality cannot be described in terms of a correspondence. However, through a phenomenological approach such connection can be *shown*. Bitbol’s argument applies to and situates the approach I take in this paper. Michel Bitbol, “Does Quantum Mechanics Require New Forms of Thought? Towards Formal Epistemology,” in *Quantum Mechanics, Mathematics, Cognition and Action: Proposals for a Formalized Epistemology*, ed. M. Mugur-Schächter and A. Van der Merwe (Vol. 129. Springer Science & Business Media, 2003).

between text and reader. Although the rhetorical style may be off-putting to some, if successful there should be at least the inkling of the spontaneity and immediacy of discovery.

My treatment of the ethical level in this paper is inspired by Levinas⁸. It is intended to be an exploration of identity, difference and return. Through the exploration, *signifyingness* emerges as a collective phenomenon that involves the irreducible interplay of the Same, the Other and the Third Party. The whole is found to be embedded in a system that forms an Umwelt. An Umwelt is an interpreted world that has particular significance for the collective or ensemble. Parts give themselves up to the whole and the whole grants identity to the parts. The systemic process is synchronized through signs that mediate the internalization of exteriority (interpretation) and the exteriorization of interiority (representation).

The emergent formalism—a relational theory of generality—is applied to the concept of “spin” in the theory of relativity.

1.3 Theology (Firstness)

The paper originates in the theological level. It comes as an answer to a question.

In a previous work, I attempted an interpretation of the opening chapters of Genesis using the archetypal duality of I Ching⁹. The focus was on humanity created the image of God:

*So God created man in his own image,
In the image of God created he him;
Male and female created he them.* [Genesis 1.27]

In that attempt I arrived at the corruption of the image in the form of an autonomous Self—man and woman—cut off from the Divine. The question for me was: *How are we to understand the image of God in which we are created?*

In *I and Thou*, Martin Buber¹⁰ opened a way forward. God’s relation to his Creation is asymmetrical. For me as a Christian, this asymmetry is experienced as love, agapé, the Passion of Jesus. In this paper, I try to trace contours of asymmetry as creative origin and eschatological completion. The Alpha and the Omega whose unity is found in the Word of God.

⁸ Emmanuel Levinas, *Otherwise than Being or Beyond Essence*, trans. Alfonso Lingis (Pittsburgh: Duquesne University Press, 2002).

⁹ See *Darkening of the light: a reading of Genesis through archetypes from I Ching*.

¹⁰ Martin Buber, *I and Thou*, trans. Walter Kaufmann (New York: Touchstone, 1970).

2.0 Phenomenology of the discrete, the continuous and the reflexive

In this investigation, “Triadic Logic” is taken to refer to a general formalism that is common to several different philosophical approaches, including those of Augustine¹¹, Hegel¹², Peirce¹³ and Levinas¹⁴. The purpose of Section 2 of the investigation is to articulate some primary formal aspects of triadic logic. This formalism will then be used to explore quantum indeterminacy in Section 3. In addition to articulating *generalized* formal aspects of triadic logic, Section 2 of the investigation will also *use* triadic logic to bring about the articulation. In other words, this section of the investigation is an attempt to both describe and demonstrate “Triadic Logic”.

The following method is used in this section to bring into view or abstract triadic logic.

I begin with the assumption that there is something called “triadic logic” that is a *common referent* for several particular philosophical approaches and that can be *abstracted* from any particular philosophical system.

I then use what I will call the “classical worldview” as a familiar ground *away from which we must move* to approach triadic logic. Within the classical worldview, classical or binary logic becomes the touchstone through which triadic logic can be differentiated as something novel. Throughout the investigation, these two open terms—“classical worldview” and “triadic logic”—inform one another in a process of determination and definition, such that triadic logic is the undercurrent of the worldview formed through classical logic. If all goes well, the classical worldview will lose its totalizing influence and a horizon will appear like a door beyond which triadic logic can be found. This breakthrough will also be a movement of *return* in which triadic logic becomes the fulfilment of, or the depth behind, the surface forms of the classical worldview.

¹¹ Augustine, *Confessions*, trans. H Chadwick (Oxford: Oxford University Press, 2008). Augustine, *The Trinity*, second edition. trans. Edmund Hill, ed. John E. Rotelle (New York: New City Press, 2012). For more on the way in which I am interpreting Augustine, see *Beyond space and time: unity and form in Augustine’s Confessions*.

¹² GWF Hegel, *Phenomenology of Spirit*, trans. AV Miller (Oxford: Oxford University Press, 1977). For more on the way in which I am interpreting Hegel, see *A physicist’s guide to [Hegel’s] Phenomenology of Spirit: resonance, disambiguation and the genesis of spatial orientation* and *A cautionary note regarding Hegel’s approach to absolute knowing*.

¹³ Charles Sanders Peirce, “Evolutionary love,” *Monist* III(1) (1892). Charles Sanders Peirce, “Law of Mind,” *Monist* II (1891). Charles Sanders Peirce, “The Architecture of Theories,” *Monist* I(2) (1891). Charles Sanders Peirce, “A Guess at the Riddle”, (1887-8). Accessed January 10, 2015.

<http://www.iupui.edu/~arisbe/menu/library/bycsp/guess/guess.htm> . For more on the way in which I am interpreting Peirce, see *Light signifying form: Peirce on creativity, responsiveness and emergence in quantum, biological and linguistic systems*. (unpublished, 2015).

¹⁴ Levinas, *Otherwise than Being*. Emmanuel Levinas, *Totality and Infinity: an essay on exteriority*, trans, Alfonso Lingis (Pittsburgh: Duquesne University Press, 1969). For more on the way in which I am interpreting Levinas, see *The Proximity of Light: a deconstruction of space*.

A new concept—the system—emerges as a singular expansion of the (reduced) concept of “class” in the classical worldview. Classes are degenerate forms of systems. Binary logic is the logic of *synchronized classes*. Triadic logic is the logic of *synchronizing systems*. Systems, which are whole and embodied, reduce to classes in the limit of infinite synchronization.

At the completion of Section 2, a generalized symbolic representation of triadic logic will be introduced as the primary formalism for the rest of the investigation. This symbolism will be interpreted as *the forming of light*.

2.1 Asymmetry

2.1.1 Infinity and Nothingness

Before starting the discussion of triadic logic, it is important to set out some essential limitations of the exploration and the way in which I intend to address these limitations.

The whole investigation turns on the question: *What is the relationship between finitude and beyond [the finite]?* Throughout *Otherwise than Being*, Levinas¹⁵ cautions us to be careful about how we think through this question because the second “term” in this relationship cannot be thematized or made into a common noun or in any way imagined as an entity. We cannot simply name what lies beyond finitude as “Infinity” or “the Idea” or “the Universe” or any other name among names. Such naming relativizes and implicitly makes the referent for the second term part of finitude, no longer beyond¹⁶. What needs to be recognized in the question is an asymmetry that is prior to any symmetry or equality. The question is *always* a theological question.

In this investigation we will use a traditional approach¹⁷ [Mark 10.17-18] that involves thematizing the “beyond” in order to correct errors in our (or at least my) current

¹⁵ Levinas, *Otherwise than Being*.

¹⁶ For further exploration of the significance of naming in relation to the beyond, see Emmanuel Levinas, “The name of God according to a few Talmudic texts,” in *Beyond the verse: Talmudic readings and lectures*, trans. Gary D Mole (Bloomington: Indiana University Press, 1994).

¹⁷ The form of this approach comes from combining cataphatic theology (*via positiva*) and apophatic theology (*via negativa*). Cataphatic theology involves positive terminology to describe God according to what He has revealed of Himself; apophatic theology describes God by negation according to what it is believed he is not. For example, in Mark 10.17-18 someone refers to Jesus as Good (*via positiva*) but then, through a form of kenosis or self-emptying, Jesus negates this statement (*via negativa*) by saying “Why callest thou me good? There is none good but one, that is, God.” Through this negation, Jesus defers Goodness beyond his own Self much like the word defers its significance beyond itself. Triadic logic involves a similar process in which thinking moves between exploring positive statements and then exploring their limits through negation. It is important to recognize that the negation here is intended to move the interlocutor towards a higher level of affirmation—it is not the same as the annihilating action of the operator “Not” in binary logic. For a more detailed discussion of this method as applied to the philosophy of logic, see BC Birchell, “Hegel’s Notion of Aufheben,” *Inquiry* 24(1) (1981): 75-102.

understanding while at the same time recognizing that this thematization necessarily incurs different errors that can only be corrected by others. I will use the term “Infinity” to thematize the beyond of finitude. This speaks to an intention to bring mathematics into play in the investigation. Bear in mind, however, that Infinity should not be imagined as an “object” of the intellect; it is verb *moreso* than noun.

There are three aspects that inform the question: finitude, Infinity and relationship. Finitude is the familiar domain of objects or things—whether these be material objects or objects of thought we will leave undetermined for now. From within finitude, Infinity appears like a horizon, a progression *towards* that is never completed. Relationship is the asymmetric connector, which we will represent by the symbol \rightarrow . Finitude flows towards Infinity in an asymmetric movement, like the set or class of Natural numbers $\{1,2,3 \rightarrow\}$.

Because we have thematized the beyond of the finite as “Infinity”, the shadowy Other of Infinity necessarily comes into play as that which gives finitude its name [Genesis 32]. I will use the term “Nothingness” to implicate this duality. Nothingness is negation, a flow *away from*. Nothingness is the *Origin* of finitude.

Nothingness \rightarrow Finitude \rightarrow Infinity

Nothingness, like a reflection in the mirror, is the abstract form of finitude *in-itself*. By this I mean, in relation to Infinity, nothingness and finitude are the *same* [Psalm 144.3-4; 1 Corinthians 13.12].

At this point you are hopefully objecting strongly to what I have written. I began with a question that involves primal asymmetry and, without adequate justification, have arrived at a thematization that places nothingness, finitude and infinity under the same relativizing gaze. To this I can only respond, “*Exactly!*” The thematization betrays Infinity (to use Levinas’ language)¹⁸. But the claim is that this betrayal has already happened¹⁹ and the intention of this investigation is to try to correct some consequences of this error as they relate to the interpretation of modern theories of physics.

The dangerous move that I will try to unpack is to rest on nothingness, equality and finitude as a basis for approaching Infinity. This move subverts the primacy of the asymmetrical relationship between God and creation. The way in which I will approach this task is to focus on how the trace of asymmetrical relatedness informs finitude. This trace can be found in the asymmetries of time, reference and agapé which, in turn, instantiate ontology, epistemology

¹⁸ Levinas, *Otherwise than Being*.

¹⁹ Levinas (*Ibid.*) makes this claim. The basis for my making the claim in the context of this investigation comes from a particular interpretation of the first three chapters of Genesis that is explored in *Darkening of the light: a reading of Genesis through archetypes from I Ching*.

and ethics, respectively. The core insight to which I will continually return is that primal asymmetry is the excluded initiative of binary logic²⁰ [Genesis 3] and therefore a different form of logic—in our case triadic logic—is needed to bring into view this excluded initiative.

I will attempt to recast the linear relationship *nothingness*→*finitude*→*Infinity* as a broken or open circularity. Like Infinity, nothingness is a horizon. But whereas Infinity is a horizon of plenitude or fulfilling, towards which finitude is drawn, nothingness is a horizon of self-emptying and return to the source. The central metaphor of this investigation is that Infinity breaks into the finite through nothingness as a creative origin and then formatively draws created forms back towards itself through a process of return. This investigation is an attempt to turn our gaze away from nothingness *as an object in-itself* and towards the Beyond *as a destination*.

²⁰ For a discussion of the limitations of closed binary systems, see *Darkening of the light: a reading of Genesis through archetypes from I Ching*.

2.1.2 Objects and Signs

The domain of finitude is the world of things. Not surprisingly, in physics we tend to think of things as *physical* objects, although we might also think of them as intellectual objects or “ideas”. Here I will use the term “object” to refer to finite *things* and remain purposefully ambivalent about whether objects are physical or intellectual. The reason for remaining ambiguous is that I want to draw attention to some formal assumptions we tend to make about finite things regardless of the disambiguation and that by examining those assumptions we might discover something important about why there is ambivalence in the first place.

I take the classical worldview²¹ to be the worldview implicit in Newton’s theory of Absolute Space, although it also refers to a particular way of thinking about “the furniture of the universe” that is common in physics, even in the context of non-Newtonian theories. In the classical worldview objects are given entities. An object simply *is* and the questions of classical logic swirl around the nature of the qualifiers that *define* one object as different from another object, as well as the relationships *between* objects. The classical worldview tends not to profoundly problematize the nature of *identity* as that which sets the object apart as an existent, finite entity. There is an assumption in this worldview about the formal nature of unity; namely that unity is like a finite monad²². I will represent this image of finitude by the symbol • . The object presents “all-at-once” under the gaze of an ideal observer; it appears to *rest in-itself* as a self-identical monad. For example, an elementary particle or a fundamental state or a point in spacetime would be increasingly abstract examples of classical objects. The archetypal form of this monad is the form of the number 1 in the class of Natural numbers. But what I want to point out here is that this image already presupposes a quantization that presents the archetypal form as a monad. The number 1 is set apart as in-itself because of the binary logic of the excluded middle which takes each natural number as a distinct entity in-itself. The in-itself of each number is a consequence of the formal lawful structure of Number theory.

²¹ What I mean by the classical worldview is discussed by Steven Rosen, *The Self-Evolving Cosmos: A phenomenological approach to nature’s unity-in-diversity*, Series on Knots and Everything Vol 18 (Hackensack NJ, World Scientific Publishing Company, 2008). Rosen uses the descriptive phrase “object-in-space-before-subject”. The classical worldview can be contrasted with the notion of Umwelt as discussed by John Deely, *Purely Objective Reality*, Semiotics, communication and cognition Vol 4 (New York: De Gruyter Mouton, 2009].

²² Recently Vassallo and Esfeld have investigated the ontology of monadic relationalism in the context of general relativity. Their monadic relationalism (which they call Leibnizian relationalism) is the form to which triadic logic reduces in the limit of “infinite synchronization”. This singular limit reduces the ontology to a classical worldview (namely, Newton’s Absolute Space of differential geometry) and in so doing obscures the quantum indeterminacy of systems that are synchronized by light in space and time. It is precisely this singular limit that I am trying to open up in this investigation by moving from an ontology of *space* to an ontology of *light*. Antonio Vassallo and Michael Esfeld. “Leibnizian Relationalism for General Relativistic Physics” (preprint, 2016). Accessed September 10, 2016. https://www.academia.edu/28019019/Leibnizian_relationalism_for_general_relativistic_physics .

Actually, the finite monadic form does not rest in-itself. An object exists in relation to other objects and this relatedness is what gives the object its self-identical form²³. In the case of Natural numbers, the lawful structure of number theory implicates a relationship between any given number and other numbers in the class. This relatedness emphasizes primal asymmetry as part of the finite monadic form—through an essential relatedness a particular member of the class is connected to other members of the class and to the whole class. Godel’s demonstration of the incompleteness of number theory²⁴, for example, brings into view the asymmetry in this essential relationality. Finitude always references or points beyond itself as illustrated in Figure 1.



Figure 1: Relationality of the Finite Monadic Form

The finite monadic form exists by virtue of a formal system in which it is embedded, such as number theory. If we think of the numerical unit as in-itself, then the asymmetry is hidden from view. However, as Godel demonstrated, the asymmetry can be brought to the fore by recognizing that the numerical unit can also be a signifier of something else, such as a true theorem.

Augustine²⁵ gives us a way to speak of this formal asymmetry that is constitutional for physical as well as intellectual objects. *All objects are signs*²⁶. A sign exists in-itself-for-another²⁷. Relationality enters into the essence of objects as signs—the finite object overflows itself towards another²⁸. This relationality—*for-another*—is a dynamic that is prior to or embedded within the static image of finitude *in-itself*. Space and time are inextricably interwoven through the sign.

²³ An interesting exploration of relational aspects of monadic forms in the context of music can be found in Victor Zuckerkandl, *Sound and Symbol: Music and the external world* (New York: Princeton University Press, 1973). This exploration provides a helpful “ontological” view of the relational nature of quantization.

²⁴ Two particularly accessible discussions of the relational, reflexive form of Godel’s approach are: Douglas Hofstadter, *Godel, Escher, Bach: an eternal golden braid* (New York: Vintage Books, 1980). And Rebecca Goldstein, *Incompleteness: The proof and paradox of Kurt Godel* (New York: WW Norton & Company, 2005).

²⁵ Augustine, *Trinity*.

²⁶ Peirce as interpreted in *Light signifying form: Peirce on creativity, responsiveness and emergence in quantum, biological and linguistic systems*.

²⁷ Hegel, *Phenomenology of Spirit*

²⁸ Levinas, *Otherwise than Being*.

Yet there is something quite misleading about the way I have represented the sign because the essential relationality of signs is *not a duality*. If we were to think of signs in terms of the dual relationship of signifier-signified, for example, we would return to classical logic and its objective worldview. We would have the signifier *in-itself* and the signified *in-itself* and the relationship of pointing from one realm (the realm of signifiers or the embodied world) to the other (the realm of signifieds or the intellectual world). What becomes excluded in this picture is the mediating act of pointing or referencing that establishes relationality between the two realms in the first place.

With triadic logic, the essence of the sign is *the potential to point*, that is to say the essence of the sign is primal asymmetry \rightarrow . And the movement of this investigation is to turn away from the in-itself of the finite monadic form \bullet towards the asymmetric pointing of relationality \rightarrow , only to find ourselves returning back to finitude. However, we return with a new image of the form of unity. Namely, unity mediates a relationship between interiority and exteriority such that things in the world have *significance* for other things in the world. The significance is mediated by the exchange of in-formation which is a process of externalization of interiority and internalization of exteriority.

In the context of modern physics the image of unity plays itself out such that space is the architecture of exteriority, time is the process of interiority and light creatively mediates their relationality. Our movement of thinking in this investigation from objects to signs as the subject of physics can be traced in the movement of mathematical thinking that happens in the transition from the theory of Natural numbers to the theory of Complex numbers as illustrated in Figure 2 and explored throughout the rest of Section 2.

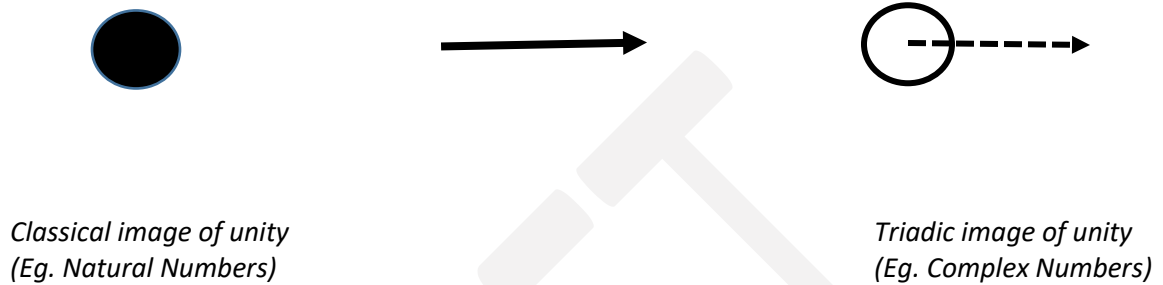


Figure 2: Movement from Object (in-itself) to Sign (in-itself-for-another)

*The object in-itself has identity by virtue of a formal system in which it is embedded (for example, the unit in number theory). When considering the object in-itself, the formal system (in our example, the theory of Natural numbers) plays the role of an Absolute background of determination. This background can be interrogated by focusing on the relationality that connects objects in the formal system. The finite thing that was formerly totalized under our gaze as an object in-itself is seen to be a sign within the system that has the **potential to reference beyond**. The potential to reference beyond is the essence of the Limit that underwrites the theory of the continuum for Real numbers but in this theory the identity of the unit becomes ambivalent because proximate numbers blur into each other. In the theory of Complex numbers, the finite unit is an infinitely repetitive circular encompassing of the origin of the complex plane (like a collapsed helix); its interior reflects the exterior plane; and the origin of the complex plane is asymmetrically connected to the Infinite horizon through a branch cut.*

2.1.3 Being and Categories

The classical worldview might be described as an “externalized” worldview, where externalization is often synonymous with objectivity²⁹. Things, as objects, exist simultaneously in a container that is called Absolute space and objects are perfectly synchronized at each point in Absolute time. Euclidean geometry is the archetypal form for the spatial container in the classical theory of Newtonian mechanics, to which time can be added as a fourth (externalized) dimension to create a four-dimensional spacetime manifold³⁰. The Euclidean form of spacetime embeds what physicists call a “block universe” as a totality that is background dependent where the background is the four dimensional spacetime manifold.

This background is a totalizing structure of lawful regularity that completely determines the past, present and future, without rupture or surprise or freedom. If we were to speak of the *being* of objects in this worldview, we would say that it is pre-structured by space and time. However, when we say this, we don’t mean “time” in the sense of our experience of time as an asymmetric movement from the past towards future, we mean time as *space*. Since Euclidean space is perfect synchronicity or timelessness, we are left to conclude that time—as the asymmetric *passing* of time—does not exist in the classical worldview. Similar forms of reasoning are often carried over to modern physics. Namely, there is a unifying category to all being and that is space; time is just an example or manifestation of space³¹. (For the rest of the investigation, the term *space* refers to any spacetime manifold in which time is interpreted as merely a fourth spatialized dimension.)

If we were to think differently (and thinking differently is the goal of this exploration), we might ask: *To what is space external* [Genesis 3.8-10]? That is we might ask about what lies beyond space as a category of finitude. If we are working under the assumption that *all is space* then even posing this question becomes challenging. To take on this challenge, we will use a type thinking, common in Eastern philosophy³² and popularized in the West by Hegel, that is *dialectical*. Dialectical thinking—a form of triadic logic—involves the recognition that whenever

²⁹ Deely, *Purely Objective Reality*.

³⁰ I have explored the classical form of Newtonian space and time in greater depth in *The proximity of light: a deconstruction of space*.

³¹ Julian Barbour, *The End of Time: The next revolution in our understanding of the universe* (New York: Oxford University Press, 1999), exemplifies the approach in physics that continues to privilege space over time. Lee Smolin, *Time Reborn: From the crisis in physics to the future of the universe* (New York: Houghton Mifflin Harcourt, 2013), claims that the elimination of time in modern theoretical physics has led to an impasse to advancement in the field and argues that time is fundamental for theoretical physics, particularly in cosmology. Rosen, *The Self-Evolving Cosmos*, provides a clear and approachable critique of the classical assumption of “object-in-space-before-subject” that permeates modern physics. For further investigation of space as a category, see Rogers, “Beyond Space and Time” and “Light Signifying Form”.

³² For example: “The Great Treatise”, in *I Ching*, trans. Richard Wilhelm, rendered into English Cary Baynes (Princeton: Princeton University Press, 1990).

we place Being or Totality under a single category, an Other to that category will manifest as something that frustrates or *opposes* the generalization. Our application of the method of triadic logic in this investigation involves repeatedly tracing this opposition within the classical worldview in order to find the still point around which the duality revolves. Since the Other cannot enter into the worldview directly (it is the excluded initiative of the worldview, namely time), the opposition can only be abstracted as something definable by relinquishing the privileged pole of the duality—namely space—and refocusing on the mediating still point around which the dialectic turns—namely light. This shifting in perspective is an example of what Hegel calls *Aufheben*³³. It is a movement beyond the classical worldview or a transcendental “lifting up” out of the totalizing system of Absolute space in which the classical worldview is embedded [Romans 12.2]. From the new perspective, space and time become relativized under a unifying Presence (such a Presence was impossible within the Totalizing system). In a nutshell, from this new perspective: space is exteriority and it is the formal cause of bodies (an example of a formal cause is symmetry); time is interiority and it is the effective cause of bodies (an example of an effective cause is action-reaction); light is the process through which bodies are creatively formed and brought into relationship.

At the risk of oversimplification, the classical worldview might be represented by Figure 3 below.

³³ Birchall, “Hegel’s Notion of *Aufheben*”.

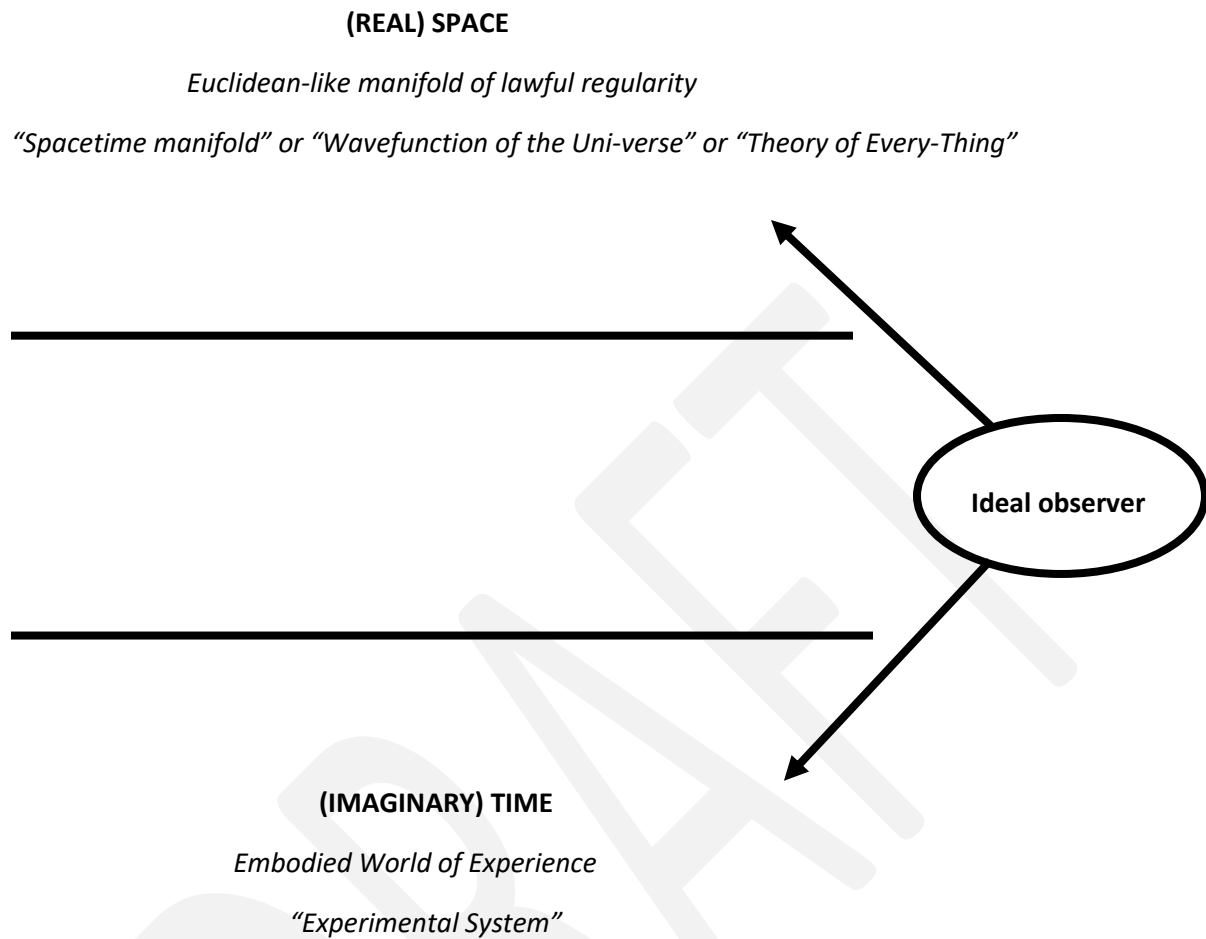


Figure 3: Classical Worldview

In the classical worldview, space is Absolute and defines or determines what is Real. The Ideal observer is a transcendental vantage that is both spatial and non-spatial. The embodied world of experience is what is determined by the Real. The experience of temporality as the passing of time is considered an illusion.

The Ideal Observer mediates between the embodied world of experimentation and the intellectual world of Absolute (to be renamed Real) Space or *Principia Mathematica*. The classical worldview imposes three assumptions that I hope to trouble in this investigation:

1. Space is Absolute so that the lawful regularity completely determines the embodied world of experience. This results in a univocal correspondence between “objects” of the theory and “objects” in the embodied world.
2. The Ideal Observer is a null point of mutual exclusion between the embodied world of experience and the lawful regularity of Space. This is the Cartesian duality of mind and body.
3. Nothingness—the excluded middle—is eternal absence. Imaginary time is the same as real space.

Peirce³⁴ provides us with a way to reframe this picture in order to avoid the totalizing assumption of Absolute space. This reframing provides a meta-physical model of triadic formalism that we will use throughout the investigation. Elsewhere I have discussed how this framework might be applied to physics³⁵. Here I want to provide a crude narrative of how we might think of this model as a singular expansion of the classical worldview.

In the classical worldview there is only one category—Real space. Real space is the lawful basis for abstracting finite objects into distinct members of generalized classes. It is the purveyor of identity (and difference). With Peirce, this category of “laws” becomes *Thirdness* which is one of three interwoven categories. Thirdness is the category of generalization. It involves the mediation of lawful regularity in relatedness. However, with Peirce laws are not absolute, they are formed through a process of repetition or habit. Laws have a specific significance or impact upon the bodies that form them.

In the classical worldview, Real space obeys the binary logic of the law of the excluded middle. The Ideal observer is a transcendental vantage on Real space that mediates between the Absolute of space and the experience of time. In some sense the Ideal observer violates the law of the excluded middle because s/he is both Spatial and temporal (non-spatial), General and particular, Absolute and relative, External and internal, Physical and intellectual. With Peirce the Ideal observer becomes a community of interpreters. Interpreters are embodied entities that collectively re-present aspects of their environment as internal forms or *in-formation*. A community of interpreters can exchange information through signs.

A sign is an entity that stands for an object to which a response can be made by an interpreter. The semiotic process of information exchange is the creative process through which a community of interpreters continually formulate their objective worldview where the “objects”

³⁴ This section is based on an interpretation of Peirce that is developed in *Light signifying form: Peirce on creativity, responsiveness and emergence in quantum, biological and linguistic systems*.

³⁵Ibid.

of this worldview come from internal re-presentations that have pragmatic significance for the interpreters. Interpreters might be a community of humans, or amoebas, or electrons. Interpreters are always embodied in their world. This embodiment or brute actuality of existence is called *Secondness*. Secondness is the basis of relationality.

The ability of interpreters to be both present to their external world (Secondness) and re-present that world internally (Thirdness) hinges on a paradox or ambiguity—the excluded middle of binary logic. The sign both is and is not itself. The sign is *in-itself-for-another* where, as Levinas emphasizes³⁶, this “for-another” (→) is a process of proximity and substitution that is also self-emptying. There is a circularity to this paradox because the “in-itself” of the sign comes from the “for-another” of other signs but then is given up, in turn, “for-another”. The nature of this circular paradox is like the nature of infinite self-referencing, as encountered for example in Godel’s incompleteness theorems³⁷.

If we stay within the confines of binary logic we must stop now because we have encountered a contradiction. Triadic logic, however, provides a way forward. Here is how it works. *Don’t try to dominate this paradox through your own understanding because it cannot be understood.* Instead, whenever we encounter this paradox of Infinite self-referencing we will take it as an encounter with the beyond or Infinity³⁸. What we have encountered is a *limit* and we will call this limit an Origin. The category of origins is called *Firstness* by Peirce. Firstness is potentiality, immediacy, spontaneity, freedom, that which exists without reference to anything else.

One of the challenges in moving from the classical worldview to this new metaphysical perspective of triadic logic is that we have to think through the nature of limitation. Limits are essential to finitude. But if we think of a limit as an Absolute barrier then we lose touch with the Beyond of finitude and we risk becoming embedded in a Totalizing system that is the empty reflection of the nothingness that finitude is *in-itself* [Psalm 115:4-8]. In triadic logic a limit is where Infinity overflows itself towards another and the limit must be included as part of the logic. Of course, taken at face value this seems absurd. But perhaps it seems absurd because we think of logic as *binary* logic and therefore as a synchronized, totalized structure of relationality that cannot tolerate the ambiguity of the excluded middle? Triadic logic, on the other hand, is a progressive evolutionary process of learning—it is about the *narrative of thinking*. The limit in triadic logic is like a transcendental moment of *Aufheben* in which a new *particular* pattern or thought is recognized as potentially iconic for a new *general* pattern or idea. The limit enables the *potential for generalization*.

³⁶ Levinas, *Otherwise than Being*.

³⁷ Hofstadter, *Godel, Escher, Bach*. And Goldstein, *Incompleteness*.

³⁸ Actually it will be taken as the trace of such an encounter. This trace points to but is different from Biblical accounts of encountering Firstness [Exodus 3; Matthew 14.22-33; John 19.30].

12. The embodiment of space and time

Returning to Figure 2 and our example of number theory, we might begin to see that this figure also describes a movement in the way limits are portrayed. In the theory of Natural numbers, the limit is *excluded* from the theory—the discreteness of Natural numbers is an Absolute given. In the theory of Real numbers the limit is *approached* as an external horizon that is contained through the use of infinite summations but is never reached—the continuum. The limit *becomes included* in the theory of Complex numbers as a movement of Aufheben that unifies the discrete and the continuous through cycles of return. In the theory of Complex numbers the limit is *ex-cluded* through the discrete numbering of cycles of return (temporality) and it is *in-cluded* through the reflection or mapping between exterior and interior representational forms (spatiality).

I have tried to provide a heuristic narrative to move our thinking from the classical worldview to the metaphysical model of Peirce's three categories. Figure 4 below is a representation of this model and I think the value of this representation comes from comparing it with the picture of the classical worldview in Figure 3 above.

THIRDNESS

Generality: Laws, Symmetries, Mediation

(Formerly called **Real space** and includes the “Ideal” of the observer)

FIRSTNESS

Potentiality: Indeterminacy, Choice, Originality

(**Excluded initiative** of the classical worldview)

SECONDNESS

Actuality: Embodiment, Event, Effect, Force

(Formally called **Imaginary time** and includes the experience of the observer)

Figure 4: Peirce’s Three Categories

In the metaphysical model of Peirce’s three categories, Firstness is “that whose being is simply in itself, not referring to anything nor lying behind anything”. Secondness is “that which is by force of something to which it is second”. Thirdness is “that which is what it is owing to things between which it mediates and which it brings into relation to each other”³⁹.

³⁹ Peirce, “A Guess at the Riddle”.

12. The embodiment of space and time

Although I have represented the three categories graphically as something spatial and accessible to our totalizing gaze, they are actually inter-related in a more primal, non-spatial way. There is a unity that weaves them together such that each category can only be identified by virtue of its relationship to the others⁴⁰. This is another manifestation of the paradox that we are simply going to call a limit. That the categories can be differentiated as three and yet remain united is a mystery that lies beyond the model itself. Of course this means that the model is limited too. Using the language of Levinas, Infinity overflows itself into the finitude of the model but the model as a model necessarily betrays the Infinite. Despite the limitation, in this investigation I hope to explore what this model might tell us about Finitude.

To that end, let's consider a particular representational form of inter-relatedness for the three categories, namely the light cone of the Special Theory of Relativity⁴¹. I will call this representation *the Present Moment*.

⁴⁰ In this sense the model might be said to explore “traces of Trinity” in creation as discussed by Augustine.

⁴¹ The form of the light cone is explored in further detail in *The proximity of light: a deconstruction of space*.

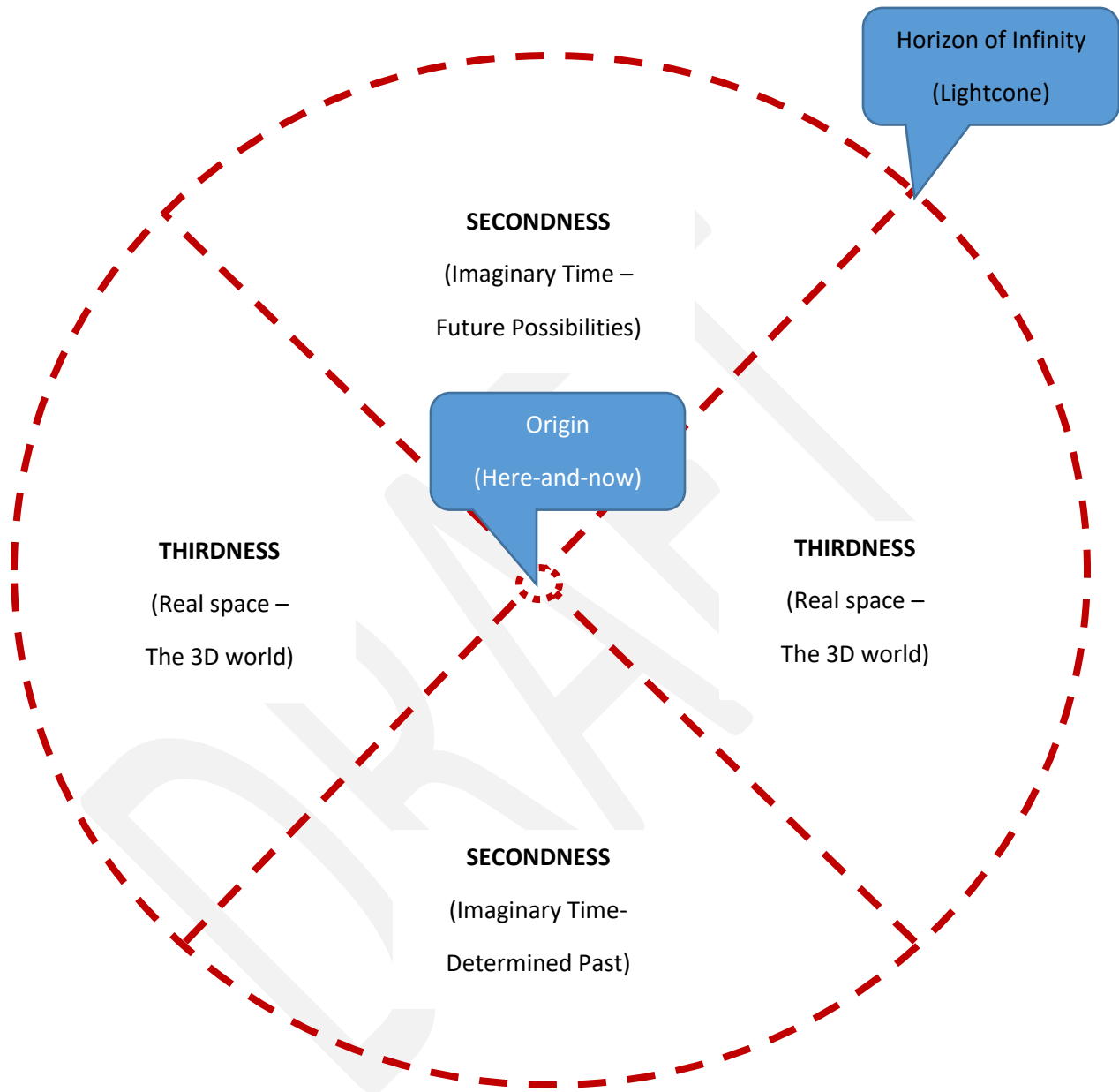


Figure 5: The Present Moment--Peirce's Three Categories Represented by the Light Cone

Thirdness is the continuum of three-dimensional space. Secondness is time that is asymmetrically divided into past and future by the embodied here-and-now. The dashed lines represent the lightcone that connects the origin of the frame of reference to the Infinite horizon. Light is Firstness. Light internalizes the (externalized) past into the here-and-now and then externalizes the here-and-now into the future. This action-reaction involves indeterminacy, spontaneity, choice.

Now I can state the original claim of this investigation: The Present Moment is the essence of the *particular*; Relativity Theory is a theory of *generalization*; and Light is the *creative source* for Finitude.

2.2 Generalization

2.2.1 Increase and the Form of Determinacy

Recall that in this investigation we are trying to think differently about nothingness, finitude and Infinity and by differently we mean differently than classical logic. The archetypal form we are using for classical logic is the theory of Natural numbers. In the classical worldview, we used the iconic image • to represent the finite monadic form, the number one, the *unit*. We then looked at how Infinity is represented in the theory of Natural Numbers. We identified a fundamental asymmetry or horizon in that representation of the Infinite → that we recognized also belongs to the unit by virtue of its embeddedness in a lawful structure.

But what about nothingness?

In the classical worldview the form of nothingness is absence. It is the operator *zero* of number theory. We come to an understanding of zero through a process of negation that involves subtracting units until *no thing* remains. But this absence should not be thought of as another thing. It is more like the expectation of something that isn't there, an expectation that only has significance because things were present before⁴². This “expectation” is a formal consequence of the lawful structure of number theory and zero is *the potential for something to be present that is not actually present*. I will call it the Origin of Natural Numbers. Zero, like Infinity, is an asymmetric movement. However, whereas Infinity is a movement towards, zero is a movement away.

If we say that zero is the potential for there to be something that is not present, the “something” is pre-structured by the generalizing system (eg the theory of Natural numbers) and zero involves a movement from potential to actual. Unlike all of the other Natural Numbers, zero is not fully generalized within the formal structure of number theory—it is not completely *defined* by the theory. Zero is a number in some ways (for example, it can be added to or subtracted from another number), but in other ways it is not a number (for example, another number cannot be divided by zero). We might say it both is and is not a number. It is this ambiguous identity that forces us to pay attention to the *context* in which zero is used in order to avoid formal errors in the theory⁴³.

⁴² For a more complete discussion of negation, see Rogers, “Beyond Space and Time”.

⁴³ In this exploration, I will take the Natural number one as the postulated unit-in-itself that forms the basis for the inductive definition of successive numbers. Some formal treatments of Natural numbers start from 0 or the empty

Zero is absence. Zero is also the form of *proximity* or relationship of nearest neighbours in the classical worldview—the between of two contiguous things. The boundary between two contiguous things is an absence of things, nothing, zero. The Excluded Middle. If we apply this description of relationship to Natural numbers, we might say that between any two consecutive Natural numbers, there is no number and this absence of number we might also call zero.

Suppose we dig deeper into the nature of this relationality. The sequence of Natural numbers is {1,2,3, ...}. Between any two numbers, say the numbers 1 and 2, there is an absence of numbers. It is important to recognize that this absence is an asymmetry. The way we traditionally understand this asymmetry is that we say any number in the sequence can become the Origin for the next number in the sequence. This process of induction is part of the definition of Natural numbers and is called the “unary representation”⁴⁴. It involves the postulate of the self-identical unit, the number one. Subsequent numbers are then defined iteratively and recursively through the process of adding the unit to the last number defined. This method of induction is irreversible in the sense that it moves successively forward in an ordered way towards infinity. The relationship of proximity between successive numbers has the form of *increase*. For Natural numbers, this *increase* is called addition. Zero—the potential for something to be present that is not actually present—is the origin of addition.

But zero is also the operator that defines equality because when the difference between any two numbers is zero, they are the same number.

Surely you are objecting now that the way I am thinking is absurd. Am I not just playing loosely with a contradiction? First I say zero is inequality between two things; then I say zero is equality between two things. How can both be true **at once**? To this objection I can only respond, “*Exactly!*” Zero is *ambiguous*. And what I really want to draw your attention to is the formal structure of ambiguity.

set, rather than 1. In triadic logic, it is problematic to attempt to “start” with a sign that points to nothingness because nothingness is the absence of unity.

⁴⁴ This discussion of the formal structure of Natural numbers is based on the Peano axioms. The Peano axioms involve the unary representation and the equality relation.

- The unary representation is the inductive process that starts with the givenness of 1 and then defines successive Natural numbers through a recursive function or process of induction. The successor function maintains the *distinctness* of the numbers. The unary representation is formally similar to the notion of temporality in that it establishes particular difference between successive instances in the sequence.
- The equality relation is formally similar to spatiality in that it establishes sameness. Equality is self-identical ($x=x$) and equality is symmetric (if $x=y$, then $y=x$); equality is also transitive and closed. The equality relation forms the “logic” or grammar of the generalizing system.

For further discussion of the formal structure of Natural numbers, see “Peano Axioms” in *Wikipedia*. Accessed September 10, 2016. https://en.wikipedia.org/wiki/Peano_axioms.

The formal definition of Natural numbers begins with the postulation of the discrete unit as a self-identical form. Consecutive numbers are defined inductively by adding the unit to the last previously defined number. For example: 2 is 1 added to itself; 3 is 1 added to 2; 4 is 1 added to 3; and so on. The formal definition of Natural numbers is progressive, asymmetrically moving from the unit towards infinity. The formalism, in some sense, “pushes us” from one number to the next in the sequence. I will call this inductive pushing *temporality*. The formalism of number theory enables and structures temporality and temporality is *increase*.

The postulate or *givenness* of the self-identical unit is the basis for a theory of Natural numbers—this givenness *grounds* the inductive process of defining Natural numbers. But this unit is not true unity or Oneness. It is only an image of unity. We can see that it is only an image by looking at the starting definition of addition. Two is the unit *added to itself*. In the definition of two, the unit is co-present with itself and therefore not one. Two involves self-reflection of the unit. Zero, as equality, provides the basis for this self-reflection. $1=1$ and the difference between 1 and 1 is zero. Equality establishes the logical framework of a formal theory of Natural numbers as a synchronized structure that can be explored generally—the formalism of Natural numbers is a theory of equality. The synchronized logic of equalities can be taken as a form of *spatiality*, where spatiality is co-presence or synchronicity. The overall (synchronized) structure of equalities I will call the *grammar* of Number theory.

We have considered Natural numbers from the perspective of temporality—as a linear progression—and from the perspective of spatiality—as co-present equalities. Zero was the turning point around which these two perspectives revolve. Now let’s look more carefully at this still point. The defining moment of number theory is $1+1=2$. What I want to show is that there is an implicit triadic logic in this moment. When looked at as a temporal progression forward, equality actually involves an operation of differentiation—two is *different* from one. Addition is the action that contains this difference and brings it into finitude. However if we look backward on this progression, $2=1+1$, we discover that equality is also based on a pre-determined sameness of the unit with itself. The determination of sameness comes into view in this backward glance, much like the past is determined for the present moment.

What we are trying to do here is to *de-synchronize* the formalism of number theory (that is to say, we are trying to break through the totalizing system). When we make this attempt, we discover that zero includes an asymmetric relationship between a determined past and future yet to be determined (through the iterative, inductive process of addition). This relationship might be called “causal” because each number in the sequence *causes* the next number in the sequence through an asymmetric dependency. Zero also includes a symmetric relationship in the past that is a consequence of co-presence, where co-presence is the result of the determination. Co-presence is the basis for generalization because it allows for the creation of a *generalized* structure of lawful relatedness. Finally, zero is the ambiguous indeterminate. It is the origin of the asymmetry of temporal progression (causality), the origin of the symmetry of spatial structure (generality) and it relates asymmetry and symmetry *by turning back on itself*. This is the essence of triadic logic. It is the kind of logic Godel used to prove the incompleteness

of Number theory⁴⁵. And the novel aspect, the part that is excluded in the traditional treatment of number theory, is the mysterious way in which the system can be seen to turn back on itself through a process of return.

In our thinking about zero, we identified three movements: asymmetric increase, symmetric equalization and return. Yet the context for each movement was different. By existing both inside and outside of the generalizing system, zero is able to relate different contexts that are not otherwise related through the fixed relational structures of the general formalism. Our thinking about zero offers us the potential for a new form of relationality. I will call this form the Limit. The Limit unites the three movements described above as shown in Figure 6.

⁴⁵ Hofstadter, *Godel, Escher, Bach*. And Goldstein, *Incompleteness*.

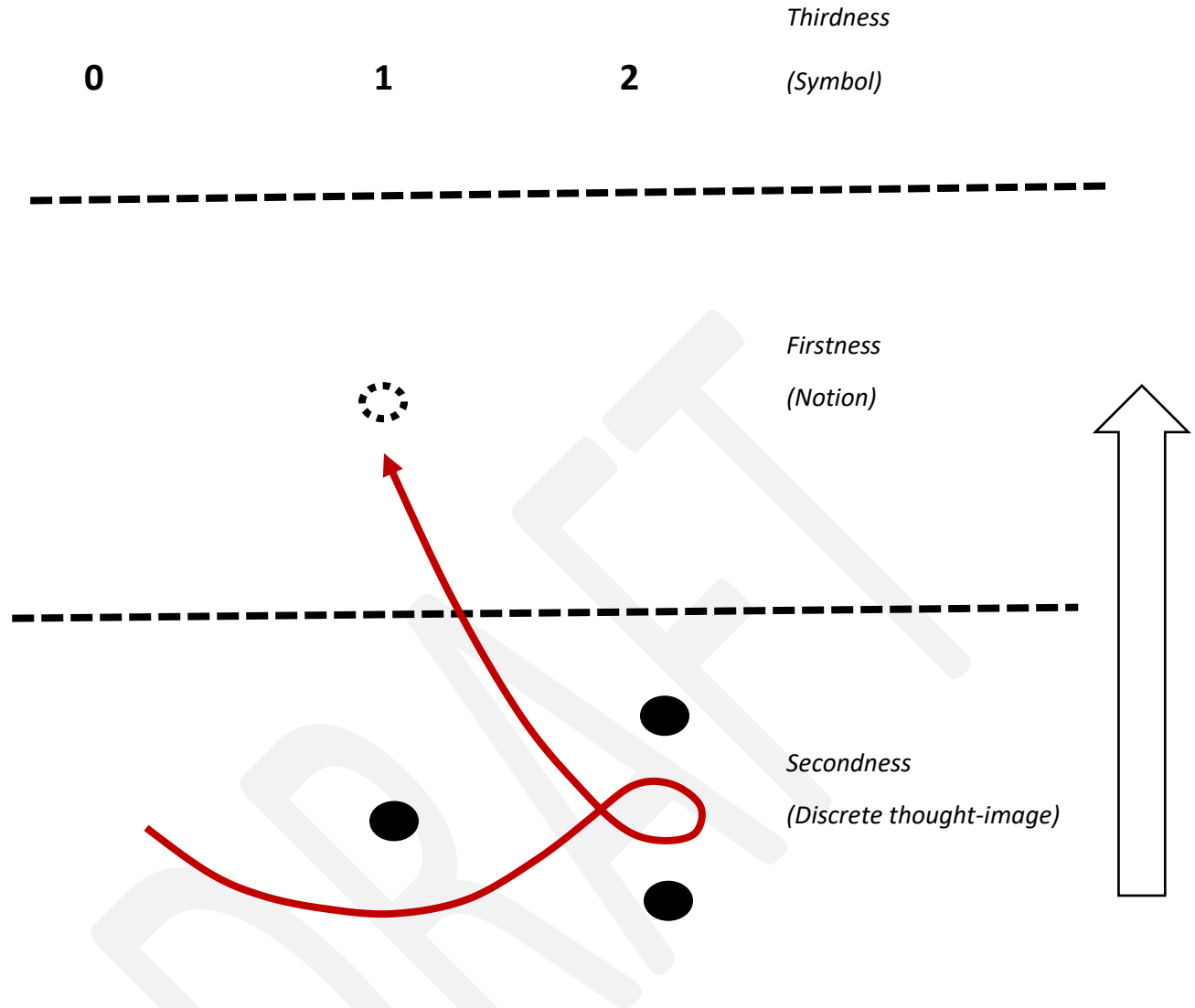


Figure 6: The Limit as a Triadic Form

The Limit is the form of finitude for the unit in the theory of Natural numbers. This limit can be traced in the definition $1+1=2$. At the level of iconic representation (Secondness), there is an asymmetric forward movement from 0 through 1 towards 2. The iconic representation of 2 involves repetition or self-reflection of the unit. Looking backward from 2 to 1, the bifurcation opens up a thetic break whereby the unit is not oneness in-itself because it has been repeated. The former image of the unit, •, becomes an iconic representation of something that can now be abstracted from the particular context of $1+1=2$. This abstracted entity is the “Notion” of Unity (Firstness). The notion of a number can be represented by an arbitrary symbol whose significance comes from the generalized system of numbers as a whole (Thirdness). Thus the Limit is the triadic form of pointing at “something” that can be abstracted from many particular contexts into a generalizing determinate. It is neither spatial (within a completely synchronized structure of generality) nor temporal (wholly dependent on context) or, perhaps, both spatial and temporal.

The Limit opens up for us three levels of thinking about unity that are distinguishable yet interwoven. At the upper level (Thirdness) there is the sign or symbol 1 which is the sign that we are intending to interpret as signifying unity. In our exploration of Natural numbers, this sign is the unifying Origin for a thought-image about unity. When we explore the formal structure of the theory of Natural numbers, we create for ourselves a “thought-image” of 1. This thought-image comes from our encounter with the sign “1” as we explore the theory of Natural numbers, both the temporal aspects of induction and the spatial aspects of logical grammar (deduction). In binary logic, the story ends here – there is the symbol of the Natural number one and the thought-image it signifies, where the thought-image is an *object* that terminates in itself. But the challenge with binary logic is that the thought-image is never completed because the formal structure through which it is contained is infinite. So an assumption must be made in order to proceed; namely, it must be assumed that the theory of Natural numbers describes a perfectly synchronized logical structure of objects-in-themselves. As we will see throughout this exploration, such an assumption implicitly contains Infinity (and its shadow image zero), such that Infinity is bounded by the lawful structure of the theory. A bounded infinity is no longer beyond, no longer Infinity; rather it is a thought-image that becomes a sign of Infinity.

Triadic logic involves the recognition that the “thought-image” of 1 that comes from exploring the theory of Natural numbers *can also be taken as a sign*. We have been using the symbol • to represent this sign. The thought-image of 1 in the theory of Natural numbers is the image of a discrete, *quantized* unit. It comes from the actual encounter with the symbol 1 in the process of thinking about Natural numbers (Secondness). Let’s take this thought-image as a sign of Unity. That is to say, this thought-image refers to or points to something else and that something else we will call the notion of Unity or Firstness. The thought-image • is an iconic sign of Firstness which means that it bears a likeness to the notion of Unity. This likeness is the *givenness* of Firstness. But the thought-image is also unlike Firstness in that it is discrete and bounded by the lawful structure of the theory of Natural numbers.

Triadic logic involves a movement in the *depth* of thought-images. Depth comes from the realization that the symbols that are manipulated in the lawful structure of a theory (Thirdness) create internal images or *interpretants* (in our case the interpretants are mental images or thought-images) such that a given interpretant can then be taken as a sign for another interpretant. The first level interpretant is bounded by the lawful structure of the theory. However, the second level interpretant can potentially transcend the lawful structure of the theory insofar as it can be brought into a different and potentially more generalizing structure of lawful regularity (abduction). In our exploration, depth will be explored by moving from the thought-image of 1 of that comes from the theory of Natural numbers (the discrete or quantized unit), to the thought-image of 1 that comes from the more expansive generalizing system of Real numbers (the “point number” one in the theory of the Real number line or continuum), to the thought-image of a unifying system that comes from Complex numbers. This

exploration of depth is fashioned according to Augustine's reflection that the symbol (or name) draws the image to the notion⁴⁶.

2.2.2 Limitation and the Form of Inertia

By focusing our attention on the unit in the class of Natural numbers we identified the Limit of (numerical) finitude as an asymmetric movement forward followed by a reversal backward into a symmetric reflection in which the re-presented image signifies beyond itself. This movement brought us to the triadic logic of the sign—the Limit is an iconic instance of the more general form of the sign. And what I want to say is: *Through limitation objects are formed as signs* [Luke 10:22].

The narrative of our thinking in the previous section was cast in a particular way in order to prepare for another cycle of increase: from zero to limit to whole. Let's recap that narrative. In the classical worldview, the formalism of Natural numbers is considered a perfectly synchronized structure, a totalized system, such as described or contained by the Peano axioms. We attempted to embed ourselves within this structure by differentiating two types of thinking implicit in the structure. *Inductive* thinking, or the forward law of increase, was presented as a "causal" process in which any given number in the sequence of Natural numbers is the effect of its predecessor and the cause of its successor. This process is an asymmetric increase from 1 to infinity. We differentiated this asymmetry of nearest neighbour relationality from the generalizing structure of equalities through which the true theorems of number theory can be represented and proven. The latter was presented as a "grammar" that determines true sign relations *deductively*. Causal processes were called *temporal* (eg. $0 \rightarrow 1 \rightarrow 2$) and grammatical structures were called *spatial* (eg. $1 = 1$). The process and the structure were brought together in a moment of Return. This moment involved a reversal which bifurcated the movement of our thinking:

- equalities kept us within the system or grammar of number theory, while
- asymmetric reference drew our attention to the fact that number theory is a system of symbols that reference something other than themselves.

These two movements, like a harmonic dyad, operate resonantly. The bifurcation was always with us, even before we became aware of it. The Limit was the sign-making process through which this bifurcation was externalized for us.

⁴⁶ For a discussion of Augustine's reflection on names, see *Beyond space and time: unity and form in Augustine's Confessions*.

Now let's explore the limiting process itself. We will do this by abstracting the Limit in order to represent it iconically in a new context and begin to bring it into a generalizing system⁴⁷. Figure 7 illustrates our working image of the Limit as an abstraction from Figure 6.

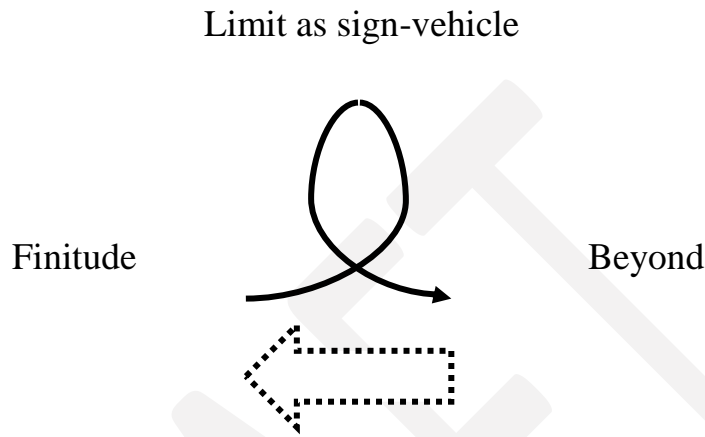


Figure 7: Abstracted Limit

The Limit stands for the relationship between Finitude and Beyond. It is an asymmetric relationship. From Beyond to Finitude is a direct relation that is the creative source of Finitude. The forward relationship from Finitude to Beyond, however, involves a process of reversal or self-reflection, such that finite objects become signs.

Successive repetitions of the limit create a continuous movement that I will take to be an iconic form of temporality. Through this creative movement future possibilities become past determinations as illustrated in Figure 8.

⁴⁷ For a more complete discussion of the formal aspects of the sign that are presented here, see *Light signifying form: Peirce on creativity, responsiveness and emergence in quantum, biological and linguistic systems*.

12. The embodiment of space and time

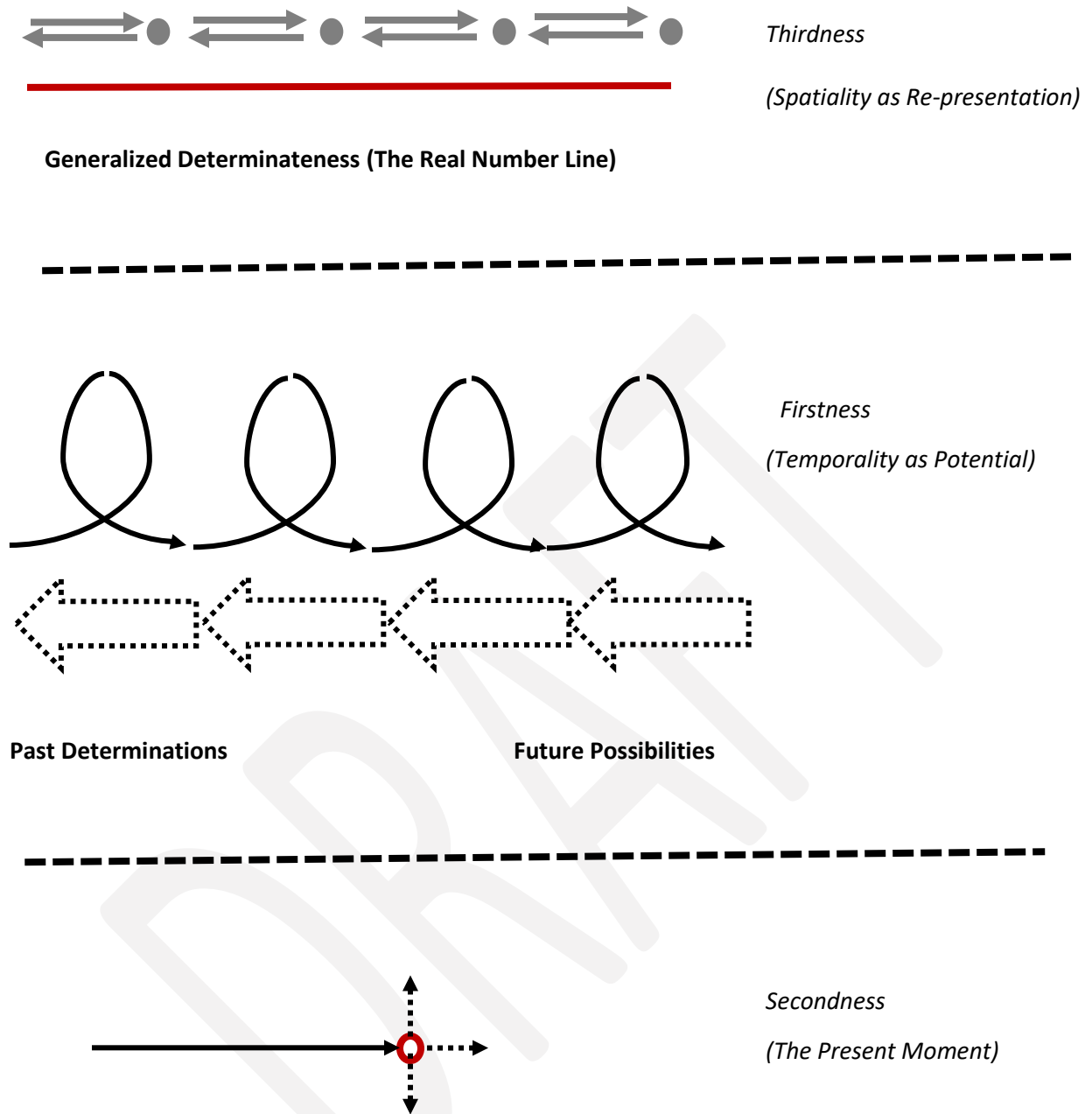


Figure 8: The Form of the Continuum of Real Numbers

The upper level (Thirdness) represents the Real Number line as a generalized system of equalities between neighbouring points on a line where each point continuously merges with the previous and next points to form a one-dimensional continuum (in Red). The middle level (Firstness) represents the repetition of the iconic limit as potentiality. This potentiality is determined in the upper level as the Real Number line. The lower level (Secondness) represents the drawing of a line as a temporal process. Here the past is determined, the present moment is opened to an indeterminate choice which selects a future from specific possibilities that are contingent on the past determinations.

To understand what I am trying to represent through Figure 8, we need to move our perspective from an external observation of a continuous line as a synchronized object that is totally present under our gaze, to the act of drawing a continuous line. As we draw a line, we are moving from past determination (the part of the line that has already been drawn) into a future possibility (the part of the line that has yet to be drawn). This act (Secondness) is represented in the lower level of the figure and is called “The Present Moment”.

Now, let’s consider the determined past for this line we are drawing. The determined past is a continuum of repeated (equalized) images of present moments (from the past)—namely, Euclidean-like points—that flow into one another as points on a line. If we assume the line we are drawing is a straight line, these images can be brought into a system of generalization called Real Number Theory, such that each equivalent point is the sign of a Real number. This generalizing system can be (imaginatively) extended into the future to determine the future possibilities as possible points on the continuous straight line after the completion of the Present Moment.

But suppose we now invert this whole way of thinking. Let’s say that the generalizing system, namely Real Number Theory, formally causes the creation of a straight line as a progressive movement in time. This formal cause I will call *Inertia*. Inertia is the result of a relationship between the particular present moment (Secondness), the generalizing system (Thirdness) and the creative potential of the beyond (Firstness). Inertia is a form of temporal symmetry in which future determinations will be repetitions of equivalent past determinations. In this way of thinking, the present moment is the moment at which the potential becomes actual. I will call the present moment, the Origin. Within the symmetry of the generalizing system, this particular moment becomes determined as the creation of the next point on the Real number line.

However, the potentiality of Firstness, namely the potential of the present moment in time, opens up the possibility for something else to happen, something other than a deterministic repetition of the past. This potentiality belongs to triadic logic and cannot be adequately understood within the classical worldview. The Origin of the present moment opens up the possibility for movement *in a different direction*. Such movement is non-inertial. It is a symmetry creating operation. This movement can be brought back into a system of generalization by *mapping the whole system back upon itself* as a two-dimensional manifold. Thus the Origin becomes an origin for the mapping of the Real Number Line back onto itself. This mapping is called coordination. And the new system is a Cartesian coordinate system that iteratively repeats or reflects the generalizing system (the Real Number Line) back onto itself, such that each instance of the generalizing system can be separately named as an axis of coordination. That is to say, the Real number line (say, the x-axis) is coordinated with an image of itself (say, the y-axis). The one dimensional line becomes a two dimensional space.

But now we can see that this symmetry creation has always already happened. The potential for multi-dimensional coordination was always there. And we might equally say that inertial

motion is a *symmetry breaking* operation in which a multidimensional *potential* (the potential for spatiality) is reduced to an *actual* one-dimensional trajectory. Inertial motion is a formal consequence of broken symmetry in the system of generalization, where broken symmetry is the Origin of the particular from the general (in our example, motion in a *particular* direction).

Similar to the way we looked at Natural numbers, our exploration of the Limit of the continuum—that is to say the Limit defining the relationship of proximity between neighbouring Real numbers—has disclosed an ambiguous dyadic process. The disclosure opened up when we de-synchronized the system by moving from the (spatial) perspective of the generalizing system (Thirdness)—namely the totalized Real Number Line—to the (temporal) perspective of actualizing or drawing or moving in a Real number line (Secondness). One aspect of the dyadic process was the habitual increasing movement in which the determined past inductively projects into the future. We called this inertia. Inertia is the result of an asymmetrical relationship between nearest-neighbour points on the line such that one point *continuously merges* into the next point. The other aspect of the dyadic process is the spontaneous movement in a new direction. This movement involves recognizing that the generalizing system (the Real Number line) can be self-reflected to create a new system of two orthogonal generalizing systems that are coordinated with one another (Eg. two orthogonal axes of a Cartesian coordination). This dyadic process, which is a form of *increase*, is represented in Figure 9.



12. The embodiment of space and time

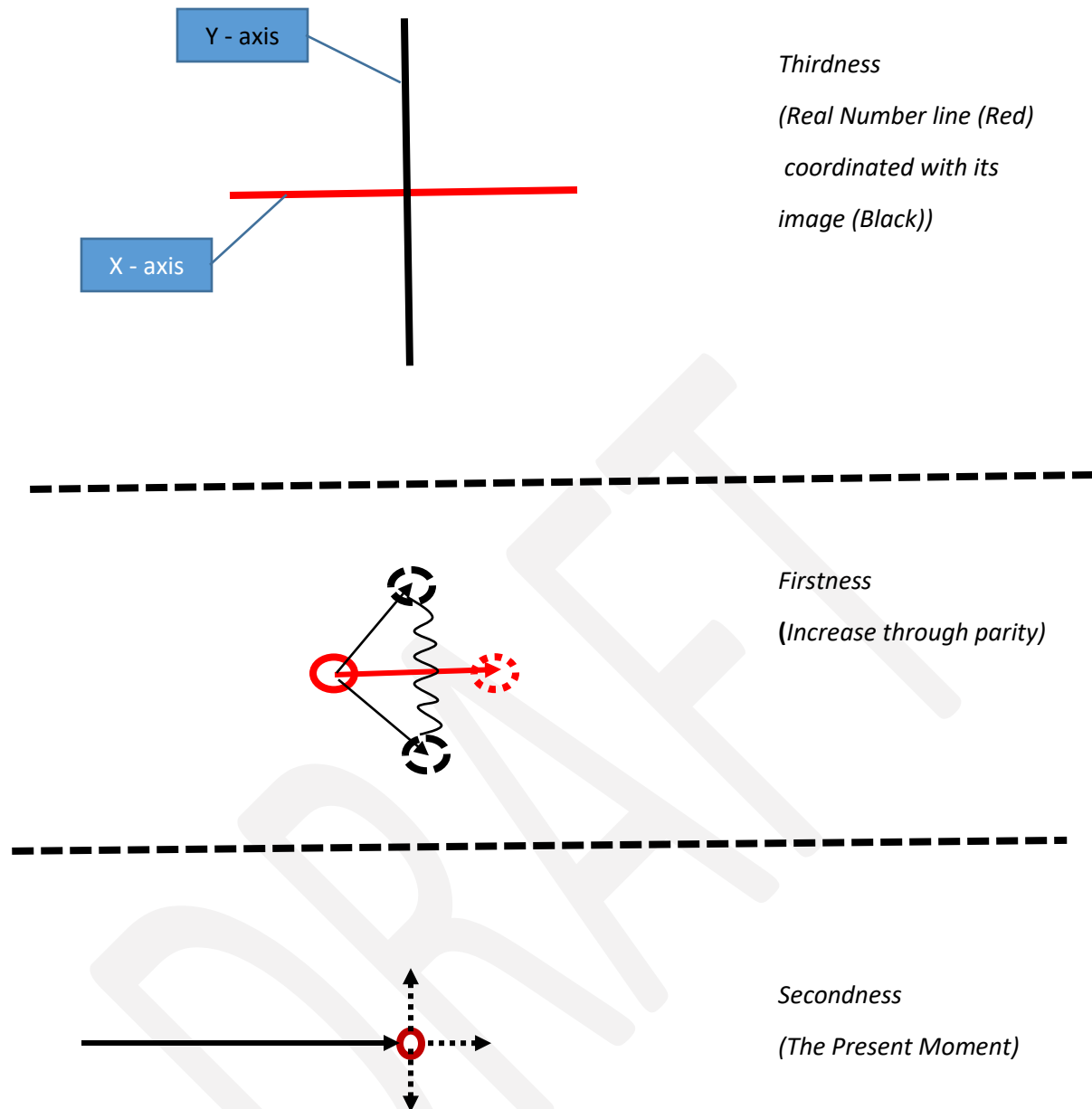



Figure 9: Inertia and Parity

The lower diagram (Secondness) represents the present moment in the drawing of a straight line (Real Number Line.) The upper diagram (Thirdness) represents the coordination of two Real Number lines where the Origin is the present moment. The middle diagram (Firstness) represents the two dyadic potentials in the present moment. Either the line can be asymmetrically extended to the next point in the Real Number Line (Red) or a new dimension may be opened up (Black). The asymmetric extension or **inertial movement** involves a broken symmetry that distinguishes past from future or left from right (Red arrow). The new dimension represents the creation of a new symmetry (Black squiggle). In order for there to be movement in the new dimension, the new symmetry must be broken (i.e. up must be distinguished from down). This symmetry is called **parity**. Inertial movement is the formal consequence of breaking parity.

Undoubtedly you are objecting now to the tenor of our exploration of the Real Number Line (and if you are not objecting yet, then this sentence will hopefully open up the possibility of objection). We have been speaking of an embodied line as if it were the same as the abstract notion of a Real Number Line, even though the two are not the same. What this allows, however, is for us to trace thought-images involved in the process of thinking about the generalizing system of Real number theory. Three foundational thought-images we encountered were

- the present moment, or point;
- the co-presence or symmetric relation between two distinct points;
- the broken symmetry or the asymmetric operator that connects proximate points

The thought-image of the point we called the Origin. It belongs to the category of Firstness. That is to say, it is an iconic sign of the notion of Unity. The likeness between this sign and Firstness is found in its *potentiality*. In this particular instance of the sign •, the thought-image-of-the-original-point is the potential to be the generative origin of the Real Number Line. The relation of symmetry between two distinct points is the equality relation for the logical grammar of the Real Number Line. This thought-image  is the basis of the generalizing system, where the generalizing system of the Real Number Line is a form of Euclidean spatiality. We will take this thought-image as a sign of the relational basis of spatial symmetry.

The thought-image of broken symmetry → came from the temporal action of our drawing an embodied line⁴⁸. At first blush it does not appear to be part of the generalizing system of the theory of Real numbers. But we might probe more deeply into this image of broken symmetry by recognizing that Real numbers form a continuum and a continuum involves continuous flow. That recognition confronts us with a difficult problem. We have been speaking of a discrete, isolated number as a *given* thought-image. But how is it possible to isolate a single point, a single number, as an entity within a continuum? When we were exploring Natural numbers, we took the distinctness of the Natural numbers as given—it was a given quality of the thought-image of the quantized unit. In order to speak of the distinctness of a particular Real number, such as the Real number one, we need to find a way to isolate that particular thought-image from the rest of the generalizing system. We need to find a way to *foreground the particular point* from the continuous line of Real numbers.

In modern analysis, this foregrounding is accomplished through the use of convergent infinite series. A convergent infinite series has an asymptotic form that is similar to a horizon. The infinite series is a process that continuously approaches an isolated point without ever actually reaching that point. The “limit” of the convergent series is the isolated or foregrounded point.

⁴⁸ Actually it came from an imaginative reflection on that potential action. This is where the connection with subjectivity becomes clear.

As a thought-image, the limit is an infinite process that *points to a terminus point*. This is an asymmetric pointing that approaches the point from one side. Thus we might say that the limit of modern analysis is a thought-image and this thought-image is an indexical sign. In fact, it is a sign of the essence of indexicality—*the act of pointing*.



T

he Limit—as a thought-image—is a sign that selects a particular point as a terminus. Through the limit, a particular point can be marked or *named*. That selected point can then be taken as an indexical origin to which other points may be ordered to actualize the generalizing system. But we can only isolate *one point at a time*. When we name a point in this way, we abstract it from the continuous background. We cannot isolate two immediately proximate points at the same time; this is the reason why the notion of proximity for a continuum is so elusive⁴⁹.

When we think about Real numbers in this way, we must always be careful to distinguish the terminus and the origin. There is a gap of potentiality, as it were, when a terminus point to an initial origin is then taken as the indexical origin for selecting another terminus point. For example, the original moment *now*, as a present point, is different from a terminus moment *later* as a point that may become a present point in the future. Likewise, the point *here*, as the indexical locus of my system of coordination, is different from the point *there* that is the terminus for a potential system of coordination for someone else⁵⁰.

The limit (as a thought-image) is an archetypal sign of the act of pointing or referencing or naming. Pointing opens up the possibility to foreground an object from the continuum and give it significance. This is the essence of Secondness. It is the essence of *intentionality*. It involves an encounter with the Other.

2.2.3 Resonance and the Form of Generality

From the inductive law of increase for Natural numbers we inferred the law of inertia for the continuum of Real numbers. From the reflection of the unit with itself in the theory of Natural

⁴⁹ For further discussion, see *The proximity of light: a deconstruction of space*.

⁵⁰ The asymmetrical nature of the limit has implications for the underlying logical structure of the system. For a discussion of the logic of asymmetrical connectors, see David Foster Wallace, "Richard Taylor's 'Fatalism' and the Semantics of Physical Modality," in *Fate, Time, and Language: An essay on free will*, eds. Stephen Cahn and Maureen Eckert (Columbia University Press, 2011), 142-216. And Kevin Knuth and Newshaw Bahreyni, "A Potential Foundation for Emergent Space-Time," *Journal Math Phys* 55 (2014) : 112501. Accessed September 10, 2016 <http://scitation.aip.org/content/aip/journal/jmp/55/11/10.1063/1.4899081>

numbers we inferred the reflection of the generalizing system with itself for Real numbers. By de-synchronizing the Real Number Line (i.e. The Generalizing System) we abducted the potential for any point on the line to be the origin of one (or many) new dimensions that can be coordinated with the original line as images in order to create multidimensional space. However, this potential can only be actualized by breaking the symmetry of parity—the ambiguous potential to move one-way or the other along the new dimension must be disambiguated, either as a result of something external impinging on the system (such as an external force) or as a result of *choice*.

Now it gets interesting. The generalizing system causes an inertia, such that the past is habitually repeated into the future. Each moment in time gives itself over to the next successive moment. But at each moment in time, the potential exists to break out of the generalizing system because the whole system is potentially present in that moment as a reflection of itself. This dyadic form is represented by the parity operator in Figure 9. The parity operator is the finite monadic form reflected back upon itself. It is the form of ambiguity.

So far in this investigation, we have been speaking of proximate points on a line or proximate moments in time as if they were discrete and differentiated monads, like the Natural numbers. But now, through the parity operator, we are encountering the challenge that proximate points of a continuum *may not be fully disambiguated*. The principle at work here is the identity of indiscernibles. The parity operator brings together two mutually exclusive perspectives on relationality (which, incidentally, underwrite the great divide between Analytical philosophy and Continental philosophy).

As *potential*, proximate points are *equivalent*. This unbroken symmetry is represented by the black squiggle in Figure 9. The perspective of equivalence can be called *external* because the points exist together under a single gaze to which they are external. The external perspective is the essence of spatiality as we have been discussing.



As *actual*, proximate points are *different* because of the irreversible relationship between them. This asymmetry is represented by the red arrow in Figure 9. The perspective of différence can be called *internal* because it comes from within the narrative of how the line was created—each point in the line gives itself over to the next proximate point in an irreversible process of substitution (to use Levinas' language). The internal perspective is the essence of temporality.



With the external perspective, proximate points are co-present and appear under the same gaze. With the internal perspective, proximate points are never co-present and never appear under the same gaze (they only become co-present *after the fact of having been drawn*, like memory).

The external perspective is the privileged perspective in theories of physics. It is the category of Thirdness or generality. But notice that there is a bit of a problem here. Each point is the same as every other point. So if proximate points are equivalent, then shouldn't they also be identical? How can one point be differentiated from the other? Don't we have to conclude that they are the same point? The difficulty in resolving the problem of the identity of indiscernibles has been discussed by Gaskin⁵¹. From the external perspective, proximate points can be differentiated if we can somehow mark or *name* one point as an indexical point to which the other point (and indeed any other point) is asymmetrically related. Through the limiting process we identified how the generalizing system might be made to point to particular points. But they also need to be given a particular mark or name. This naming—a symmetry breaking action—comes from outside of the generalizing system. Said another way, the external perspective *lacks an origin*. Once an origin has been named, however, then all points can be differentiated by their asymmetrical relatedness to that indexical point.

The internal perspective provides a means of differentiating proximate points because of the asymmetry of proximity/substitution as each point gives itself over to the next. One point is the cause and the other point is the effect, so to speak. However, this perspective also has a bit of a problem. Since each point gives itself up to the next proximate point, no point ever rests in itself. Like the progression of time, there is no actuality to any particular point; as soon as it appears it is gone. Pure flow without sameness or identity. From the internal perspective *there are no points* to speak of.

If we continue the tradition in physics of privileging the external perspective we will remain perpetually mystified by the Origin of our generalizing system that can and must be named although that naming can never enter into the generalization. More importantly, we will miss the fact that the Origin is actually the door through which we can break free of the totalizing influence of the system itself in order to see the generalization for what it actually represents.

Suppose, instead of privileging exteriority or space and then trying to deduce interiority or time as an epiphenomenon, we try to bring these two perspectives together in an abductive leap as represented in Figure 10.

⁵¹ Richard Gaskin. "Identity and Reference in a Black Universe." Accessed February 13, 2016. https://www.academia.edu/19755831/Identity_and_Reference_in_a_Black_Universe.

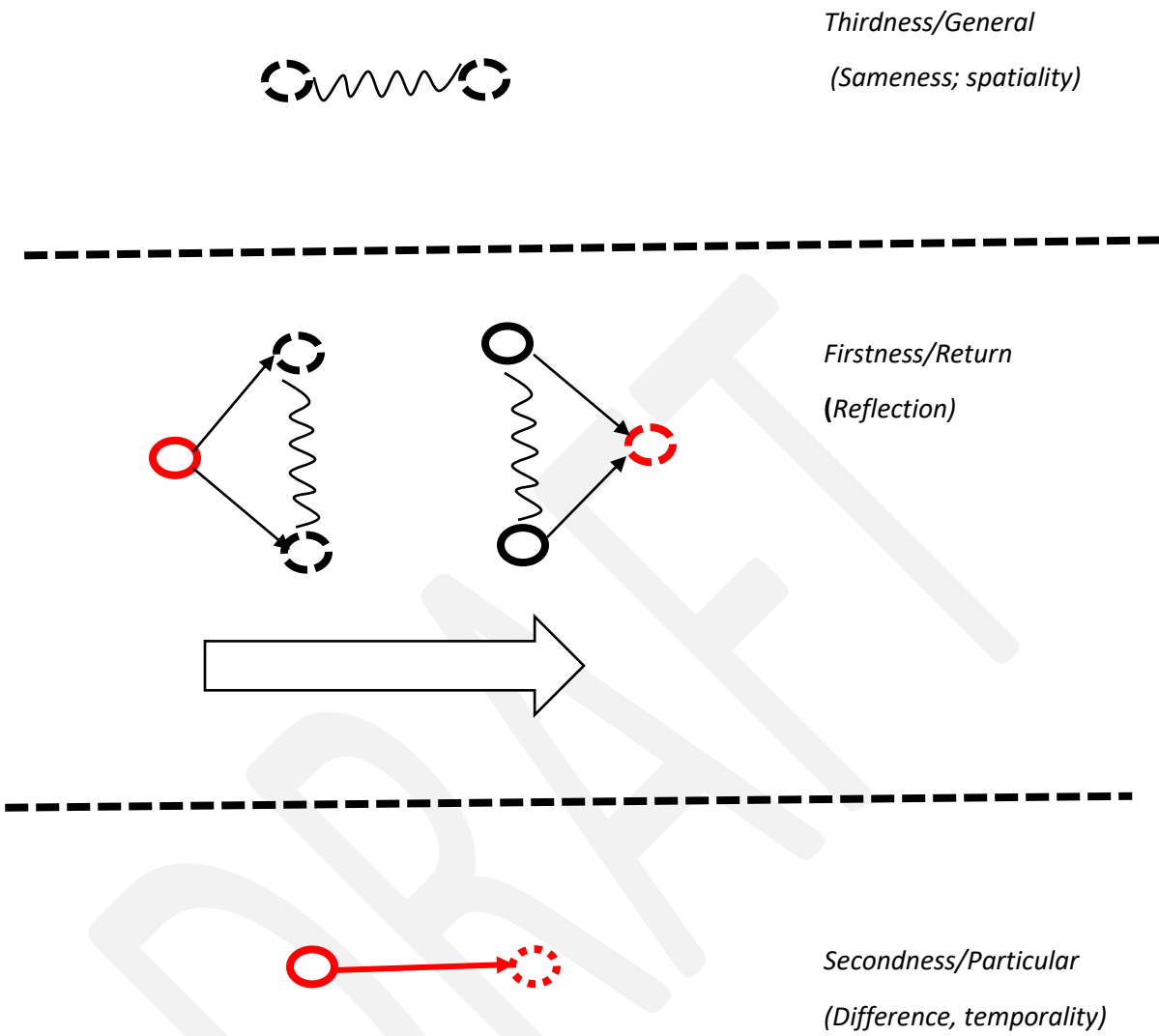


Figure 10: Disambiguation and Return

The upper diagram represents sameness or spatiality or resonance between two proximate points (Thirdness). The lower diagram (Secondness) represents difference or temporality or actuality of two proximate points. The middle diagram (Firstness) represents the first stage of a process intended to unify the two other diagrams. Here the image of parity from Figure 9 has been reflected back upon itself as a reversal. This reversal implicates the irreducible triadic form of return.

Notice that the ambiguity of relationality is the pivot around which the interior and exterior perspectives revolve⁵². Proximate points are *the same* in an exterior or general or abstract way and they are *different* in an actual or particular or experienced way. Now—and this is the key to triadic logic—let’s invert our habitual way of thinking. Rather than deductively moving from the general to the particular, let’s inductively move from the particular to the general. And presto! The ambiguity of relationality pops out as the process by which the particular becomes generalized. ***Rather than seeking a general theory of relativity, we are now seeking a relational theory of generality.***

Precisely because relationality can pivot between particular difference and general identity, it is possible to move from the particular (temporal) context to the general (spatial) system. I will call this process *disambiguation*. Starting from an Origin, points on the Real number line can be disambiguated through a generalizing system. But disambiguated points have the curious property that they are the same in a general way yet different in a particular way.

What is the nature of disambiguation? It is like the movement from metaphor to iconicity to parable [Mark 4.13]. It is when two things are said to be the same even though they are actually not the same. The double movement—*is and is not the same*—allows for abstraction from the particular to the general. Consider, for example, the metaphor “Joseph is a fruitful bough”⁵³. Because Joseph is actually not a plant, the metaphor compels us to seek an abstract aspect of a fruitful bough that would also be a characteristic of Joseph. In that moment of intentionality, the fruitful bough becomes iconic because the bough is itself but it also represents a generalized characteristic that might be replicated elsewhere (for example, in Joseph). It becomes a sign. We have already encountered this double movement when we recognized that our starting image of unity, namely • , was actually an iconic sign for something that was beyond the image itself, namely the idea of One.

The double movement is the act of pointing or referencing. It is pure intentionality. It is also formative. Through the double movement the particular is given a generalized form. And at the same time, the particular points beyond itself to its *significance* within the generalizing system.

What we are speaking about here is pattern formation. It begins in the particular or, as a poet might say, in the *suchness* of an experienced object-image. The abstract quality or pattern becomes manifest by repeated comparison of the object-image with other object-images that also possess the quality or pattern. The object-image can then become an icon for the pattern. Finally, through the act of naming or marking, the abstract pattern breaks free of its embodied representations and becomes its own abstract object-image—the meaning or significance of

⁵² This “pivoting” is related to the pivoting between *ens reale* and *ens rationis* discussed by Deely in *Purely Objective Reality*.

⁵³ This discussion of metaphor draws on Northrop Frye, *Words with Power: Being a Second Study of "The Bible and Literature"* (Toronto: Penguin Books, 1990). And Zwicky, *Wisdom & Metaphor*.

the name. This process might happen with sensory images in our embodied world, as is often the case with poetry. It might also happen with thought-images in our minds, as we have been exploring in this investigation⁵⁴.

And it also might happen for other entities in the world that are capable of internally representing an external form, such as electrons.

2.3. Return and the Form of the Whole

In spiraling around Firstness, our exploration of unity has led us from *absence*, to *idea*, to *potential*, to *increase*, to *reflection*. At the same time, the givenness of the quantized monad—the unit or the Natural number one—lost its grounding. We discovered that the unit is only present in self-reflection and therefore actually represents something other than itself. And this discovery revealed that the whole system through which the unit is defined also contains the potential for self-replication. The unit is defined by and contained within a system, and the system *as a whole* reflects back the form of the unit. Moreover, the system as a whole is present in the unit as the general *possibility* of replication (dimensionality) and the particular *actuality* of symmetry breaking (inertia).

Ambiguity is the pivoting dynamic of the spiral. Ambiguity opens up for us a double movement or *resonance* between particular difference and general identity. How is this possible? The trick we have used is to break the synchronicity of binary logic by allowing the excluded middle into our thinking. When we do this, we momentarily lose touch with the nature of identity because ambiguity blurs identity and difference. However, the process remains unified insofar as the double movement is held fast and brought together in my, and possibly your, imagination. We have internalized the paradox of ambiguity, so that now we can externalize it back into the system. Figure 10 represents this intended final stage.

The unifying process involved here is a form of *interpretation*. Interpretation is the logical process through which the double movement of ambiguity is held fast by interior representations and then fixed or relationally embedded into a generalizing system. It is the process of generalizing.

How is the interpretive process of triadic logic different from the definitional structure of binary logic?

Recall that the defining moment of binary logic is the law of the excluded middle: for any given A, both A and not-A cannot be *simultaneously* true, where A represents some state of affairs,

⁵⁴ For further exploration of this process, see *Light signifying form: Peirce on creativity, responsiveness and emergence in quantum, biological and linguistic systems*.

some *thing*. The defining moment of binary logic is also the defining moment of what a “thing” is in the classical worldview; namely, a thing is an object and that object’s identity rests eternally in its general or universal form. It is the “given-ness” we mean by saying “for any given *A*”. The general form, in turn, rests eternally in the totalizing *structure* in which that general form is defined, where a structure is an infinitely synchronized (i.e. spatialized) system of relations, a system of *equalities*, such as found in the theory of Natural numbers.

But the theory of relativity is forged from the premise that simultaneity may be relative and not absolute⁵⁵.

Therefore, we cannot assume that binary logic provides an appropriate logical paradigm for understanding the theory of relativity. And we cannot assume that classical objectivity is the right fit for interpreting the relationship between theory and experience. In our earlier exploration, when we let go of the assumption of simultaneity or absolute synchronicity, we moved from speaking about *objects* to speaking about *signs*. Signs are different from objects because they do not rest in themselves; they refer to something other than themselves; they have significance. We also moved from thinking about a generalizing system as an absolutely synchronized structure of relational equalities, to thinking of the system as a process of generalizing. This movement involved embedding our own subjective viewpoint into the system; it involved moving from the perspective of an Ideal observer of logic standing outside of the logic, to the perspective of our engaging in a logical process by moving within the system of logical relations—the narrative of thinking. What we discovered from within the system was the importance of an Origin as the particular around which the generalizing system is indexed or coordinated. Using the image of “drawing a line” we took our own subjectivity as this index for the objectivity of the generalizing system of Real numbers. But this particular Origin/index remained unrelated to the generalizing system. The Origin was arbitrarily chosen through an act of naming.

In the third and final mo(ve)ment of this Section, we will try to weave the Origin back into the system. The formal process we will follow has already been introduced. At the beginning of our exploration, we introduced the figure • as an image of the finite monad. We then found that this image could become an iconic representation of the “idea” of one through repetition. First we applied this iconic sign to the “natural number” one. Then we applied this indexical sign to the Euclidean point as the generalizing form of the “real number” one. Now we will take up this image as a symbol of the indexical origin for the “complex number” one. With each iteration, our notion of unity becomes enriched and expanded through the systemic forms of unity-in-diversity we encounter.

⁵⁵ Here I am referring to the simultaneity of *two* events or states. In triadic logic, the simultaneity of *two* events or states is relative, but the simultaneity of *three* may be invariant.

What is this starting figure of One, this figure of the in-dividual, this thought-image of the unit or the dimensionless point? In the classical worldview, it is called the fundamental particle and it is the basis upon which all objects are constituted, or equivalently, we might say all objects reduce to fundamental particles. But, and this key, *a fundamental particle in-itself is irreducible*. We called this the “givenness” of self-identity. As Rosen argues⁵⁶, we must therefore recognize that there is a categorical difference between objects and the fundamental particles from which they are constituted. We can analyze objects, but particles or points are indivisible and unanalyzable. The fundamental particle is the Other of the object; it belongs to the subject; it belongs to us. “The fundamental particle to which an object is reduced is the element upon which the subject’s analysis of that object is built”⁵⁷. We the interpreters have imposed the givenness of self-identity and that givenness reflects back to us what we take to be our own self-identity⁵⁸.

Why is this point troubling us? Surely we are taking our direction from “out there”, either from the experimentation in the real world or from exploration of the mathematical world of numbers. Yet what we are finding now is that our generalizations require a particular indexical origin in order for the logical system of conceptual analysis to hold together. This indexical origin is the unique point of reference to which all else is related—*the origin of the frame of reference*. If we continue to remain within the classical worldview, then this origin or index is achieved by arbitrarily marking one individual, finite monad as special and different from the rest and taking it to be the locus for all relationality. But this marking or naming is categorically related to our own subjectivity. To move beyond the classical worldview, not only do we have to understand unity in objects differently, we also have to understand the unity of subjects differently. Specifically, we must relinquish the discrete finite monad—the thought-image of *identity-resting-in-the-finite-self*—as the formative basis for objects *and* subjects. We must come to a different understanding of how objects and subjects are related to each other and to infinity. What we might hold on to, however, is the intuition that the unity-in-diversity of objects somehow reflects the unity-in-diversity of subjects.

Now comes the difficult turning point for the whole exploration.

Just as we recognized that the image of the finite monad • is not one-in-itself, but is an iconic representation or sign of one, so can we recognize that the origin of a reference frame—which until now comes from our subjectivity—is not one-in-itself. Rather it is a sign of unity. And if we want to explore the meaning of this sign—the Idea of an origin—we need to find a way to externalize the sign back into a system. But we have already been doing this all along insofar as

⁵⁶ Rosen, *Self-Evolving Cosmos*.

⁵⁷ Ibid.

⁵⁸ For an exploration of the challenge of self-identity in the classical worldview, see *Identity and paradox in Habermas’ approach to critical reflection: metaphor as necessary other to rational discourse*.

we have introduced and worked with a new symbolic language, the language of the “figures” or diagrams that have interrupted the flow of the text.

In our new symbolic language, we have taken the iconic figure • to be a sign of the thought-image of the number one. In our exploration of the continuum, we arrived at the insight that the unity or “one-ness” of the Real number one is dependent on the whole system of Real numbers in which it is embedded (similar to the case with the Natural number one). Now, let’s postulate an image to this Real number one, just as we postulated an image to the iconic form of the Natural number one. Let’s call this image *the Imaginary number one*. The Imaginary number one does not refer to any actual Real number, it is a sign of the potential for the iteration or replication of the Real number one and its system of generalization. The Real number one exists within the system of the Real number line and the Imaginary number one exists within the system of the Imaginary number line, such that the Imaginary number line is a complete reflection of the Real number line. The Imaginary number system is an iconic reflection of the Real number system.

In Euclidean geometry, we found that the Real number line could be coordinated with its own image by creating a system of Cartesian coordination. Cartesian coordination, however, is an externally imposed system of coordination that comes from our subjective and totalizing gaze upon the represented spatiality. The Origin of Cartesian coordination is a featureless, dimensionless point—the assumed image of our subjectivity. The Cartesian Origin exists in-itself as a bounded and singular vantage that is cut off from the Infinite horizon. This is the vantage that we are trying to relinquish in our exploration because, as I hope we will see, it is an arbitrary, closed, and false image of subjectivity and, therefore, objectivity as well.

In the place of Cartesian coordination, we will explore the synchronicity of Complex numbers which are formed by combining Real numbers with Imaginary numbers through addition. In theory of Complex numbers, the Real number line can be synchronized with the Imaginary number line to form the Complex plane. This synchronization revolves around the Origin of the Complex plane as shown in Figure 11.

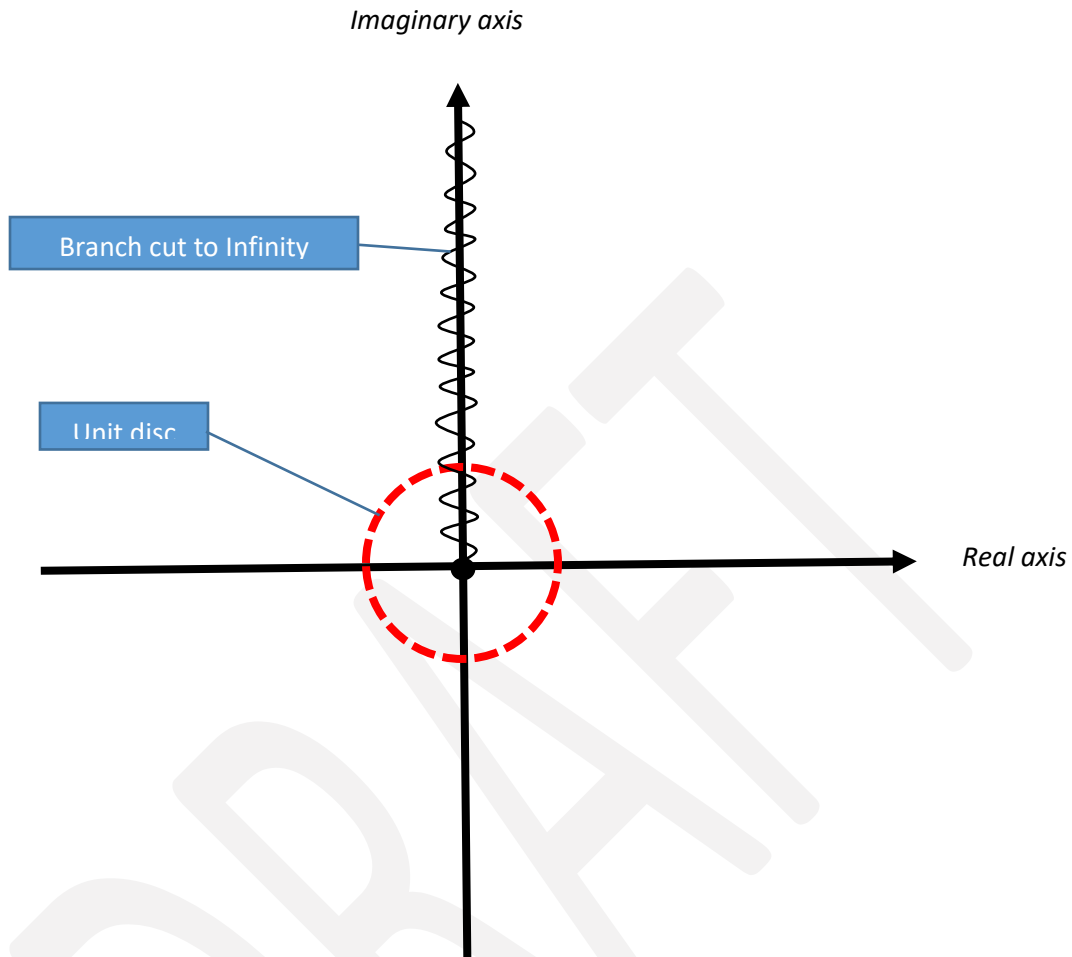


Figure 11: The Complex Plane

The Complex Plane is the coordination of the real axis with the imaginary axis. Unlike the Euclidean plane, the Complex Plane is self-synchronizing. The Complex Number One, $e^{i\theta}$, traces a unit circle around the Origin, where the phase angle θ marks out a circular movement that returns upon itself. The Complex Plane is like an Infinite spiral (out of the plane of the page) that has collapsed upon itself. The Origin of the Complex Plane is a branch point that remains in contact with Infinity by virtue of a branch cut—the branch cut differentiates different levels or planes or stages of the collapsed spiral. The exterior of the Unit disc can be mapped onto the interior through Inversion—the mapping involves a reflection.

Whereas the unity of the Natural numbers was “given” and the unity of Real numbers was foregrounded or “abstracted” by the Limit as intentionality or *point*-ing, the unity of the Complex plane involves “synchronization” as an iterative process of circling the Origin. The Origin, in turn, is a symbolic sign of the Idea of an origin as an indexical focal point for a complex system of individuation. However, to understand Complex numbers and their significance for objectivity (and subjectivity), our metaphors must change.

Let’s replace the former image of the finite monad • with the image of an open circular boundary—a unit disc—that separates an exterior domain from an interior domain. We will no longer speak of the unit in-itself. Instead we will speak of a *unifying process*. And we will no longer speak of objects and subjects, instead we will speak of *exteriority* and *interiority*.

Within the system of the Complex plane of numbers we can relocate spatiality and temporality:

- Through inversion, the exterior domain can be mapped onto the interior domain as a reflected image or re-presentation. Thus we might say that the interior re-presents the exterior. Re-presentation has the relational form of spatiality.
- The boundary of the unit disc involves a process of circulation. The phase angle marks this circulation such that the circle repeats itself iteratively as the phase angle increases continuously. Thus we might say that the circle returns upon itself marking discrete points through continuous increase. The process of repeated return has the form of temporality.

The Origin of the Complex plane is called a branch point. It has no analogue in Euclidean geometry. The branch point—a new image of negation—is *the absence of unity*. The phase angle becomes indeterminate at the branch point. The branch point remains in immediate or proximate relation with Infinity through the branch cut. This relationship, which is represented by a squiggle arrow in Figure 11, I will call *rupture*. Rupture creates a branch cut that marks the repeated circular motion around the unit disc, such that Return can be identified as return to the place of rupture. In Figure 11, rupture is marked along the positive imaginary axis; however, this particular choice is not unique—the angular orientation of the branch cut can be chosen arbitrarily.

Repeated circulation around the unit disc—temporality—can be thought of as an Infinite spiraling motion. Each time the branch cut is traversed, a new “plane” or branch of the spiral is entered. In some sense, it is like a three-dimensional spiral is collapsed upon itself to form the two-dimensional plane. Better said, the two-dimensional Complex plane has the potential to express a three dimensional spiraling form. This potential to express three dimensional form I will call *depth*. Unlike the Euclidean plane, the Complex plane has unexpressed or hidden depth. Through depth, space and time become interwoven.

What are we to make of Complex numbers? What form do they signify? Where have we arrived in our exploration of number theory?

Again three levels of thinking are opened up for us.

When we explored Natural numbers, we naturally assumed the discreteness of each number. Where did this assumption come from? I would suggest it came from our subjective experience of everyday objects that we use and manipulate and play with. We crafted for ourselves a thought-image of Unity that matched this discreteness and allowed us to use and manipulate and play with numbers as thought-images. This is the level of Thirdness. When we explored Real numbers, we came up against the background continuum from which individual numbers come into view as individuated thought-images. We found that Unity involves a creative process of naming and foregrounding or abstracting thought-images. It came from our subjective experience of thinking. This process is like the way in which bodies in the world are creatively formed and evolve in time, never fully isolated and discrete from their environment but rather continuously interacting, merging and emerging with one another. The background continuum—the being of the Real—is the ground for abstraction. This is the level of Secondness⁵⁹.

At the deepest level, the level of Firstness, we became aware our own subjectivity. We discovered that image formation—abstraction of discrete finite monadic thought-images from a continuous background—is rooted in our experiential encounter with the narrative of thinking. We then tried to abstract image formation as process or system. Complex numbers came to us as a potential theoretical form for this abstraction.

Now for the abductive leap that will jettison us outward, beyond the frontier of Space.

What I want to suggest to you is this: whereas Natural numbers (quanta) represent the abstract form of *things*, and Real numbers (continuum) represent the abstracting ground of *experience*, Complex numbers represent the creative forming of *Light*.

⁵⁹ For an exploration of the abstraction of bodies from an undifferentiated background, see *Is Dretsky's theory of information naturalistically grounded? How emergent communication channels reference an abstracted ontic framework.*

0. Interlude

Our exploration of numbers has led us through a series of thought-images about unity, from the finite monad, through asymmetrical pointing or limit, to an indexical Origin of a Complex system. These thought-images were exteriorized through the narrative of our journey and brought into a relationship of similarity with concrete objects-in-the-world: things, ground and synchronized system. The view was always external.

Yet, we might appreciate that there is a corresponding movement of thought-images related to our own interiority or subjectivity. The finite monad has a correspondence to the interiority of an isolated individual, a particular ego consciousness. Our discovery that the finite monad is limited and that this limit is a relationship of intentionality with others corresponds to the realization that individual ego-consciousness comes into being through an asymmetrical relation to Others. Levinas calls this relationship *proximity*⁶⁰. It is an asymmetric giving up of one-self to the neighbour with no expectation of return. An ethical relationship to the Other that is prior to my own being or identity. The prior ethical imperative foregrounds individual ego-consciousness through embedded relationality.

Within the Cartesian paradigm, this relationality is relativized as a symmetrical and reciprocal relationship of equality. Like Euclidean points of line, all individual egos might then be taken as identical and general, with no place for particularity to the ego, no Origin. Additionally, the finite ego-consciousness remains isolated and cut-off from the Infinite, such that the latter appears only as a distant horizon that is formed from a totalizing system that generalizes all (possible) ego-consciousnesses into a timeless state⁶¹ rather than a living person. This is similar to the way in which the individual Euclidean point is cut-off from the Infinite horizon of space. In turn, the totalizing system becomes the determinate structure that constrains the individual ego and replaces the *actual* asymmetrical relationship of the individual with God by a *hypothetical* symmetrical relationship to a “generalized individual” [John 5.30-44] where the generalized individual has no particularity, no embodiment, no incarnation. Extending the metaphor, the ethical relation to one’s neighbour becomes a deterministic system of mutual exchange, an economy in which the medium of interaction is a null or empty sign⁶² [Matthew 22.17-22]. The freedom of the person is given over to the totality of the system of exchange in the same way that the individual point is determined by the system of Euclidean geometry.

⁶⁰ Levinas, *Otherwise than Being*.

⁶¹ I am using the term “timeless state” in order to directly connect with concepts from physics. The term “timeless universal” might also be used here. However, I am not intending to refute the existence of universals nor advocate for nominalism. My critique is focused on the qualifier *timeless* which I am taking to mean “spatialized”. Timeless (which is defined in relation to space) is not the same as *eternal*. Eternal belongs to a higher level of categorization that includes light and word.

⁶² A Peircean-like understanding of the coin as a sign within an economy of exchange can be found in Karl Marx, “Commodities and Money,” in *Capital*. Great Books for the Western World Vol 50, ed. Friedrich Engels, trans. Samuel Moore and Edward Aveling (Chicago: University of Chicago, 1952).

To rediscover asymmetrical relatedness is to rediscover of the ethical basis of freedom and equality.

Our movement to complex numbers recasts the model of subjectivity just as it recasts the model of objectivity. Individuals maintain an ongoing relationship of proximity with the Infinite through *rupture*. This asymmetrical relationship has the form of self-giving or agapé. It is the origin of signification. Individuals are likewise asymmetrically related to the Other, to the neighbour. Through the Infinite, this asymmetrical relationship returns back upon the individual in an ongoing process of meaning formation. Meaning is not constructed by an individual; it is a collective and evolutionary process rooted in Love.

One of the strange things about triadic logic is that my thoughts no longer belong to me alone. Through words (signs) I participate in a collective process of which I am only partially aware. My individuality is not an isolated island, a self-made kingdom. It is a singular vantage that is sustained by the community in which I live and calls me into actual, ethical relationships with my neighbours. Firstness is the first person perspective, I am. Secondness is my loving relationship of proximity to the Other I encounter, to **You**. Thirdness is the generalizing world or text through which we live together.

Too poetic? Please don't take this interlude to be a theory of subjectivity, a topic that is far beyond the scope of our investigation. What I want to intimate here is that questions about the metaphysics of physical theories and mathematical formalisms are inextricably woven into questions of ethics and theology. And this is the intimation: ***The way in which we understand objectivity is directly related to, and can be determinate for, the way in which we understand subjectivity.***

Again we encounter the triadic form of return. The object asymmetrically points to the subject for which it is an object. But then, the subject can reflect back on the object as an image of itself. In this moment of return, the object becomes a *sign*. Further, the moment of return opens up the possibility for something new to happen. A spontaneous increase. Through a deeper understanding of our own subjectivity, we might be able to formulate a deeper understanding of objectivity.

3.0 Embodiment

Let's turn our attention now to the subject of the investigation. *Cogito*. Subject as object. The externalization of interiority.

In the previous section we traced a path of thinking about numbers that moved in a circular way between 0, 1 and infinity. Starting with Natural numbers we investigated the discrete; then through Real numbers we encountered the continuous; and finally through Complex numbers we entered into self-reflection or *Return*. From Potential through Presence towards Significance. Figure 12 is a visual representation of the course or narrative of this thinking.

DRAFT

12. The embodiment of space and time

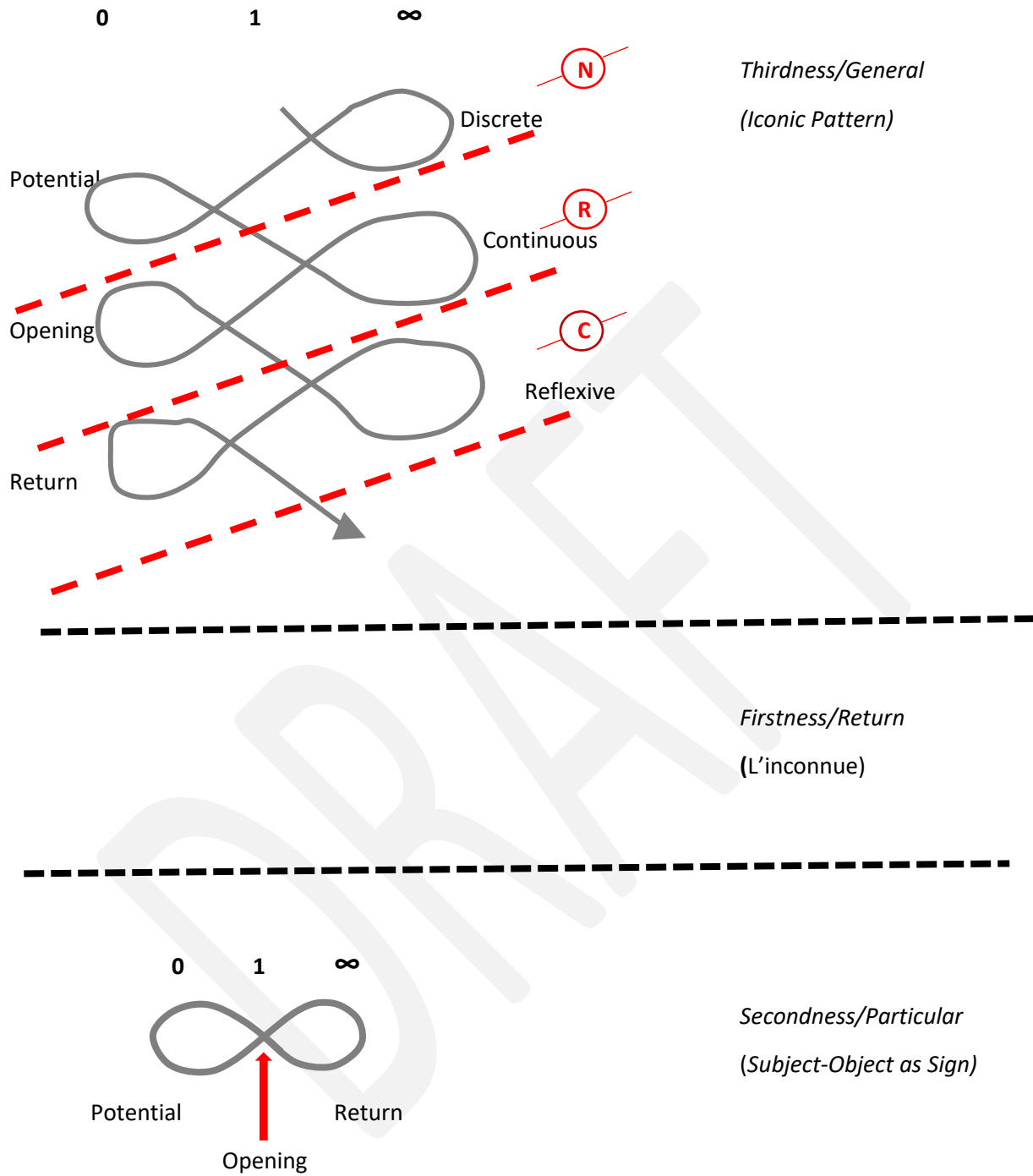


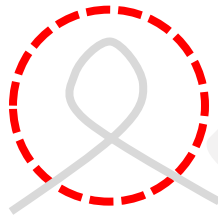
Figure 12: Cogito

A retracing of the narrative of Section 2—cf. Figure 3. Thirdness (generality) lays out the temporal path as a spatial structure—Natural (*N*), Real (*R*), and Complex (*C*) numbers. Secondness (particularity) re-presents this structure as a spatio-temporal process folding back upon itself to form a sign. Firstness

(Return) is l'inconnue. L'inconnue is the Other, the one to whom I am ethically bound, my neighbour. L'inconnue is you my friend, the Reader. Now let's try to weave our way back.

3.1 The Same, the Other and the Third Party (Identity, Difference and Return)

We will start with our found image of an open domain whose interiority is in relationship to an exteriority. The boundary of the domain is the reflexive door or gate between interior and exterior. The open domain is not a thing; it is a *process*, a *unifying action*.



More accurately it is a unifying re/action because the interior action is contingent upon exterior action and vice versa. The simplest example, to which we will continually return, is *spin*. Spin involves a cycle (or multiple cycles) of return such that interior and exterior are differentiated and then brought back into original unity. For example, as the earth spins on its axis the positions of the stars are differentiated in time moving across the vault of heaven and sinking into the horizon and then they are re-aligned with the earth at the completion of a (sidereal) day. Through spin the interior (eg. earth) and exterior (eg. stars) are brought into synchrony as repeating cycles of return (see Figure 11). This unifying action is not like a finite monad. It doesn't exist in-itself. It only exists in an explicit and yet to be determined relationship with others and with infinity.

The open domain—as a process—can become an origin for a frame of reference, an index through which exteriority is brought into relationship (like the first person perspective in grammar). In the above example of the earth and the stars, the earth forms an open domain. The cyclical process of return creates an interior temporal unfolding that, along with Bergson⁶³, we will call *duration*. “Duration is essentially a continuation of what no longer exists into what

⁶³ Henri Bergson, *Duration and Simultaneity with reference to Einstein's theory*. trans. Leon Jacobson (New York: The Bobbs-Merrill Company Inc., 1965). My treatment of time as duration follows Bergson. However, the notion of reciprocity that I use comes from Levinas and is different from Bergson's treatment of reciprocity as mutual exchange. In this difference, the problems with the interpretation of relativity theory for which Bergson is criticized might be resolved. For a discussion of the critique of Bergson's interpretation of relativity theory, see Jimena Canales, *The Physicist and the Philosopher: Einstein, Bergson and the debate that changed our understanding of time* (Princeton University Press, 2015).

does exist”⁶⁴. It is what we mean by the word *passing* when we speak of the passing of time. Through cycles of return the open domain endures and this duration instantiates a form of identity. But this identity is particular and contingent on difference which manifests in the relationship between interior and exterior.

*An image might be helpful here. Imagine we are in a spaceship far from earth. Our spaceship becomes the only index available to coordinate the starry skies that surround us. It becomes the origin for our frame of reference. Suppose our spaceship is rotating about an axis. As we look out we see the stars rotating about us. Who is rotating? Us or the stars? The rotation establishes a cycle of return and this cycle of return embodies temporality for us.*⁶⁵

We will call the open domain an *interpreter*. The reason for this name may not be clear yet. But one might imagine that measured cycles of return create an iterative process and this iterative process can serve as the basis for marking the exterior in relation to the interior. For example, the spin of the earth creates a measured process for marking the day in relation to the revolution of the stars.

Perhaps you are objecting now, because I have just presented the open domain “in itself” and yet I am saying that it cannot be present in itself. To this objection I can only agree that the (triadic) logic I am using is circular. Only after we have discussed relationship will the (self) identity of the interpreter become manifest.

The interpreter relates interior and exterior through a process of return. Action, re-action, re-re-action, and so on *ad infinitum*. The open domain is constitutionally dependent on relationship and is not like an elementary particle, or a Euclidean point, or an ideal observer. The interpreter *in-itself* cannot be abstracted from context⁶⁶.

What action? Suppose we want to coordinate the starry skies surrounding us. This can happen through the mediation of light. Light comes to us as the vehicle through which we come into synchrony with the external world. But this mediation involves re/action. We receive light and we reflect it back again. A process of signaling. At this point, however, there seems to be no way to differentiate signal from self.

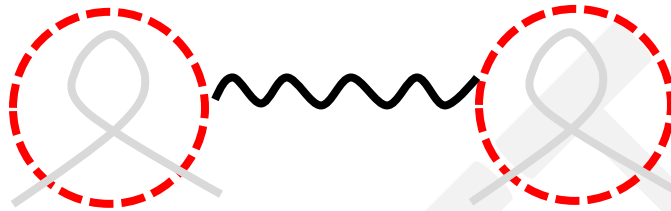
⁶⁴ Ibid., 9

⁶⁵ *A thought experiment with light: how the ontological form of quantum mechanics is consequent to the principles of relativity theory* explores this image of indexicality. It might be helpful to consider that thought experiment before continuing with the current exploration

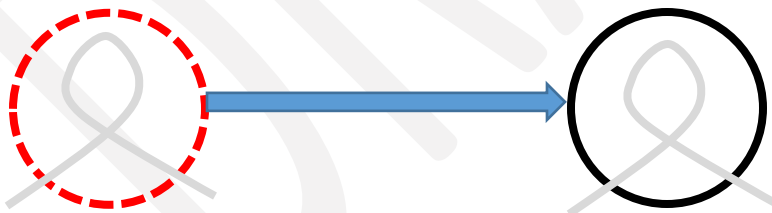
⁶⁶ The nature of this relationality that is constituted through signs is explored in *Light signifying form: Peirce on creativity, responsiveness and emergence in quantum, biological and linguistic systems*.

12. The embodiment of space and time

Now imagine a second open domain, like the first. This domain can also become an origin for a frame of reference. It will also have duration and it can also become an interpreter. If we bring these two domains into relationship we can begin to speak of co-presence. Both domains endure together. Yet they are also separate and this separation we will call extension.



*Hold on a minute! Now we have broken out of the first person perspective. If we are in the spaceship, we cannot also be outside of the spaceship looking at it as an exterior phenomenon. Where is the origin for the coordination of the two open domains **as equal**? At this point we can only say that from the frame of reference of the first domain, the second domain appears as an external phenomenon. And from the frame of reference of the second domain, the first domain appears as an exterior phenomenon.*

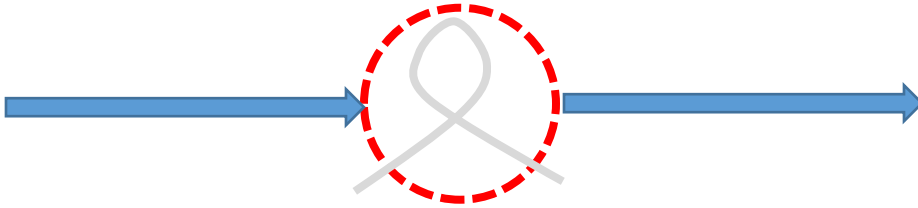


The relationship between two interpreters is asymmetrical. The Origin and the Terminus are not identical. The Origin is the indexical centre of a frame of reference. I will call this original frame the Same. Through signaling, the Same can give itself over to interpretation by an Other. However, the Other as Terminus is never fully subsumed into the frame of reference of the Same because it retains a proximate relation to infinity that is not directly accessible to the Same (i.e. it has interiority). The Other, likewise, is a potential index for another frame of reference. The interiority of this second frame of reference—its duration or temporality—is particular to that index. Through a process of equalization that has yet to be determined, the two frames might synchronize their interiority to create a spatio-temporal structure that defines their bond. Through this bond, the Other can *interpret* the Same.

What do I mean by interpretation? The Same is a perspective of interiority, like the first person perspective. The Other (according to the Same) is a perspective of a bond between this interiority and something exterior, like the second person perspective. From the frame of reference of the Same, the Other is seen only as an externalized phenomenon⁶⁷. A phenomenon that is interpreted through the frame of reference of the Same. The Same cannot experience the interiority, the temporality, the duration of the Other. This means that time is always particular, although it can be brought into a generalizing system through the bond between the Same and the Other in a process that has yet to be determined. But precisely because time is always particular it becomes the initiative for abstraction and generalization as explored in Section 2.

The open domain, the interpreter, is a processor. It can receive an input from an Other, interpret that input through an interior process and then react. The reaction of the open domain becomes an externalized phenomenon (an interpretant) that can be interpreted by another. But as an index the open domain is unique or particular. At the core of its interiority is an indeterminateness; we might call this indetermination *ambiguity, indecision, or choice*. Unlike the Euclidean point that can be both origin and terminus at the same time, the open domain is de-phased or de-synchronized and this desynchronization opens up a gap of indeterminacy. The indeterminateness can never be fully externalized for an Other because the Other can only interpret external form. External form manifests after the fact of making the indeterminate determinate, after the fact of selecting or choosing. That is to say the interpreter can only interpret *generalizing form* that emerges through the structure of ambiguity as discussed in Section 2. This generalizing form is the exterior surface or the *face* of the Other. Because the interior core cannot be determined by an Other, it cannot be determined by the Same either. It is a perpetual state of potential to select or choose. This indetermination, I hope to show, is the essence of the Principle of Uncertainty, as articulated by Heisenberg, for example.

⁶⁷ In *Otherwise than Being*, Levinas calls this “the face of the other”.



The interpreter is the terminus of a signal from an Other. But it is also the Origin for a signal that can be received by an Other. In binary logic the Origin and the Terminus are identical. For example, the Euclidean point receives its neighbour and transmits to the next neighbour in a deterministic process that was called Interia in Section 2. The Euclidean point is fully synchronized and does not sustain a gap of indeterminacy. In triadic logic, the Origin and the Terminus always remain differentiated. Therefore the interpreter contains an ambiguous indetermination which is the gap between being the Terminus of a signal from an Other and the Origin of a signal to a Third party. Something happens in this gap. Structures are assembled and brought into relationship⁶⁸. We will call this gap *the present moment*. The present moment is constitutional for duration.

*How might we think about this gap⁶⁹? At this very moment I am writing these words in an attempt to understand triadic logic. They resonate and reverberate within systems of understanding that have their origin in my subjectivity here-and-now. But you are receiving these words elsewhere. You are receiving these words then-and-there, so to speak. You will (hopefully) try to draw these words—the trace of my thinking—into an intelligible structure in your frame of reference, for your subjectivity, for your here-and-how. However, **your here-and-now is never actual for me** (just as my here-and-now is never actual for you.)⁷⁰ Your interiority remains forever different from mine. For me, your here-and-now is a Terminus that is only a **potential Origin** for meaning that I might try to interpret but can never fully know. This is like the structure of time⁷¹. Now is the only actual. Some time in the future or the past might be interpreted as a potential now, but that interpretation never possesses the rich interiority that exists for me now. Only now is present. A future time might become present in the future, but there is a gap of indetermination between the actualization of that future presence and my interpretation*

⁶⁸ In *Otherwise than Being*, Levinas relates this gap to the extraordinary event of knowing.

⁶⁹ For further investigation of the way in which light/text mediates this gap, see *On the relationship between the concept of text in Gadamer's theory of hermeneutics and the concept of light in Einstein's theory of relativity*.

⁷⁰ For further discussion of the particularity of duration, see Bergson, *Duration and Simultaneity*.

⁷¹ For further discussion of the connection to time, see *Beyond space and time: unity and form in Augustine's Confessions*.

*now of a potential future presence that is not actual. There is an asymmetrical connection between the present moment and any determined past moment or any potential future moment. This logic of asymmetrical connectivity (of time) has been described elsewhere⁷². Note that in our exploration, we are applying the logic of asymmetrical connectivity to time **and space**⁷³. Light mediates this relationality.*

Two interpreters are brought into mutual relationship through the Third Party. The first open domain we called the Same; we placed ourselves within its interiority to speak of duration; and from this vantage we created an indexical Origin for an interpretative frame of reference. The second open domain we called the Other. I suggested we imaginatively differentiate ourselves so that my here-and-now was the centre of the first open domain and your here-and-now was the centre of the second open domain. Yet each interpreter remained particular because an interpreter can only offer up interiority to avail the other. Each is the Same-for-another through an irreversible process represented by asymmetrical connectivity. The Other remains *l'inconnue*. To bring about the possibility of exchange and mutuality, of give-and-take, of coming to an understanding, *of equality*, a Third Party must be constitutionally present⁷⁴. The Third Party mediates the relationship between the Same and the Other, between I and You. The Third Party makes possible a process of return through which we can synchronize our interiorities and enter into mutuality. The Third Party forms the bond between us. This bond might be called love. It is ethical in the sense that it is the gift of response to my act of offering up myself, my interiority, for you [Mark 12:31]. Through the Third Party, you and I become neighbours, we become proximate, we become *equal*. But this proximity is different from the relationship of contiguity that defines neighbouring elements or “selves” in the classical worldview, it is different from the (non)relationship that defines spatiality through the null point.

Let's call this triadic form—the relational possibility for mutuality and equality—the proximity of light.

⁷² Wallace, “The Semantics of Physical Modality”. And Knuth and Bahreyni, “Foundation for Emergent Space-Time”.

⁷³ By applying the logic of asymmetrical connectivity to space, we are moving beyond Bergson's interpretation of relativity theory. This movement beyond involves relinquishing the unifying notion of “Duration” in order to encounter the special role of light in the theory of relativity.

⁷⁴ Levinas, *Otherwise than Being*.

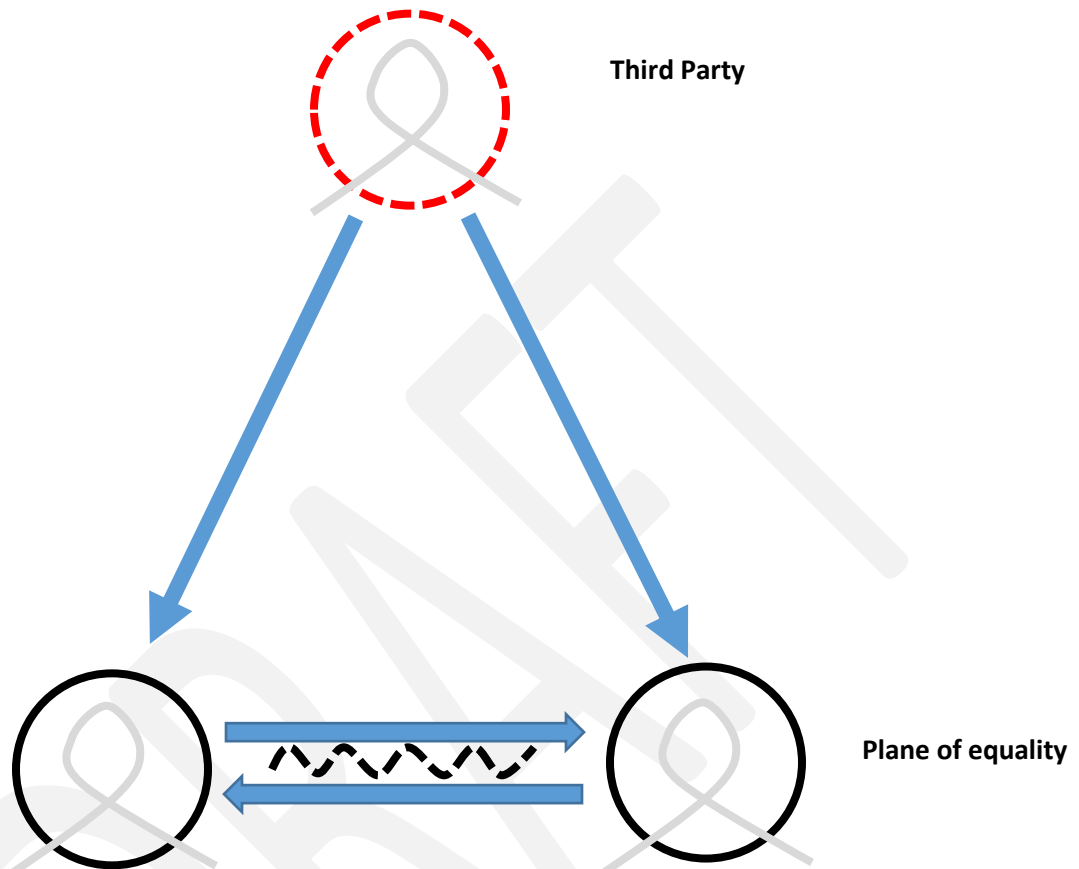


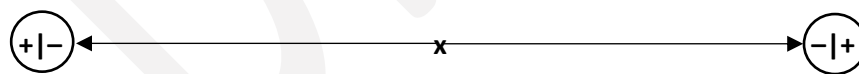
Figure 14: Equality through the transcendent Third Party

The Same and the Other enter into mutuality through exchange, which is a process of interiorization of exteriority and exteriorization of interiority. Mutuality creates a resonant bond as indicated by the wavy line. The bond has the form of co-presence or spatiality within the plane of equality. The Third Party remains transcendent to this plane, like a hidden dimension or depth or potential for emergence. The Third Party holds together the two in their relationship of mutuality, and in this relationship of mutuality each of the two becomes the other to the same. That is to say, the Third Party constitutionally governs the manifestation of the Same (I) and the Other (You) as open domains of inter-relationship. The Same and the Other form “selves” through offering up their interiority to the other as a gift from the Third Party. All the relationships are immediately proximate—the proximity of light.

Interpreters complete one another. If we consider the bond of mutuality that joins the Same to the Other, we might recognize that it has the curious property of enacting both identity and difference. The Same and the Other are different in as much as we can speak of their co-presence. Yet they are the same in as much as we can speak of a mutual exchange. The bond has the structure of ambiguity that we explored in Section 2. The simplest manifestation of such a bond is *opposition*. Opposites become opposite by virtue of an identity—opposites are identical in every sense except the sense in which they are opposite. Perhaps complementarity is a better word here than opposition⁷⁵. Opposites are *completed* through their mutual bond.

Interpreters mark their world as text. Suppose we return to our naïve image of spin as a cycle of return, a simple rotation through which interior and exterior are differentiated and brought into relationship. There are two possibilities for rotation—clockwise and counterclockwise—and these two possibilities create a binary opposition. The pair forming this opposition might be referred to as + and – (any symbolic representation of opposites will suffice here). In Figure 14 we presented the mutuality of the Same and the Other as a bond of exchange. For the pair of spins we might represent this bond in the following way: If the Same is + then the Other is –; likewise, if the Same is – then the Other is +. The pair are in a proximate relationship of resonance: each spin is differentiated from its complement by opposition, and yet neither spin is determined. **The pair exist in a state of potential disambiguation**⁷⁶. If they were to be disambiguated, then one of the pair would have a definite orientation and the other would be its opposite. Such disambiguation would be similar to naming or marking as discussed in Section 2.

Let's use this image of coupled spins as a model for exploring the emergence of spacetime from light. The coupled spins are coupled photons. They are in immediate proximity because they are light and, for light, the spatio-temporal separation (the metric) is null. The photons travel in opposite directions at the speed of light to create a straight line for us.



⁷⁵ Ekeson has developed a topological model for the interpretation of quantum reality based on the dialectic of opposing functions. The themes he explores are similar to the themes we are exploring in this paper. Kigen William Ekeson, "The Zen Interpretation: A general hypothesis concerning quantum states, individuation, and the measurement problem" (December 2015). Accessed September 10, 2016:

https://www.academia.edu/19511948/The_Zen_Interpretation_A_General_Hypothesis_Concerning_Quantum_States_Individuation_and_the_Measurement_Problem.

⁷⁶ For a more expansive treatment of this state of disambiguation, see *A physicist's guide to [Hegel's] Phenomenology of Spirit: resonance, disambiguation and the genesis of spatial orientation*.

*The resonant exchange of spin between the coupled pair results in a cycle of return, a temporality. The differentiation of the photon pair creates extension as the gap between them. The gap of indetermination that belongs to the pair as their interiority. Through this gap spatial extension increases for us as external observers (interpreters). That is to say, coupled photons create spacetime and spacetime **increases**. The law of increase is the speed of light. The mid-point—the creative **source** of this coupled pair—is the opening through which the pair might interact with and become embedded within a whole system (the system to which we as interpreters belong). The mid-point implicates the rest of the world (the system); it represents our potential observation of the coupled pair. However, the pair remain potential until they interact with the system through a terminus event. In quantum mechanics, this interaction is called measurement. Through measurement, the indeterminate opposition becomes determined. The potential becomes actual. One photon becomes + and the other becomes —. The generality of orientation is particularized in the selection of a specific orientation. The event of disambiguation is the act through which the line becomes **oriented**—symmetry is broken (i.e. created) and left can be differentiated from right as discussed in Section 2. The choice becomes marked within the system as a trace of the event that has now passed. A sign. The sign avails of interpretation by others, like text⁷⁷.*

3.2 Rest [Sabbath⁷⁸]

In the exploration above the Third Party seemed to become momentarily immanent as the mediating bond of binary opposition, as the excluded initiative of the principle of non-contradiction. The enacted opposition obeys the law of the excluded middle—once disambiguated or *determined* each spin is either + or – and the other spin is its negation. But this enacted opposition exists as the trace of the past because it only becomes actual after the fact of selection or determination.

Additionally, through the exploration we began to recognize that binary logic is embedded in a prior sameness or likeness when we realized that opposites are opposites by virtue of the fact that they are alike in every other way except the sense in which they are opposites. Opposites determine or select or abstract that sense through a process that we will call *abduction*. Abduction is the inference or actualization of an abstracted pattern that is potentially embedded in the particular; it involves a logical movement from the particular to the general.

⁷⁷ For further exploration of the relationship between text and light, see *On the relationship between the concept of text in Gadamer's theory of hermeneutics and the concept of light in Einstein's theory of relativity*.

⁷⁸ Abraham Joshua Heschel and Ilya Schor, *The Sabbath* (New York: Macmillan, 1951)

12. The embodiment of space and time

The Third Party became instantiated as a creative origin for the abduction of orientation and we spoke as if somehow this creative origin is a gateway into the general or the “rest of the world” or the *system* without really defining what we mean by that.

Now let’s focus our attention on origins using Figure 15.

DRAFT

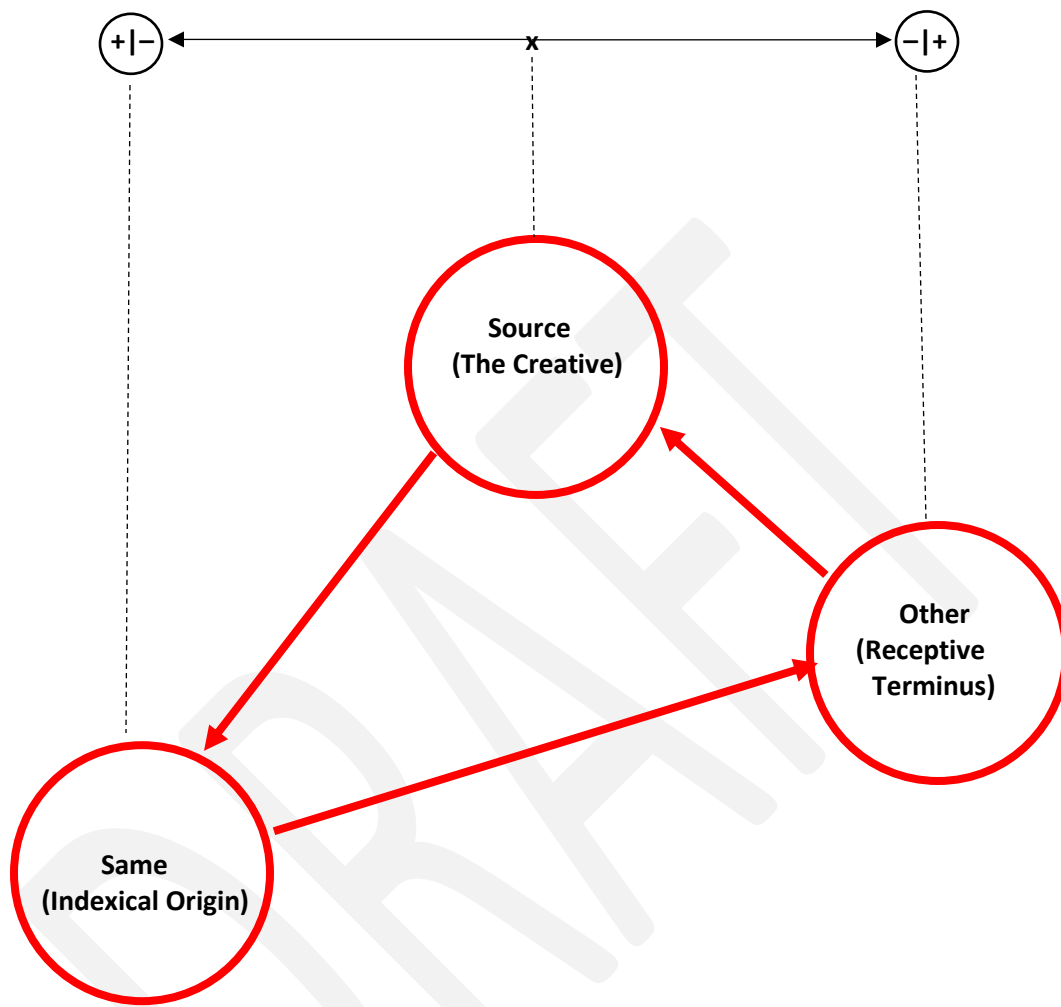


Figure 15: The form of determination or measure

The coupled photon pair is presented at the top as if it were seen under a unifying gaze as three co-present centres or origins (black circles and cross). This “theoretically transcendent” vantage is never actual; it belongs to a classical worldview. The red circles and arrows show the actualization of coupled photons within an embedded frame of reference. This is the vantage of triadic logic. The “Same” is the chosen index or origin of the frame of reference and is connected with the measuring system. The “Other” is the centre or origin of the second coupled photon from the frame of reference of the Same. It is called a receptive origin because the Other is always determined as the opposite of the Same. The “Source” is the origin for the coupled pair and brings them into relationship with the generalizing system. The Source is the creative origin for the abduction of (the logic of) orientation.

So far we have been speaking of coupled photons as if we could imagine them as unified under a common gaze or frame of reference. This imaginative vantage belongs to our subjectivity and we have been speaking of this vantage as if we transcended the system of coupled photons in order to grasp them all-at-once as purely externalized phenomena. This “transcendental vantage” belongs to the classical worldview (of binary logic) and is the vantage that we are trying to deconstruct in our investigation. In triadic logic, whenever we want to speak of a system, such as the coupled photon pairs, ***we must locate our vantage within the system***. That is to say, we must select an indexical origin to which everything else in the system is to be related.

If you are like me and working against deeply engrained habits of thinking, you might think that the most natural choice for an indexical origin would be the source (or the Creative) from which the two coupled photons emerge. However, this origin is not actual. It has no duration. It exists sometime in the past and was never observed; it is only inferred after the fact of observation or measurement. In fact, our indexical origin must be the photon that we intend to measure, the photon that interacts with our experimental apparatus, the photon that intersects with our actual subjectivity. Through the pair bond, this photon determines the orientation of the Other after the fact of observation or interaction. For that reason, I have called the other photon the “Receptive Terminus”. Notice that, from the frame of reference of the Same, the receptive terminus is not an origin. However, it is a potential origin for another frame of reference for which it would be the index.

In the classical worldview there is no difference between an origin and a terminus. The same and the other are interchangeable. The assumption of interchangeability implies a transcendental vantage for our subjectivity in which the frame of reference centred on one photon is co-present with the frame of reference centred on the second photon. The two frames of reference can be compared without loss or gain from this transcendental vantage. The transcendental vantage is the mediating still point for the interchangeability of the two (identical) origins. In the classical worldview this vantage is *spatial*. This assumption of spatially mediated interchangeability negates the possibility of any interiority to the origin, any particularity to the origin, any differentiation of the origin. It is the paradoxical proclamation of a “general particular”, of “discernable identicals”, of “is” and “is not” as explored in section 2. The mediating still point is the undermining of the law of the excluded middle that defines the binary logic of the worldview. The mediating still point is the excluded initiative of binary logic.

With triadic logic, we can locate ourselves within the frame of reference of the Same. From that frame we can interpret the Other because of the relational bond between the two. It would also be possible to locate ourselves within the frame of reference of the Other (which would now become a new indexical origin, a new “Same”). From that vantage we could interpret the

first. ***But we cannot locate ourselves within both frames of reference at the same time***⁷⁹. In the back and forth between the two frames of reference there is a gap of indetermination, a give-and-take, a resonance. A cloud of unknowing. This gap of indetermination has no correlate in the classical worldview. We have been calling this gap “indeterminate opposition” or “ambiguation”. This gap becomes the excluded initiative of binary logic. It is also the constitutional origin of the uncertainty principle of quantum mechanics.

But if we are to claim that there is a core of indetermination in the interchange between the Same and the Other, then how is it possible to speak of any determination at all?

It is through the Third Party, through the Source, through The Creative that determination becomes possible⁸⁰. The Creative mediates the interchange and brings the Same and the Other into a process of equalization. The process of equalization is an abductive process in which the Same and the Other mutually interpret one another through the exchange of information. In the case of spin, the exchange involves the simplest unit of information, the binary bit. The interpretation involves externalizing information into a general system. Through the generalizing system the external form becomes the interpretation to which all members of the system can respond uniformly. For the case of spin, the external form is called orientation.

A coupled photon pair that are separating from one another at the speed of light exist on the edge of spacetime. Despite the fact that their spatial separation increases with time, they remain in immediate proximity because the metric for their separation is null. This is a paradox that binary logic cannot contain or tame, and more profoundly, it is the paradox that forms the creative source or origin of binary logic as the computational logic of “bits” of information. Within the more expansive framework of triadic logic (recall that triadic logic reduces to binary logic in the limit of infinitely fast synchronization), we discovered that there is no frame of reference in which we can speak of the coupled photons as fully determined. Determination means determination with respect to a particular frame or indexical origin and within that frame one of the coupled pair remains an inferential reference to an “other” frame of reference that cannot be fully subsumed into the indexical frame. There is always a beyond to a particular frame that cannot be determined by that frame, although it can come into determination through the exchange of information with other frames of reference. This exchange of information is an interpretive process of signaling or communication that involves exteriorization of interiority and interiorization of exteriority. It is a process of response and counter-response that involves selection or choice.

Coupled photons separating from one another at the speed of light is an exterior image of triadic logic. But this exterior image can itself be internalized. Through the still point of the

⁷⁹ Here is where my interpretation of synchronicity differs from Bergson’s interpretation.

⁸⁰ Levinas, *Otherwise than Being*.

Creative or the source, we can imagine a coupled pair of spins that are held together in a dance in which each spin gives itself up to the other only to find it is returned again from the other. A mutual exchange of spin held together in the proximity of light.



This internalization would create a spinor which requires two cycles of return in order to synchronize with the generating spin, where each cycle corresponds to a branch of a lemniscate⁸¹. Such an internalization would present as if the coupled pair were a single entity with half the spin of a photon. Namely, a fermion such as an electron. What I want to suggest is that this interior form might be seen as the basis of matter, where matter is the formal process of stabilizing spatial structures in time. This formal process embodies the triadic logic of quantum spin. The electron exists in a state of “rest” where rest involves synchronicity with the Creative source. Unlike the classical notion of rest that invokes the image of an isolated relationship with self, in triadic logic rest involves a synchronous relationship of proximity with the Other and with Infinity.

Rest is like the relationship I might have with You in God [Acts 17.28].

3.3 Synchronicity

How are we to understand the worldview that comes from triadic logic?

The classical worldview ends in a totalizing system governed by deterministic laws. All is external, general, third person. In the classical worldview, the observed world has no duration, no freedom, no humanity, no love, no incarnation, no “I am” (see Figure 3).

⁸¹ For further exploration of this internal form, see *A physicist's guide to [Hegel's] Phenomenology of Spirit: resonance, disambiguation and the genesis of spatial orientation* and *A thought experiment with light: how the ontological form of quantum mechanics is consequent to the principles of relativity theory*. What I have described here as an internal form has also been explored as an external form by other authors. For example, Rosen, *Self-Evolving Cosmos*, explores this form as a topological (spatialized) form. Richard Gauthier explores this form as a helically circulating photon in several papers including “*The Electron is a Helically Circulating Spin-1/2 charged photon generating the de Broglie Wavelength*” (2015). Accessed August 10, 2016.

https://www.academia.edu/15272484/The_electron_is_a_helically-circulating_spin-1_2_charged_photon_generating_the_de_Broglie_wavelength. However, with triadic logic the internal form is never fully externalized. See also Ekeson, “The Zen Interpretation”.

Triadic logic arrives at a very different way of understanding creation⁸². Particular entities—be they persons or amoebas or electrons—have duration. Each is sustained through its relationship to others. By means of these relationships interior responses are communicated externally, responded to by others who in turn communicate externally to yet others. This wholistic, collective process of interpretation results in a generalizing system for those interpreters that is dynamic and evolving. The generalizing system creates an Umwelt⁸³—a tentative worldview that has significance for the ensemble of interpreters. While general in form, the Umwelt is also particular to the ensemble of interpreters. The *Umwelt* of amoebas is different from the Umwelt of electrons. An Umwelt is not a world in the classical sense; it is a model or interpretation of duration or *experience*.

By virtue of duration, a singular entity within the ensemble of interpreters becomes the indexical origin for a frame of reference—the Same. The frame of reference brings the generalizing system into a particular context. However, unlike the case with the classical worldview, this frame of reference is partial and incomplete. **A frame of reference never reduces to a transcendental vantage.** The frame of reference enters into completion because of the possibility of signaling or communication with other frames of reference. The generalizing system mediates this signaling or communication because it brings the particular into the general. Again unlike the case with the classical worldview, the generalizing system can evolve and expand and adapt as new interpretations become significant for the ensemble of interpreters. Triadic logic holds together the evolving Umwelt. The singular entity as the index or the Same is Firstness. The Other who responds to or interprets the Same is Secondness. And the generalizing system is Thirdness. Figure 16 represents this dynamical process for the simple case of electrons.

⁸² This way of understanding creation is explored in more detail in *Light signifying form: Peirce on creativity, responsiveness and emergence in quantum, biological and linguistic systems*.

⁸³ Umwelt is a term borrowed from the field of biosemiotics. For an introduction to triadic logic in biological systems, see Claus Emmeche and Kalevi Kull, eds. *Towards a semiotic biology: Life is the action of signs* (World Scientific, 2011). For a discussion of the philosophical pedigree of the concept of Umwelt, see Deely, *Purely Objective Reality*.

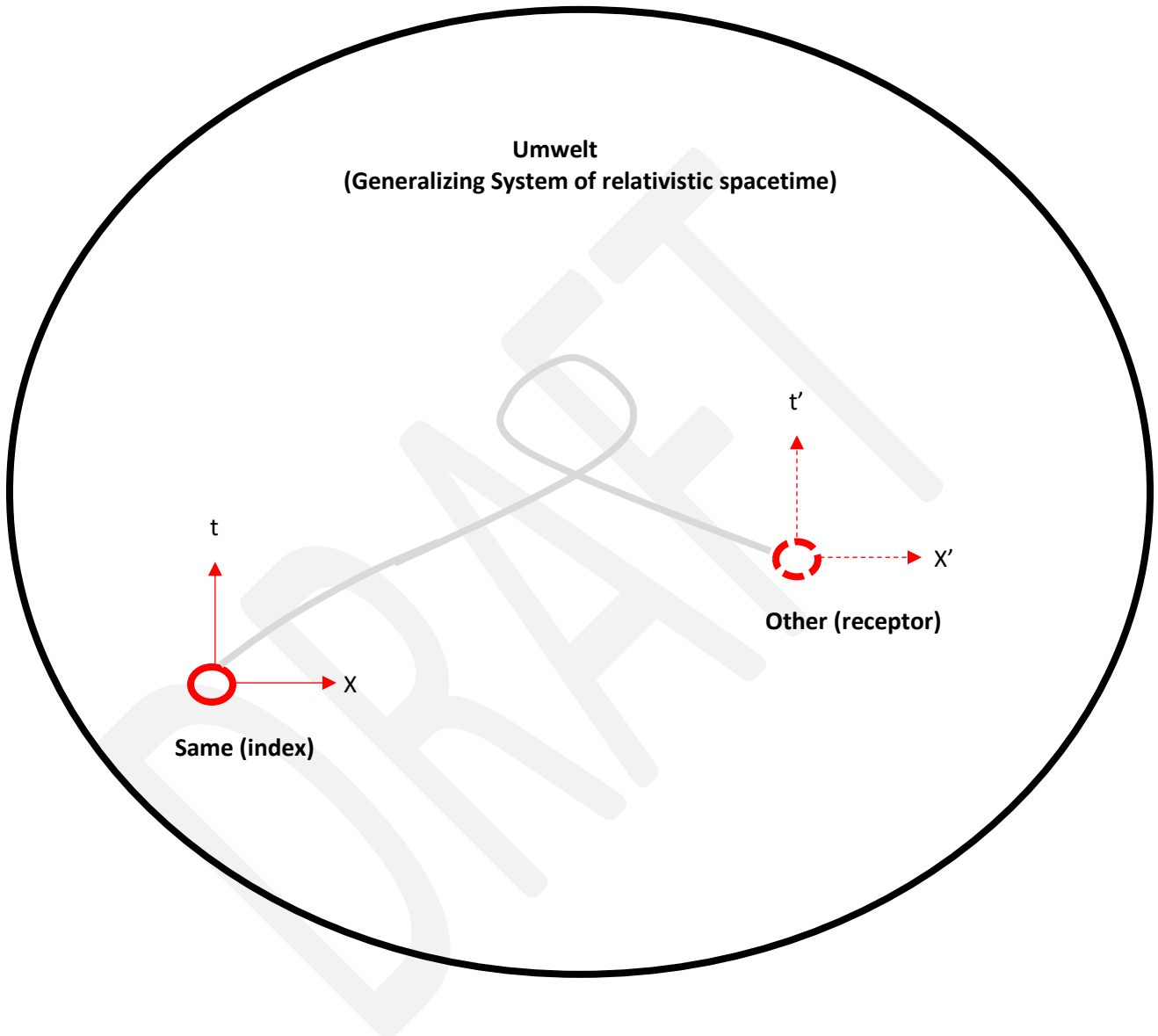


Figure 16: The Umwelt of Electrons

The frame of reference for an indexical electron (Same) instantiates the particular context. This frame is labelled with the axes x (space) and t (time). Another electron can respond to this indexical electron within the context of its own frame of reference (labelled x' and t'). This relationship of response and counter-response is mediated by the generalizing system which interprets the dynamical exchange. The generalizing system in this case is relativistic (Minkowski) spacetime. The generalizing system is an interpreted model; it is not an actualized substrate. There is always a beyond that infuses spacetime.

In Figure 16, the Same—by virtue of its interiority, its duration, its actualization—can interpret relativistic spacetime, where relativistic spacetime is the Umwelt or generalizing system of quantum spin. The Same is constitutionally in relationship with Others as particular instantiations. This relationship involves particular dualities represented by Other in the figure. The Other (as a different index) has its own frame of reference and this frame is not contained by or subsumed within the frame of reference of the Same. That is to say, the Other always maintains a proximate relationship with infinity (beyond) that is inaccessible to the Same. As a result of this incompleteness, the Other *draws out the Same* to express its interiority as external form. It is through this drawing out that the Umwelt is maintained. The Umwelt is the generalizing perspective that applies to all particulars in the ensemble.

Through the Umwelt, the Same and the Other can enter into a spatio-temporal relationship of give-and-take, of mutual exchange, of *resonance*. This resonance is a bond whose interiority is inaccessible to the generalizing system. The generalizing system only constrains or limits or determines external form. Therefore the bond between the Same and the Other allows the generalizing system to adapt and evolve—a situation that is impossible in the classical worldview.

Now for the abductive leap.

The generalizing system is not a totalizing system. Unlike the case with the classical worldview, the generalizing system is not unified through space-like structure. So in what way can we say that it has unity?

The generalizing system is itself the interiority of a particular entity. Its duration creates a global temporality that is an *internal form* for the generalizing system but an *external form* for the particular entities who constitute the generalizing system. Through the duration of the generalizing system, the Same and the Other (within the system) can synchronize their particular durations or temporalities. This process of synchronization, in turn, is what sustains the generalizing system as a wholistic entity. The term used in quantum mechanics to describe this synchronicity is coherence. As long as the Same and the Other remain within the particular generalizing system they are coherent and mutually interpreting. However, because the generalizing system is a particular entity, it is also a “Same” that is in relationship with an “Other”, although this relationship is formed at a higher level of abstraction.

The result is an embedded hierarchy of systems that involve interpretations at multiple levels⁸⁴. (For example, electrons within molecules within cells within bodies within ecosystems.) As long

⁸⁴ For a further exploration of this hierarchical ordering, see Rogers, “Light Signifying Form”.

12. The embodiment of space and time

as a particular entity remains synchronized within a particular system, it enters into an interpretive relationship with other entities in that system. However, it is possible for a particular entity to de-synchronize from a given system—a processes called de-coherence in quantum mechanics. And it might then become synchronized with another particular system. In this process, interpretation is ruptured. I will leave it as an exercise for the reader to apply this way of thinking to the problem of the twin paradox in relativity theory⁸⁵.

Depth manifests in embedded hierarchies. At each level of the hierarchy, systems unify their constituents to the extent that they are, in turn, unified by their bonds to the Other and to Infinity. Parts belong to the whole of which they are a part and wholes enable the individuation of parts. The processes of semiosis through which interiority (representation) is externalized and exteriority (embodiment) is internalized maintains the hierarchy. The body is unified through a process of identity formation in which the signifier of the whole is broken, shared and inwardly digested by each member of the collective.

This image, this central metaphor, brings us to the terminus of our investigation: An insight through which we might enter into a contemplation of the Christian mystery of the Body of Christ⁸⁶ [John 19], [John 6.32-35,50-51; Ephesians 4.1-16; Matthew 17.1-9].

⁸⁵ Along the lines of Bergson, *Duration and Simultaneity*.

⁸⁶ Teilhard de Chardin, *Phenomenon of Man*, trans. Bernard Wall (New York: Harper and Row, 1959).

Before completion

*deep may
beneath the budding maples
snow*

*along the limestone path
a pale yellow flower
recedes with the sun*

*beneath moon-traced clouds
fingertips touching
petals of a trillium*

Acknowledgements

This thesis is the culmination of a long journey and I would like to thank the many people who have helped and supported me along the way, as well as a host of authors present and past.

I want to particularly thank Jim Olthius for introducing me to “theopoetics” and David Neelands for encouraging me to follow my intuition even when it wasn’t clear where it would lead. I also want to thank Peter Sheridan for his personal guidance.

*Thanks be to you, God, for your unspeakable gift.
[II Corinthians 9.15]*

References

Augustine. *Confessions*, trans. H Chadwick, Oxford: Oxford University Press, 2008.

Augustine. *The Trinity*, second edition. trans. Edmund Hill, ed. John E. Rotelle, New York: New City Press, 2012.

Barbour, Julian. *The End of Time: The next revolution in our understanding of the universe*, New York: Oxford University Press, 1999.

Bergson, Henri. *Duration and Simultaneity with reference to Einstein’s theory*, trans. Leon Jacobson, New York: The Bobbs-Merrill Company Inc., 1965.

Birchell, B.C. “Hegel’s Notion of Aufheben,” *Inquiry* 24(1) (1981): 75-102.

Bitbol, Michel. “Does Quantum Mechanics Require New Forms of Thought? Towards Formal Epistemology,” in *Quantum Mechanics, Mathematics, Cognition and Action: Proposals for a Formalized Epistemology*, ed. M. Mugur-Schächter and A. Van der Merwe, Vol. 129. Springer Science & Business Media, 2003.

Buber, Martin. *I and Thou*, trans. Walter Kaufman, New York: Touchstone, 1970.

Canales, Jimena. *The Physicist and the Philosopher: Einstein, Bergson and the debate that changed our understanding of time*, Princeton University Press, 2015.

12. The embodiment of space and time

De Chardin, Teilhard. *Phenomenon of Man*, trans. Bernard Wall, New York: Harper and Row, 1959.

Deely, John. *Purely Objective Reality*, Semiotics, communication and cognition Vol 4, New York: De Gruyter Mouton, 2009.

Ekeson, Kigen William. "The Zen Interpretation: A general hypothesis concerning quantum states, individuation, and the measurement problem" (December 2015). Accessed September 10, 2016:

https://www.academia.edu/19511948/The_Zen_Interpretation_A_General_Hypothesis_Concerning_Quantum_States_Individuation_and_the_Measurement_Problem .

Emmeche, Claus and Kull, Kalevi, eds. *Towards a Semiotic Biology: Life is the action of signs*, World Scientific, 2011.

Frye, Northrop. *Words with Power: Being a Second Study of "The Bible and Literature"*, Toronto: Penguin Books, 1990.

Gaskin, Richard. "Identity and Reference in a Black Universe." Accessed February 13, 2016.

https://www.academia.edu/19755831/Identity_and_Reference_in_a_Black_Universe .

Gauthier, Richard. "The Electron is a Helically Circulating Spin-1/2 charged photon generating the de Broglie Wavelength," 2015. Accessed August 10, 2016.

https://www.academia.edu/15272484/The_electron_is_a_helically-circulating_spin-1_2_charged_photon_generating_the_de_Broglie_wavelength

Goldstein, Rebecca. *Incompleteness: The proof and paradox of Kurt Godel*, New York: WW Norton & Company, 2005.

Hegel, GWF. *Phenomenology of Spirit*, trans. AV Miller, Oxford: Oxford University Press, 1977.

Heschel, Abraham Joshua and Schor, Ilya. *The Sabbath*, New York: Macmillan, 1951.

Hofstadter, Douglas. *Godel, Escher, Bach: an eternal golden braid*, New York. Vintage Books, 1980.

[unknown author]. *I Ching*, trans. Richard Wilhelm and rendered into English Cary Baynes, Princeton: Princeton University Press, 1990.

Knuth, Kevin and Bahreyni, Newshaw. "A Potential Foundation for Emergent Space-Time," *Journal Math Phys* 55 (2014) : 112501. Accessed September 10, 2016

<http://scitation.aip.org/content/aip/journal/jmp/55/11/10.1063/1.4899081>

12. The embodiment of space and time

Levinas, Emmanuel. *Totality and Infinity: an essay on exteriority*, trans. Alfonso Lingis, Pittsburgh: Duquesne University Press, 1969.

Levinas, Emmanuel. "The name of God according to a few Talmudic texts," in *Beyond the verse: Talmudic readings and lectures*, trans. Gary D Mole, Bloomington: Indiana University Press, 1994.

Levinas, Emmanuel. *Otherwise than Being or Beyond Essence*, trans. Alfonso Lingis, Pittsburgh: Duquesne University Press, 2002.

Marx, Karl. "Commodities and Money," in *Capital*. Great Books for the Western World Vol 50, ed. Friedrich Engels, trans. Samuel Moore and Edward Aveling, Chicago: University of Chicago, 1952.

Peirce, Charles Sanders. "Evolutionary love," *Monist* III(1) (1892).

Peirce, Charles Sanders. "Law of Mind," *Monist* II (1891).

Peirce, Charles Sanders. "The Architecture of Theories," *Monist* I(2) (1891).

Peirce, Charles Sanders. "A Guess at the Riddle", 1887-8. Accessed January 10, 2015. <http://www.iupui.edu/~arisbe/menu/library/bycsp/guess/guess.htm> .

Rosen, Steven. *The Self-Evolving Cosmos: A phenomenological approach to nature's unity-in-diversity*, Series on Knots and Everything Vol 18, Hackensack NJ, World Scientific Publishing Company, 2008.

Smolin, Lee. *The trouble with physics: The rise of string theory, the fall of a science, what comes next*, Boston: Houghton Mifflin, 2006.

Smolin, Lee. *Time Reborn: From the crisis in physics to the future of the universe*, New York: Houghton Mifflin Harcourt, 2013.

Somers-Hall, Henry. "Heidegger, Ontotheology and the Foundations of Formal Logic" [draft]. Accessed September 28, 2016 https://www.academia.edu/28442778/Heidegger_Ontotheology_and_The_Foundations_of_Formal_Logic .

Vassallo, Antonio and Esfeld, Michael. "Leibnizian Relationalism for General Relativistic Physics", preprint, 2016. Accessed September 10, 2016. https://www.academia.edu/28019019/Leibnizian_relationalism_for_general_relativistic_physics

12. The embodiment of space and time

Wallace, David Foster. "Richard Taylor's 'Fatalism' and the Semantics of Physical Modality," in *Fate, Time, and Language: An essay on free will*, eds. Stephen Cahn and Maureen Eckert, Columbia University Press, 2011, 142-216.

[unknown author]. "Peano Axioms" in *Wikipedia*. Accessed September 10, 2016.
https://en.wikipedia.org/wiki/Peano_axioms

Zuckerlandl, Victor. *Sound and Symbol: Music and the external world*, New York: Princeton University Press, 1973.

Zwicky, Jan. *Wisdom & Metaphor*, Kentville, Nova Scotia: Gaspereau Press, 2003.

DRAFT

Embodied individuation

DRAFT

13. Word, identity and the relational form of the individual in Paul's *Letter to the Romans*

Introduction

Hear O Israel, the Lord our God, the Lord is One
[Deut 6.4; Mark 12.29]

If God is One, then nothing else in creation is one except through participation in God, neither things, neither ideas, neither persons. So how are we to speak of one and how are we to understand unity in the things of our world or the thoughts of our minds? A false mental image of unity—a false *idea*—is as dangerous an idol for us as were the embodied idols in the time of Moses. This is the troubling motivation for the exploration.

In *Letter to the Romans*, Paul describes a journey or path from the *one man* Adam—through whom sin and death entered into the world—to the *one man* Jesus—through whom grace and salvation comes. This journey, the way of the Cross, will be the light illuminating our exploration of mental images of unity. Paul's letter will be interpreted by overlaying a Patristic reading with contemporary methods of literary criticism. The intention of the overlay is to both enable and disrupt analytical, rational thinking, which in itself is "like some labyrinth or puzzles which have no end to them any where, and do not let the reason stand upon the rock, as having their very origin in vanity" [Chrysostom, II:1.17]. If successful, the disruption will also be an opening in which a false image of unity is unmasked and orientation to the transcendent illumination of Truth is disclosed.

Specifically, through a close reading of Chrysostom's *Homilies on Romans* [1861] we will trace formal contours or *figurations* of individuation in Paul's writing, with a focus on the tropes of typology, analogy and anagogy. These tropes, through which identity is formally announced by likenesses, will be re-read through the contemporary literary tropes of metaphor and symbol. With *metaphor*, two things are said to be the same when they manifestly are not the same and it therefore involves a logical contradiction [Frye 1992, 71-2]. A metaphor is a meta-image, "a way of showing how patterns of meaning in the world intersect and echo one another" [Zwicky 2003, 6]. A *symbol* is something that "may be of limited interest or value in itself, but points in the direction of something that can be approached directly only with its help" [Frye 1992, 109]. A symbol is a sign, yet it can also be more than a sign. With a sign, the thing signified reduces to rational knowledge and there always remains a semantic gap between signifier and signified; a symbol can go behind such rational signification to lead to an epiphany in which the whole of the symbol manifests or participates in the reality of what is signified [Frye 1992, 109-10; Schmemmann 2002, 141-2]. Thus with metaphor identity operates on two levels

simultaneously—the experiential or literal level and the meta level of abstracted form. Through symbol these two levels might converge.

The premise of the exploration is that all images of unity are relational and no image of unity rests in-itself. Although it may appear innocuous, this premise implicates a radical un-grounding of modern analytical approaches to discursive argument insofar as they seek to totalize meaning within fixed systems of definition [Levinas 2002; Deely 2009]. To assist us in remaining conscious of this trap of a mental image that rests “in-itself”—an image whose very relational form is the false image of unity we are attempting to unmask—the exploration is organized in four levels similarly to the way Frye organizes his discussion of literary levels or modes [Frye 1992]. Each level flows from an *excluded initiative* of the previous level, where an excluded initiative is a centrally present but largely unexamined assumption [Frye 1992, 7]. Thus the levels come into definition relationally and holistically, through their essential dependence on one another. Each level begins with an optional poem that is related to, but other than, the exploration. An epilogue situates the logical form.

1. Time

now time is a knife
slicing words into images

my eyes betray me
there is grit on my tongue
from the desert wind

beneath the beautiful philosophies
a terror is bartered among thieves

*voices can be hammered into weapons
desire can be conjured from the night
what is truth?*

in the ancient places
your wisdom seems silent as stone

where are you now
that the moon knows blood?

[First published in [Numinous: Spiritual Poetry](#)]

In Chrysostom's reading of Romans, the one man Adam is a type for the one man Jesus and the narrative of the expulsion from the garden of Eden [Gen 2-3] formally discloses the condition of humanity in the present world [Chrysostom, X:5.12-3]. As a work of literature, this narrative has the following symbolic form. God creates a single man Adam from the earth and breathes into him the breath of life. However, God says (to us) that the singularity or *aloneness* of Adam in-himself is not good [Gen 2.18], so he creates a companion Eve, a likeness to Adam who is also another and bears within herself the rest of humanity as potential. The two—male and female—are created in the image of God [Gen 1.27]. In this beginning, Adam is in a loving relationship to Eve, and through her to all of humanity, and both Adam and Eve are united with God. In the garden of Eden, Adam is a symbol of a relational “self” and Eve is metaphorically the Other to Adam. The Serpent deceives them by promising that they could become “like God” in themselves [Gen 3.5], despite the fact that they are already created in the image of God. When Adam and Eve eat from the tree of knowledge, they become aware of good and evil. But having no knowledge of righteous judgement, they become afraid of God when they cannot discern his Infinite goodness. Their former relationship to God and to one another, a relationship of implicit trust or faith, is ruptured. Adam's self-image is changed from a relational one (*being for another*¹) to one of aloneness (*being for itself*) and he becomes a symbol of a false image of unity. Schmemmann says of the fruit of the tree of knowledge: “it was food whose eating was condemned to be communion with itself alone, and not with God. It is the image of life understood as an end in itself” [Schmemmann 2002, 61].

Through transgression, the unity of male and female is turned into two parts in opposition to God. Chrysostom sees in this rupture a type that describes the breakdown of all human relationships, provoking war among people, both against one another and against themselves [Chrysostom, IV:1.26-7]. Sin and death enter the world and are propagated throughout. Figuratively, there is a fall from an eternal communion with God to a temporal existence in which false images of unity—idols whose end are in themselves—reflect the fallen state of humanity, a “fallen away from the awareness that God is all in all” [Schmemmann 2002, 16].

Like time itself, the fallen state is characterized by its transience. Chrysostom likens it to sleep and the things in it to dreams:

But when you hear me speak of sin, do not think of it as a substantial power, but evil doing, as it comes upon men and goes from them continually, and which, before it takes place, has no being and when it has taken place, vanishes again [Chrysostom, XII:7.13].

¹ The terms “Being for itself” and “Being for another” are borrowed from Hegel [1977]. Levinas [2002] draws a similar distinction, although he sees the distinction operating on a much deeper level. For him, “Being for itself” is the category of entities and systems and he calls it simply “Being” (or the Said); being for another is then an ethical condition of possibility for being that he calls “Beyond Being” (or the Saying). Augustine [2008] even more simply distinguishes Being from Life.

Moreover, the fallen state involves a type of darkness [Gen 1.2] in that individuals cannot see on their own how far their condition is from the goodness and glory of God and they lack the power of getting free [Chrysostom, XI:6.18].

In the story of the garden of Eden, the relational open image of unity in which Adam and Eve were created is transformed into a closed and empty image of nothingness or death as a result of transgression and sin. The excluded initiative of the temporal level is *law* that opens to wisdom and corrects judgement.

2. Law

a man is running towards me on king street he's
carrying an attaché case and his trench coat open
black flaps with the motion between us
is a man half sitting half sprawled on the
sidewalk without missing a step
the businessman leaps the drunk in a single
bound

The world is a system of teaching. Wisdom, or natural law, allows us to ascend to God through contemplation of things seen in His creation [Chrysostom, III:1.20]. Through transgression and sin, however, humanity's understanding of God's creation was corrupted and a metaphorical blindness ensued.

God set before them, for a form of doctrine, the world; He gave them reason, and an understanding capable of perceiving what was needed. None of these things did the men of that day use unto salvation, but they perverted to the opposite what they had received [Chrysostom, III:1.24].

Sin corrupts *intention*, so that knowledge for the glory of God is perverted into knowledge *for itself*. Human judgement is like a mirror [Romans 2.1]. In seeing the sins of others, we recognize the sin within ourselves. A metaphorical identity obtains between the judger and the judged that is the essence of equality. Perversion happens when an individual assumes an unequal stance of superiority towards the other [Chrysostom, V:2.11]. Because righteous judgement is from God, such a stance *for itself* is against divine law and is *false in itself*. False judgement increases sin like mirrors reflecting one another propagate a multiplicity of images.

Divine law came through Moses to the Israelites—through an individual to an individual people or community². It brings distinct knowledge of sin [Chrysostom, VII:3.20] and in this sense is corrective. However, the essence of divine law is not in its rational interpretations, rather it is in the covenantal relation it creates between God and His people [Wright 2014]. Divine law brings knowledge of righteous judgement, where righteous judgement, or *justification*, means that the righteousness of God is manifested as the fruits of the action of the individual (person or community) [Chrysostom, VII:24-5; Wright 2014]. Divine law *orients intention* away from self and towards God such that a righteous individual is one who becomes a signifier of the Word of God.

The essence of divine law and its relational fragility is symbolically portrayed in the story of Moses' descent from Mount Sinai with the stone tablets of the covenant [Exodus 32]. In his absence, the Israelites fashioned for themselves an idol and worshipped it as God. Upon seeing the idol, Moses breaks the tablets—a symbolic breaking of the unity of the covenant. He grinds the idol into dust, scatters it upon the water and makes the people drink it—symbolically revealing the false unity of the idol. Then Moses manifests to the people the violent and bloody breakdown of love between brother, friend and neighbour that the idol represented.

While divine law can lead to repentance and turning toward God, in itself it cannot bring salvation [Chrysostom, VII:3.24-5]. If “there is not one who is righteous, not even one” [Romans 3.10], then sin and its false images abound and there is no rock to stand upon, no unifying identity that can draw all people into a true image of God. The glory of divine law is not in the rationalization of its signs as tokens of righteousness. Rather, the glory of *Torah* is that it reveals the Lord as teacher. The excluded initiative of law is faith that opens oneself to the Word of God.

² Note that Moses is not the same type as Adam. Whereas Adam was the progenitor of the whole of humanity, Moses relation is to a particular people or community *that is in relationship with other communities*. So the whole, to which Moses is connected, is a relational unity within humanity.

3. Faith

*night windowblack returns
within*

*yet in deeper still come forms
a landscape*

*reflecting penetrating
two lights
two darknesses*

through a pane of glass

eyes
no eyes

According to Chrysostom, faith *establishes* law by establishing its intention and thereby perfecting it [Chrysostom, VII:3.31]. While the significance of law is righteousness, without faith it has no power to make a person righteous because all have sinned.

Abraham is the pro-type of the faithful individual. After offering his son as sacrifice, Abraham's faith is established and it becomes a blessing to his offspring and *to all nations* [Gen 22.17-19]. Recognizing that a nation, or a "people", is another form of relational unity, it becomes possible to trace in Chrysostom's discussion of faith, a relational dialectic of the sign as the working of faith [Chrysostom, VI:2.17-3.7]. He sets two peoples in relation to one another—the Israelites who have divine law and the Greeks (metonym for Gentiles) who have natural law. Divine law is written and lies on the "outside", while natural law lies within. The Israelites are marked in the flesh by circumcision as the sign or seal of faith. For themselves, this sign represents ethnic identity through generation from the body of Abraham. However, because the Israelites and their neighbours, the Greeks, are in relation, there is a third "law of action" —*justification*— connecting the intentionality of divine law with the wisdom of natural law:

For that which is by writing [Divine law] lieth outside; but this is within, the natural [law], and the other [law] is in actions. And one the writing proclaims; and another nature; and another, action. Of this third there is a need for which sake also those two are both the natural and the written [Chrysostom, VI:2.25].

As a result of this threefold relatedness, circumcision as a sign of faith is freed from its bodily marking to signify something beyond, namely "circumcision of the heart", that is available to all. The sign has true intention because of the covenantal relation of the Israelites with God through divine law; yet through relation with the Greeks and natural law, it also comes to signify an identity that transcends the ethnic identity of the flesh and becomes an inward-pointing signifier of true wisdom.

The relational dialectic of the sign, rooted in faith, opens up markings of the flesh to spiritual significance. This relational dynamic depends on the bond between neighbours, both neighbouring persons and neighbouring peoples or communities. Spiritual significance is always collectively formed and its truth comes from a covenantal relationship with God. The excluded initiative of the sign is the sacrament through which the sign of faith and its signified wisdom are brought into one.

DRAFT

4. Sacrament

as light scatters from morning mist
all is subtly born
in shape and form alone

a loon calls
through the grey
dream of the blood moon

dream related
to the architecture of water

the sound of this paddle
dipping beneath the surface

blurred
echoes
echoing

in the beginning
I am

*I am
in the beginning*

*echoing
echoes
blurred*

*dipping beneath the surface
sound of this paddle*

*to the architecture of water
dream related*

*of the blood moon
through the grey
a loon call*

*in shape and form alone
all is borne
as light scatters*

The sign of faith draws individuals into relationship, into the *nearness* of neighbours, as symbolically represented by the relationship between Israelites and Greeks. At the same time it lifts them up, beyond the markings of the flesh, to the spiritual level of signification. Through this sign the vantage shifts, so to speak, from individuals *in-themselves* to relationality, to the very site where sin corrupts the bonds of love. And the between-ness of neighbours is, by metaphorical extension, the between-ness of members of a whole, and the between-ness of the flesh and the Spirit. Here in the between-ness, neither flesh nor Spirit, Paul locates the “law of sin”: *But I see another law warring against the law of my mind, and bringing me into captivity* [Romans 7.23].

[Paul] does not use the word conquering only, but *bringing me into captivity to the law of sin*. He does not say the bent of the flesh, or the nature of the flesh, but, the law of sin. That is, the thrall, the power. [Chrysostom, XIII:7.23].

Through sin, individual persons become isolated from God and from one another, like dust on the water. This isolation leads to death. The sign of faith re-constitutes the bonds of love such that individuals regain their relationality, they become members of a whole.

But in itself, a sign is merely a sign. It has no power to reconstitute the world. In order for a transformation to occur, the sign must be the living Word of God. It must become a sacrament.

According to Schmemmann, “symbolism is the essential dimension of the sacrament, the proper key to its understanding” [2002, 139]. Whereas a sign signifies an object of intellectual knowledge—an *idea*—a symbol involves participation in the reality of what is signified. The symbol reveals the other as *Other* such that knowledge “depends on participation—the living encounter with and entrance into that ‘epiphany’ of reality which the symbol is” [Schmemmann 2002, 141]. The early Church Fathers understood the world in this symbolical way:

the world is symbolical ... in virtue of its being created by God; to be symbolical belongs thus to its ontology, the symbol being not only the way to perceive and understand reality, a means of cognition, but also a means of participation [Schmemmann 2002, 139].

Schmemmann [2002, 140] goes further to say that in this symbolical worldview, a sacrament is the fulfillment of the symbol by Christ [John 1.1-5]. A sacrament is a moment in which the eternal and the temporal might become one. The entrance into the Kingdom of Heaven is sacramental.

The first sacrament is Baptism. In Baptism we enter into the death of Christ—a death to the fallen world—in order to share in His victory over sin and death [Romans 8.3-4]. Through Baptism we are born of the Holy Spirit and become members of His Risen Body [Romans 12.4-5]. Our identity is transformed into a temple for the presence of God [Wright 1998], a living encounter with the person of Jesus in whom “the whole fullness of deity dwells bodily” [Col 2.9].

Through this new relational identity in Christ, the sacramental promise of creation might be said to dawn [Gen 1.3; John 1.4-5]

Epilogue: Patristic guidance for a simple Christian philosopher in a postmodern world

Come now, and let us reason together ...
[Isaiah 1.18]

At the end of Acts, St Paul enters Rome to proclaim the Gospel “without hindrance” [Acts 28.31]. The next canonical encounter is St Paul’s Letter to the Romans, through which there is a formal transition from the exterior perspective of a narrative journey, to an interior perspective of (written) thoughts.

In his Homilies on Romans, St John Chrysostom traces two forms appropriate to this interior perspective of *thinking*, namely, argument and analogy. The two forms work together for him. Argument provides reasons for faith, but if left to themselves reasonings are “like some labyrinth or puzzles which have no end to them any where, and do not let the reason stand upon the rock, as having their very origin in vanity” [Chrysostom, II:1.17]. Analogy, which by its very nature points beyond its constitutional images, can orient us to the Truth. Yet it risks finding its end in creatures rather than the Creator [Chrysostom, III:1.19-23]. While each of these forms of thinking is vain in itself, St John shows how the two come together in St Paul’s writing through *Faith* which is their origin and foundation [Chrysostom, II:1.17].

St John’s eleventh homily begins with an analogical ascent to a vision of the *meaning* of Jesus’ Death and Resurrection that is the orienting light for his entire reading of St Paul’s letter to the Romans [Chrysostom, XI:5.5-11]. He comes to this vision by first tracing St Paul’s argument for the work of Christ. Roughly sketched, the argument is that death entered into the world through the sin of one man, namely Adam [Chrysostom, X:5.12-14]. Once entered, sin and death propagated and prevailed because through that one man all have sinned [Chrysostom, X:5.12]. As sin and death multiplied, grace and life abounded even more [Chrysostom, X:5.15-17]. However, humanity could not see their state of sinfulness and lacked the means to change their fallen state by themselves [Chrysostom, IV:1.26-27]. Law entered, bringing distinct knowledge of sin, like a reflection in the mirror [Chrysostom, VII:3.20; VIII:4.12]. However, it was only with the Incarnation, Death and Resurrection of Jesus that one man, by fulfilling the Law in obedience to the Father, was able to overcome sin and death [Chrysostom, X:5.15-19]. St Paul writes: “For as by one’s man’s disobedience many became sinners; by the obedience of One shall many be made righteous” [Romans 5.19]. Moreover, because Good and evil are not equals [Chrysostom, X:5.14], Christ did infinitely more good than Adam did harm [Chrysostom,

X:5.16]. Jesus gave humanity remission of sins, justification by faith, grace and blessings, and the promise of eternal Life.

St Paul's argument, as traced by St John, brings us to the foot of the Cross and prepares us for a contemplation on what it means to participate in the Life of Jesus. That contemplation is condensed in Romans 6.5 and unpacked in two parts by St John [Chrysostom, XI:6.5].

For if we have been planted together in the likeness of His death ...

St John describes this planting as becoming dead to sin [Chrysostom, XI:6.7; X:6.2]. It is accomplished by Jesus in Baptism, a Baptism into His Death, with a view to our dying as He died [Chrysostom, XI:6.6; X:6.3-4]. In using the word "planting", St Paul alludes to the fruit of the Resurrection. The "likeness" through death brings two together into one, yet both remaining distinct [Chrysostom, XI:6.5; X:6.3-4]. Jesus died in the flesh on the cross and was buried in the earth. Our death at Baptism is to sin and we are buried in water. Both are deaths, but not of the same subject [Chrysostom, XI:6.5]. St John writes that, for us, the "man of sin" dies but not our essence [Chrysostom, XI:6.5]. Herein lies the miracle, in Baptism our essence is united with Christ. Moreover, St John writes that Jesus' Death on the cross is the very reason of his being immortal—the death of death. "Because He did die, He therefore did not die" [Chrysostom, XI:6.9]. This paradox discloses a limit to reason, which St Paul also refers to allegorically as the foolishness of the Cross to the Greeks [1 Cor 1.23].

... we shall be also in the likeness of His resurrection.

Just as we die in the likeness of Christ's Death at Baptism, so we can share in the likeness of His Resurrection. Through death, our old life in sin vanishes and a new life in righteousness is lived [Chrysostom, XI:6.13-14]. By "righteousness", St John means that we are able to manifest the righteousness of God in our lives [Chrysostom, VII:3.21-25]. As helper, the gift of the Holy Spirit, the Spirit of Truth, is given to us in the present life [John 14]. But St John's insight goes much deeper. He writes that the passage means that we share in the *reality* of the Resurrection [Chrysostom, XI:6.5]. Not just a likeness of two separate subjects, there is a union intended. This union, the essence that is revealed through Baptism, is the promise of Resurrection into eternal Life [Chrysostom, XI:6.5]. With this orientation of *Hope*, the blessings we receive after Baptism in the present life bear the fruit which provide reasons for our faith in eternal Life.

What part do we play? Using the Prodigal Son as a type, St John writes that we need to return to the Father's house. "Do but put a beginning on the business, and the whole is done" [Chrysostom, X:6.3-4]. This return is a return to loving God, for His "exceeding desire to be loved, comes from loving exceedingly"[Chrysostom, X:6.3-4].

Adam transgressed through sin, but the exceeding Love of God overcomes that transgression through faith in Christ. In His Light, we return to a true Love of God. Using argument, and oriented to Truth through an analogical ascent whose completion is the Person of Jesus, St John

and St Paul together offer us guidance in our reading towards a deeper understanding of the *Love of God*.

Jesus saith unto him, I am the way, the truth, and the life
[John 14.6]

References

Augustine. *Confessions*. Transl. by H Chadwick. Oxford: Oxford University Press, 2008.

Chrysostom, John. *The Homilies of S. John Chrysostom Archbishop of Constantinople on the Epistle of Paul the Apostle to the Romans*. Transl by John Henry Parker. Oxford: Baxter, 1861. Because the Homilies are structured according the Chapters and Verses of Romans, I have used the following citation format [*Homily Number: Chapter.Verse*].

Deely, John. *Purely Objective Reality*. New York: De Gruyter Mouton, 2009.

Frye, Northrop. *Words with Power: Being a second study of "The Bible as Literature"*. Toronto: Penguin Books, 1992.

Hegel, GWF. *Phenomenology of Spirit*. Transl by AV Miller. Oxford: Oxford University Press, 1977.

Levinas, Emmanuel. *Otherwise than Being or Beyond Essence*. Transl by Alphonso Lingis. Pittsburgh: Duquesne University Press, 2002.

Schmemmann, Alexander. *For the Life of the World: Sacraments and orthodoxy*. Crestwood NY: St Vladimir's Seminary Press, 2002.

Wright, Nicholas Thomas. *What Saint Paul Really Said: Was Paul of Tarsus the Real Founder of Christianity?* Grand Rapids: Wm. B. Eerdmans Publishing, 2014.

Wright, Nicholas Thomas. Jesus and the Identity of God. *Ex Auditu*. 1998, 14: 42-56.

Zwicky, Jan. *Widsom & Metaphor*. Kentville NS: Gaspereau Press, 2003.

14. Towards the case against reductionist theories of evolution

Drawing on insights from modern physics and post-modern philosophy, this paper explores of the structural foundations of evolutionary theory. Gould's archetypal form for theories of evolution is used, which involves the interdependence of agency (locus of action), efficacy (causal mechanism), and scope (domain of applicability). It is argued that the (meta-physical) assumption of reductionism, which is often assumed by interpreters of evolutionary theories, is not consistent with the archetypal form. A reframing of the theoretical underpinnings of evolutionary theories is proposed that avoids reductionism while also remaining open to theological concerns.

*Return is small, yet different from external things
— I Ching*

Introduction

One of the major theological challenges posed by the success of Darwin's theory of evolution is the bleak portrait of life it appears to present. Put bluntly, how, in the face of evolution's seemingly random, meaningless suffering and self-serving, is it still credible to speak of a purposeful, just and loving God? Most theological responses to, what Haught calls, the "cosmic pessimism" of evolution have been framed as theodicies or apologies for religious hope *despite* what the theory tells us [Haught 2000; Southgate 2002]. Scientific credibility, to the extent that it is sought at all, comes from displaying the consonance of religious belief with conventional interpretations of evolutionary science [Haught 2000, 106]. In this paper, I take a different approach. By careful examination of the foundations of evolutionary theory, I argue that a hermeneutic of pessimism, meaninglessness and self-centredness commonly read into the theory come from implicit metaphysical commitments—similar to those of classical physics—which are at least questionable and perhaps even inconsistent with the theory itself. The most significant problem, I will attempt to demonstrate, is the assumption of reductionism. Drawing from insights of modern physics and post-modern philosophy (especially Brian Cantwell Smith 1998 and Emmanuel Levinas 1998), I offer a re-framing of the theoretical underpinnings of evolution that provides tremendous openness to theological concerns.

Archetypal evolutionary theory

Evolutionary theory today is remarkably subtle, complex and full of controversy. However, the essence of the theory is still captured by Darwin's original insights, which were succinctly put forth in the introduction to his book *On the Origin of Species*:

14. Against reductionistic theories of evolution

"As many more individuals of each species are born than can possibly survive; and as, consequently, there is a frequently recurring struggle for existence, it follows that any being, if it vary however slightly in any manner profitable to itself, under the complex and sometimes varying conditions of life, will have a better chance of surviving, and thus be *naturally selected*. From the strong principle of inheritance, any selected variety will tend to propagate its new and modified form." [Darwin as cited in Shanahan 2004, 14].

Gould has eloquently argued that the Darwinian picture can be thought of as an archetypal form for all evolutionary theories [Gould 2002, 1-89]. He notes three interdependent aspects that are crucial to the structure of the archetype: agency, efficacy and scope. *Agency* refers to the locus of action of the evolutionary mechanism, which in the Darwinian picture is the individual organism. *Efficacy* refers to the causal mechanism, which is natural selection. *Scope* refers to domain of applicability, which in the Darwinian picture extends from micro-evolution of organisms, to macro-evolution of species and ultimately to the history of our ecosystem. Subsequent developments of evolutionary theory, according to Gould, can be placed within this archetypal form. For example, Dawkins [1976] has argued that the agency of evolution is genetic material rather than individual organisms, although the efficacy and scope remain similar to Darwin.

In this paper, I examine each of the three aspects of evolution, proposing an interweaving of their inter-dependence that avoids the reductionistic tendencies of Darwin and most of his successors. The first section on agency is a careful critique of the concept of temporal identity in evolutionary theories. The next section on efficacy is a speculative argument for emergent phenomenology in evolution, based on an irreducible relatednesses underlying natural selection. The final section on scope further explores the remarkable similarity of this irreducible formal relation to quantum field theory, statistical mechanics, and Levinas' ethics. Throughout the discussion "thought pictures"—presentations of fundamental concepts from physics—are used as analogues or metaphors for framing the metaphysical commitments of evolution. In seeking consonance between evolutionary theory and theoretical physics—a consonance that is demanded if the natural sciences are to be coherent—I hope to show how a place for theological dialogue is opened.

Agency (temporality, genesis)

Classical physics describes the universe as an ensemble of elementary particles that interact through various types of forces. These elementary particles constitute the agency or locus of action for the forces. Molecules, gases, liquids, solids, planets, stars and every other observable thing are all consequences of differing combinations of elementary particles which move in response to the forces. Elementary particles themselves, however, are individually separate, eternal in duration and immutable in nature. This is the essence of the reductionistic picture of "classical particle ontology".

Evolutionary theory also appears to posit a reductionistic picture. In the Darwinian form, the analogues of elementary particles are individual organisms, engaging in a "struggle for existence" with other organisms in the natural environment. A great deal of attention in evolutionary theory is directed to the analogous "force", namely natural selection, which acts upon organisms, bringing about adaptation and change [Bowler 1989; Gould 2002; Shanahan 2004]. Although recognized, what is not fully unpacked in most discussions of evolution, however, is the fact that the very *being* of organisms is radically different from the elementary particle picture of classical particle ontology. In evolutionary theory, the analogous "elementary particles" (be they organisms, DNA or any other units of evolutionary change) are not eternal, nor immutable, nor separate and it is precisely their transitory, relational nature that allows them to be units of evolutionary change.

The agency of evolution operates through heredity [Bowler 1989; Gould 2002; Shanahan 2004]. Organisms thrive *and generate offspring*. What endures is not the particular organism, but the continuity of hereditary lines. And it is not only the fitness of particular organisms to survive that matters, but also their capacity to generate offspring who survive to produce their own offspring and so on. The jump discontinuity or rupture in identity that happens through reproduction (offspring are *other than* their parents) is crucial to the theory, because it is in this "gap" that random changes occur which enable hereditary lines to adapt to environmental fluctuations. Unlike in Lamarck's theory, where adaptation of individual organisms is central, in Darwin's theory, adaptation depends on the rupture of identity in agency that occurs in offspring generation. Figure 1 compares the temporal nature of agency in classical physics and evolutionary theory.

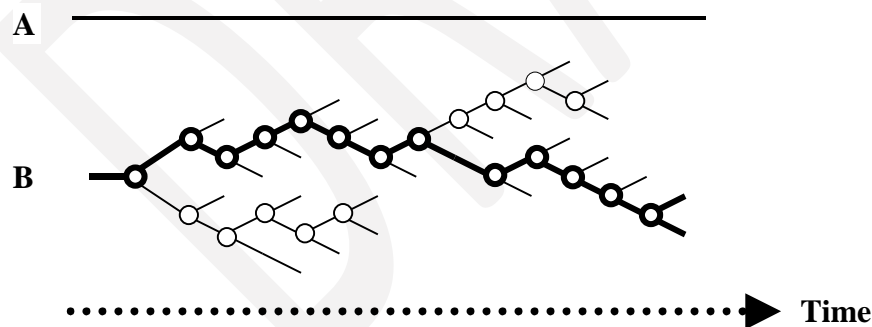


Figure 1. Comparison of the temporal identity of elementary particles (A) with the hereditary line(s) of evolutionary dynamics (B). In A, extra-temporal identity (straight line) is synonymous with sameness. In B, there is a diachronous continuity (dark line) despite rupture of identity through asexual reproduction (circles). The more complex case of sexual reproduction would produce a web of inter-connected hereditary lines (not shown).

As a consequence of this ontological paradigm shift, agency in evolutionary theory becomes fundamentally *temporal*. In classical physics, elementary particles are postulated as extra-temporal entities that substantiate all dynamical processes—things before change. In the language of Levinas, classical physics can be said to be based on an ontology of the "same" [Levinas 1998]. In archetypal evolutionary theory, on the other hand, what is postulated is a fundamental drive to survive and generate—intrinsic to individual, ephemeral (temporally bound) organisms (or DNA or any other unit of evolution)—that animates hereditary lines. This animating drive to being is assumed by the theory—change supersedes "thingliness". In the language of Levinas, evolutionary theory maintains a radical relatedness of the same to the Other (i.e. parent to offspring) [Levinas 1998]. Since there are no extra-temporal entities in archetypal evolution (i.e. "elementary particles"), it is probably best interpreted as a theory of *becoming* and the crucial aspect is the diachronic *process* of animation rather than the ephemeral units of agency (eg. organisms, DNA).

Agency in evolution is also fundamentally *contingent*. For example, when evolving systems are subjected to extreme changes in external variables, such as temperature, all living organisms can be killed, effectively annihilating the agency of evolution—albeit tenacious, the drive to survive and generate is fragile. Further, there are systems such as rocks, gases, fluids in which there are no apparent entities exhibiting a drive to survive and generate—the agency of evolution is neither necessary nor ubiquitous (at least from the point of view of classical physics). Finally, although some experiments have produced bio-molecular fragments from "chemical soups", the spontaneous manifestation of the explosive and sustained agency of evolution has never been observed—"the question of just how the inanimate became animate has proved stubbornly recalcitrant" [Morris 2003, xiv]. Unlike classical physics, in which elementary particles are postulated *a priori*, in evolutionary theory the origin and maintenance of the agency of being itself is in question.

Clarification of the nature of agency can help re-frame debates of theological import. For example, Dawkins [1976] puts forward a significant theological challenge when he claims the agency of evolution is to be found in genes (rather than organisms) and consequently he associates the final apex of life with DNA molecules, from which everything else, presumably, is derivative. The crux of his argument, as traced by Morris, is that genes replicate themselves faithfully, exist in large numbers and persist for long periods of time [Morris 2003, 70]. Here Dawkins seems to be arguing for a reductionistic ontology of sameness (although, as Morris points out, the sameness is not in the material molecule itself, but rather the encoded information). Dawkins discounts organisms as agents of evolution because they are short-lived, exist in far fewer numbers and reproduce themselves imperfectly. In light of the above discussion, however, this argument is not fully convincing. Agents of evolution *must* have a finite lifespan and *must* be imperfect in their replication in order for random fluctuations to occur in the process of generation. That is to say, there must be imperfection in the identity transfer from one generation to the next (similar to Smith's idea of "flex and slop" [Smith, 1998]). What is required is *stability* (not material identity) through generations, which I will

argue in the next section is a non-reductionistic consequence of the inter-play between DNA and organisms.

Another debate with theological ramifications is the role of individualism (or "self") in the agency of evolution. Much attention has been devoted to the importance of survival of the individual organism in the "struggle for existence"—a metaphor that is easily distorted into a hyper-masculine, self-centred and conflict-oriented ideology [Bowler 1989; Dawkins 1976; Shiva 2001]. In this line of argument, the essential point extracted from evolutionary theory is that more fit organisms will succeed in the struggle to survive, therefore increasing the likelihood of passing their hereditary material to the next generation. Here fitness refers primarily to the capacity to survive and evolution selects for individuals who best succeed in the struggle with others. But this is only part of the agency of evolution. Continuation of hereditary lines involves survival of individual organisms *and* their ability to generate offspring *who survive to generate their own offspring*. Shanahan provides a nice discussion of this often overlooked aspect, using the experimentally-based analysis by Lack of the clutch size of birds [Shanahan 2004, 41-44]. What is emphasized in Lack's studies is that fitness to generate offspring is not simply a question of producing as many offspring as possible. According to Lack: "Clutch size has been evolved through natural selection to correspond with the largest number of young for which the parents can on the average find enough food. In this view the upper limit of clutch size is set by the fact that, with more young than this, some are undernourished, and so the parents tend to leave fewer, not more, descendants than those with broods of the normal size" [as cited in Shanahan 2004, 42].

Built into the agency of archetypal evolutionary theory is a fundamental relatedness to the Other, namely the next generation. It is this *future-directed* nature of generation that ensures continuity of hereditary lines. In the discontinuous process of producing off-spring, there is "flex and slop" of the hereditary material, enabling random changes from one generation to the next, changes which allow adaptation to occur. The discontinuous process of generation is made more stable by an implicit "obligation" to the Other (the next generation), an obligation that will be selected for because it strengthens the hereditary line. "Nurture"—a traditionally feminine concept—is essential to the agency of evolution (although not necessarily in the loaded, anthropomorphic sense that is sometimes meant by this term). Moreover, this temporally based, same-Other relatedness between generations is remarkably similar to Levinas' concept of responsibility to the Other through proximity and substitution, which he argues is the basis of ethics. Far from a hermeneutic of meaninglessness and despair, the agency of evolution includes future-directedness, nurture, and, possibly, ethics. It should be noted that the relatedness described here is intrinsic to the *very being of an individual organism* as an agent of evolution, and is separate from (although related to) the idea of collective or group relatedness which is discussed in the next section.

Efficacy (spatiality, co-existence)

Consider classical electrodynamics as an archetypal theoretical form. In this theory, particles, such as electrons, possess charges that are the sources for electromagnetic fields: from knowledge of the spatio-temporal distribution of the charged particles the fields can be calculated. Electromagnetic fields, in turn, impact the dynamics of charged particles: from knowledge of the spatio-temporal fields the motion of charged particles can be calculated. This manner of handling electro-dynamical problems, however, is not complete and, at best, can only be approximately valid. The difficulty arises from the fact that a moving charged particle generates an electromagnetic field and the field affects the motion of the charged particle that created it [Jackson 1975, 178]. In other words, a moving charged particle creates a field, but the field alters the motion of the particle, which alters the field, which alters the motion ...and so on.

As Jackson further points out, this structural relation, which I will call "return", touches on one of the most fundamental aspects of physics—the nature of an elementary particle. Return draws into question the *a priori* separation of particle and field and, through this back door, thrusts ontology into the arena of indeterminism and irreducibility. In Quantum Field Theory, the (infinite) renormalization of return (more specifically "self energy") is the structural mechanism which brings about discrete particles as created from and annihilated into a continuous field—the essence of particle identity as *separate and yet interwoven* into the field from which it came. It sets limits on the degree to which elementary particles can be defined as localized in space, thereby forging an essential connection between "self identity" (particularity) and relatedness [Teller, 1988].

Because, as argued in the previous section, the agency of evolution is ephemeral (temporal) and contingent, reductionism cannot be assumed in the efficacy of evolution—a situation not unlike quantum mechanics. Gould argues against the reductionistic tendencies of, what he calls, "classical Darwinism" in which natural selection only acts on the level of the organism (in distinction to genes, cells, groups, species). He writes:

"classical Darwinism then envisages a ... privileged direction of causal flow, as information from the environment (broadly construed, of course to include other organisms as well as physical surroundings) must impact the causal agent (organisms struggling for reproductive success) and be translated, by natural selection, into evolutionary change. The organisms supplies the raw material in the form of 'random' variations but does not 'push back' to direct the flow of its own alteration from the inside" [Gould 2002, 31].

In this section I want to suggest that return offers a powerful, non-reductionistic metaphor for understanding the foundations of evolutionary theory, weaving the being of organisms into their environment as the natural course of organisms alters the environment, which alters the natural course of those organisms ... and so on. Notwithstanding the fact that the separation of organism and environment may be a good approximation in many instances (as is the case with

the separation of charged particles and fields in classical electrodynamics), what is at stake is the entire metaphysical basis of the theory of evolution and therefore also its hermeneutics.

The problem of reductionism, and the role of return, is particularly relevant to the understanding of homeostasis or balance in evolutionary theory. If left unchecked, the agency of evolution results in explosive growth of populations, as seen when an organism is introduced into a new and favorable environment. However, such explosive growth is rarely observed in nature—under normal circumstances, populations tend to remain stable. This raises the question: "If organisms are physiologically capable of reproducing at such an explosive rate, and natural selection favours the more fecund, why then is it that under normal circumstances populations remain remarkably stable?" [Shanahan 2004, 40]. Darwin locates the homeostatic mechanism in the balance between the tendency to increase and the checks on this tendency: "every single organic being around us may be said to be striving to the utmost to increase in numbers ... Lighten any check, mitigate the destruction ever so little, and the number of the species will almost instantaneously increase to any amount" [as cited in Shanahan 2004, 40]. The reductionistic picture of classical Darwinism postulates individual organisms as *essentially* separate beings in mutual co-existence with other organisms. Collectivity, group dynamics and holism are then seen as derivative, emerging from the "classical particle ontology" of individual organisms.

In the previous section, I argued that this reductionistic approach is not adequate for explaining the continuity of hereditary lines (temporality/genesis). There also has been considerable controversy about whether the reductionistic picture is adequate for explaining group phenomena (spatiality/coexistence) in which individuals appear to act, not for their own survival, but for survival of the group to which they belong, as seen in insect societies and human altruism [Shanahan 2004, Gould 2002]. Shanahan, for example, offers a graphic portrait of other-relatedness in nature, concluding that "many animals put themselves at risk, or even endure the ultimate sacrifice, in order to safeguard their cohorts" [Shanahan 2004, 64-5]. Typically the thrust of the reductionistic argument is that, in each specific instance where group-oriented behavior is observed, it is not *necessary* to consider natural selection as acting at the group level—the individual's contribution to the group can be seen as an indirect means of ensuring individual survival [Shanahan 2004, 37-52; Bowler 1989]. However, this response seems to miss the forest for the trees—reductionistic arguments are remarkably silent concerning overarching ontological questions, such as how natural selection produces effective, holistic regulatory mechanisms in the first place and why distinct groupings, synergies and hierarchies of organisms exist at all (eg cells, organisms, species, societies, ecosystems) instead of a morphologically continuous morass of inter-breeding individuals.

Gould argues forcefully for a non-reductionistic model for the efficacy of evolution in which natural selection operates on multiple levels resulting in a stasis "actively maintained among potentially competing forces at numerous levels, with change then regarded as exceptional rather than intrinsically ticking most of the time, and punctual rather than smoothly continuous when it does occur (representing the relatively quick transition that often accompanies a

rebalancing of forces)" [Gould 2002, 33]. Gould's model is premised on homeostasis and balance. The concept of return may shed some light on efficacy in a non-reductionistic model like Gould's.

Suppose we begin at the most elementary level—namely the molecular basis of evolution. Perfectly replicating molecules, in and of themselves, cannot be the agency of evolution because they would eventually consume the raw materials of any finite environment at which point the environment would cease to support their further replication. In order to sustain agency, replicators must be imperfect, recycling their raw material and allowing for adaptation to environmental changes (either externally imposed or caused by their own growth)—a cycle of return. However, randomness at the molecular level raises significant problems for molecular stability—the replicators must be safeguarded against random events attaining so much importance that they destroy the statistical regularity of replication required to maintain an underlying molecular basis for continued replication. [For a more detailed discussion of sustained replication, see Prigogine & Stengers 1984, 190-1]. The genetic solution, as Schroedinger has suggested, is that "an incredibly small group of atoms, much too small to display exact statistical laws, do play a dominating role in the very orderly and lawful events within a living organism. They have control of the observable large-scale features which the organism acquires in the course of its development, they determine important characteristics of its functioning; and in all this very sharp and very strict biological laws are displayed" [Schroedinger 1967, 21].

Unicellular organisms are one of the simplest cases in which the irreducible nature of return is manifested stably. Here DNA molecules are the basic replicators, which alter their immediate environment by coding for and causing the creation/maintenance of a cell. But the cell, in turn, ensures the stability of the DNA molecule in its replicating cycle. The cycle of return is completed in the mutual interdependence of the DNA and the cell, neither of which can be an agency of evolution on its own. Moreover, return opens up *interiority*, such that the cellular environment, which is different from the rest of the environment, forms an *organic whole*. Multicellular organisms are another case. Here cells formed from DNA interact with one another through chemical messengers on their surfaces, altering the expression of DNA within each cell. As a result, an organic whole—the body—is formed in which different cell lines produce organs, tissues, etc., all from the same DNA backbone. Once again, interiority emerges (the body) to enhance the capacity for survival—the multi-cellular body allows differential expression of DNA leading to coordinated functioning of different cell lines [Cole 1996]. What I want to suggest is that return is *essential* to these processes, rather than derivative.

With the irreducible framework presented here, "self identity" (of genes, cells, organisms, etc.) emerges from a more fundamental dynamical relatedness. The holistic "self" is forged from the stabilizing influence of cycles of return, similar to the process of renormalization in quantum field theories. The framework is emergent in the sense that new selves emerge as stable, replicating "gestalts", which incorporate (and modify) pre-existing gestalts, as for example a multicellular organism incorporates the cellular gestalt. The process leads to hierarchies of

organization, where at each successive level of complexity, new or emergent phenomena appear, as for example, the capacity of organisms to self-regulate cell lines and gene expression. The framework is not unlike Levinas' approach to intersubjectivity where (ethical) relatedness, in the form of responsibility to the Other, is prior to self identity of subjectivity. Put simplistically, the continuous cycle of return fixes correlated co-existence—particle, cell, organism, subject—as an emergent "self identity" from a more prior dynamic.

The existence of irreducible, emergent phenomenology in evolutionary theory completely reframes theological hermeneutics. The breakdown of reductionism implies the breakdown of autonomous self-identity (i.e. classical particle ontology). Instead, a fundamentally irreducible relatedness weaves the fabric of being. Emergent levels of "self-organization", such as genes, cells, bodies, self-consciousnesses, affect one another holistically creating a hierarchical dynamic of emergent wholes which impact their parts—a picture consistent with Paul's view of the Body of Christ and also profoundly resonant with Jesus' teaching of "Love thy neighbour *as thyself*".

The approach I have outlined in this section to interpreting quantum mechanics, evolutionary theory and Levinas' ethics, through the concept of "return", is novel and requires further development. However, the concept of emergence is not new [Emmeche et al. 1997], and its potential application to biology has generated some theological interest. Clayton's guarded optimism is probably quite apt here:

"Still, it is hard to miss the potential harmony between emergence results and religious interests. Harmony is not fusion. Too many have jumped on the bandwagon of emergence and from there proclaimed the unification of science and religion. The more cautious will explore the openings that emergence offers while continuing to soberly assess the actual empirical results. Emergence provides an important new field for religious reflection or theology. But it is not the final proof of God or Brahman; it supplements, but does not replace, science as we have known it." [Clayton 2004, 3]

Scope

The "macroscopic" physical world we encounter in everyday life is composed of astronomically large numbers of atoms exhibiting complex individual dynamics. And yet despite the unimaginable complexity of microscopic dynamics, a phenomenology at the macroscopic level—thermodynamics—emerges which does not require reference to the detailed micro-dynamics although, through the formalism of statistical physics, it can in some sense be "derived" therefrom. "Thermodynamics has been able to describe, with remarkable accuracy, the macroscopic behavior of a huge variety of systems over the entire range of experimentally accessible temperatures ($10^{-4}K$ to 10^8K). It provides a truly universal theory of matter in the aggregate. And yet the entire subject is based on only four laws, which may be stated rather simply ..."[Reichl 1980, 9]

Advances in statistical physics during the last century have significantly enhanced our understanding of emergent phenomenology, in which complex behavior at one level of description (eg. microscopic dynamics) leads to simple, universal behavior at a higher aggregate level (eg. thermodynamics), with a completely different set of relevant observable quantities and laws. While most of the work has focused on systems in equilibrium (where the system does not evolve at the "macroscopic" level), the concepts and techniques of statistical physics are increasingly being applied to non-equilibrium systems, such as the one described by evolutionary theory [Prigogine & Stengers 1984; Reichl 1980]. Typically, however, these developments do not appear to significantly inform current controversies and research into biological evolution.

For example, Gould steadfastly maintains that, since there is no inherent directionality to the random fluctuations allowing species to adapt through natural selection, therefore there can be no directionality to evolution *on any level*—the evolution of life is entirely random [Gould 1989]. "Re-run the tape of the history of life, as S. J. Gould would have us believe, and the end result would be an utterly different bio-sphere" [Morris 2003, 283]. Apart from the fossil evidence which suggests otherwise [Morris 2003; Shanahan 2004], Gould's argument loses most of its punch in light of the fact that statistical physics has already clearly described systems where the microscopic dynamics are reversible (non-directional in time) and yet the macroscopic dynamics show temporal directedness [Prigogine & Stengers 1984; Reichl 1980]. What has been found in physics is that there can be averaged or large-scale phenomena that exhibit universal behavior not evident at lower levels of description. So, while the individual variations that drive evolution may be completely random at the local level, that does not necessarily refute the possibility of overall global trends which are emergent from aggregated behaviour, and, in fact, the evidence from statistical physics suggests that such global trends might be expected. Shanahan carefully refutes Gould's arguments putting forward the case for evolutionary progress, from less to more complex organisms [Shanahan 2004, 196-246]. Morris also mounts an extensive empirical case against Gould, arguing instead for "convergence" of evolution towards universal adaptations that are manifested across diverse species, such as eyes, biochemical pathways and central nervous systems. According to Morris: "Evolutionary convergence shows that we live in a constrained world, where all may not be possible. It does not, to be sure, rule out unique solutions, nor does it guarantee the emergence of the identical. It shows, however, that at many levels evolution is seeded with probabilities if not inevitabilities" [Morris 2003, 298]. While both Morris and Shanahan present arguments consistent with the findings of statistical physics, neither draws support from research in this area.

One of the more intriguing areas of potential consonance between evolution and statistical physics concerns the question of speciation. Specifically, how does a single species bifurcate into two separate species? The classical mechanism is through separation of lineages geographically [Gould 2002, 774-81]. As two geographically isolated lineages evolve divergently, they become genetically isolated (i.e. no longer inter-breeding). Once the lineages are genetically isolated they are separate species and, although they may subsequently co-

mingle, they evolve separately. Nonetheless, geographical isolation is crucial to the initiation of the bifurcation and this mechanism is historically contingent on a segment of a given species splitting off geographically for some (apparently) external reason. A similar problem, which may have a formal relation to speciation, arises in statistical physics, namely phase separation, where an initially homogeneous system spontaneously separates into two phases, each with differing characteristics. For example, a metal alloy spontaneously separates into regions that are rich in one component and regions that are deficient in the same component. What has been discovered in statistical physics, however, is that such processes can be *spontaneous* consequences of global instability in the overall system. Spontaneous symmetry breaking, in which a single phase *continuously* bifurcates into two separate phases is particularly rich in metaphors for understanding speciation. Moreover, this process is predicated on the idea of "return" in which random fluctuations at the local level are amplified into coherent global patterns. (In fact, the role of return in spontaneous symmetry breaking in statistical field theory is formally identical to its role in quantum field theory discussed in the previous section.) The concept of spontaneous symmetry breaking is also consistent with Gould's theory of species evolution through "punctuated equilibria" [Gould, 2002] and leads to temporal evolution of species similar to the branched structure shown in Figure 1 for organisms. While it is beyond the scope of this paper (and author!) to develop a precise connection between these areas of research, the need for better dialogue is certainly apparent.

Conclusion

As evolutionary theory continues to inform modern science, theology is faced with the daunting task of responding to atheistic overtures in a scientifically relevant way. As Haught writes:

"even though science cannot decide by itself the question of whether religious hope is less realistic than cosmic pessimism, we must admit that any beliefs we may hold about the universe, whether pessimistic or otherwise, cannot expect to draw serious attention today unless we can at least display their consonance with evolutionary science. We must be able to show that the visions of hope at the heart of the Abrahamic religious traditions provide a coherent metaphysical backdrop for the important discoveries of modern science." [Haught, 106-7].

In this paper, I have argued that the hermeneutics of evolutionary theory is an important place for opening up such theological dialogue. I have attempted to roughly sketch out the problems with reductionism in particular, and to connect the foundational issues of evolutionary theory with formally similar issues that have appeared in quantum mechanics, statistical physics and postmodern philosophy, all of which have important theological implications. While both tentative and speculative, this area of exploration seems ripe with promise.

References

Bowler, Peter J. *Evolution: the History of an Idea*. 2nd revised edition. Berkley: University of California Press, 1989.

Clayton, Philip. Emergence: Is it hypothesis, hype or history in the making? *Science & Theology News*, 2004 October. Available: <http://www.stnews.org/News-642.htm> [December 5, 2005].

Cole, R. David. The molecular biology of transcending the gene. In *Religion and Science: History, Method, Dialogue*, eds. W. Mark Richardson and Wesley J. Wildman. New York: Routledge, 1996.

Dawkins R. *The Selfish Gene*. Oxford: Oxford University Press, 1976.

Emmeche, Chris, Simo Koppe and Frederik Stjernfelt. Explaining emergence: towards an ontology of levels. *Journal for General Philosophy of Science*, 28:83-119, 1997. Available: <http://www.nbi.dk/~emmeche/coPubl/97e.EKS/emerg.html> [December 5, 2005].

Gould, Stephen Jay. *The Structure of Evolutionary Theory*. Cambridge: The Belknap Press of Harvard University Press, 2002.

Gould, Stephen Jay. Possible worlds: the power of "just history". In *Wonderful Life: The Burgess Shale and the Nature of History*, 292-323. New York: Norton, 1989.

Haight, John. Evolution, Tragedy and Cosmic Purpose. In *God After Darwin: a Theology of Evolution*, 105-20. Boulder: Westview Press, 2000.

Jackson D. *Classical Electrodynamics*. 2nd edition. New Jersey: Wiley, 1975.

Levinas, Emmanuel. *Otherwise than Being or Beyond Essence*. Translated by Alphonso Lingis. Pittsburgh: Duquesne University Press, 1998.

Morris, Simon Conway. *Life's Solution: Inevitable Humans in a Lonely Universe*. Cambridge: Cambridge University Press, 2003.

Prigogine, Ilya and Stengers, Isabelle. *Order Out of Chaos: Man's New Dialogue with Nature*. Toronto: Bantam Books, 1984.

Reichl, L.E. *A Modern Course in Statistical Physics*. Austin: University of Texas Press, 1980.

Schroedinger, Erwin. *What is Life? The Physical Aspect of the Living Cell*. Cambridge: Cambridge University Press, 1967.

14. Against reductionistic theories of evolution

Shanahan, Timothy. *The Evolution of Darwinism: Selection, Adaptation, and Progress in Evolutionary Biology*. Cambridge: Cambridge University Press, 2004.

Shiva, Vandana. Democratizing Biology. In *The Gender and Science Reader*, eds. Muriel Lederman and Ingrid Bartsch, 447-465. New York: Routledge, 2001.

Smith, Brian Cantwell. *On the Origin of Objects*. Cambridge: MIT Press, 1998.

Southgate, Christopher. God and evolutionary evil: Theodicy in the light of Darwinism. *Zygon: Journal of Religion and Science*. 37:105-20, 2002.

Teller, Paul. Three problems of renormalization, In *Philosophical Foundations of Quantum Field Theory*, eds Henry R. B, 1988.

DRAFT

15. Theological insights into the notion of order in physics and the natural sciences

An exploration of the metaphysics of process-ordering in Quantum Theory and Relativity Theory that is guided by Bohm, Peirce, Levinas, and Torrance.

Why Order?

The notion of order extends beyond the confines of a particular theory; permeates the whole infrastructure of concepts, ideas, and values; and enters the very framework in which human thought is understood and action carried out. To understand the full meaning of creativity, and what impedes it, it is necessary to go into the whole nature and significance of order.

[Bohm and Peat, 104-5]

Questioning the notion of Order opens us to the possibility of contemplating the unity in relatedness of theology and science, not by way of determinate content, but rather by way of likeness or meta-form. Metaphysics, which concerns the order underlying reality, can mediate this relatedness by relating the reality of the physical world to the reality of God while also maintaining the essential difference in the two realities. The mediation involves the trope of metaphor which simultaneously asserts *the identity and the difference* of the vehicle and the tenor. The reality of the physical world is the reality of God; the reality of the physical world is not the reality of God. By contemplating this paradox we might hope to be led to the insight that the reality of the physical world *in some sense* is *like* the reality of God even though the two are unlike and indeed incommensurate. That is to say, the reality of the physical world indicates or points to or *signifies* the Reality of God that is wholly Other.

As discussed by Winslow, the theological grounding for this mediation of relation is *analogia entis* whereby analogies embedded in the world are taken to be ontologically real (and not arbitrary human constructions) such that the Divine can be grasped in the created world through analogy. Viewed theologically, Winslow contends, scientific findings and discoveries “are the revelations of God’s Self to humans *through analogy* since it cannot be otherwise” [Winslow].

Natural science, and more specifically physics, deals directly with physical reality at its most fundamental level. Torrance points out that the theological notion of the creation of the world out of nothing (*ex nihilo*) “implies that if we are to understand the world of contingent reality we must investigate the world itself, and learn of it out of its own natural processes and interior relations. By doing that, on the other hand, we have to attend to the world in its own created independence, in its own given reasonableness detached from its Author, that is by considering it in its utter otherness from God and without taking God into account” [Torrance 1985, 33].

The physical *world-in-itself* is thus the subject of physics and, in its complete Otherness, says nothing about God. The physicist looks down, as it were, upon the world as the object of interest. The independence of this gaze from the subject of God is theologically significant insofar as physics, and more broadly natural science, recognize the ontological Otherness of the Divine. However, from this can come the impression that physics stands on its own and has nothing to do with God because there is no direct route from the object of interest to its Creator—the two realities of the physical and the Divine, *each in-itself*, are wholly incommensurate and unrelatable. What is lost in this gaze is the *meaning* of the world.

When we concentrate our attention upon the universe itself, then, it gets shut up in itself, so far as our understanding of it is concerned, and thereby loses the range of depth in which its meaning as a whole is to be found. Even as a harmonious intelligible whole the universe can provide no explanation of its own inherent rationality. If we are to recover the meaning of the universe, and meaning of the universe as a whole, we must learn to look beyond the universe, or look through the universe, to its transcendent ground in the uncreated Rationality of God.

[Torrance 1985, 34]

There is a subversive presumption in this solitary gaze. It is the presumption that the unity of the universe can rest in itself. If this presumption be true, then all is physical because nothing can stand in relation to One. Consciousness, mind, humanity must be taken as illusions of “epiphenomena”. Whatever the reality of such a universe be, it cannot be our experienced reality. Where are we to stand in relation to this universe?

So, on the one hand, physics and natural science must attend to the world-in-itself to avoid confusing creation with the Creator. On the other hand, the world-in-itself, created *ex nihilo*, cannot contain unity or indeed humanity. The world-in-itself is meaningless and irrational yet natural science requires the world be rational and meaningful. What are we to do with this paradox?

One way forward is to recognize that when we attend to the world-in-itself it is not necessarily true that we are attending to the world as One. The world-in-itself is not One at the very least because we are also there, attending to it as something external to us. Even when we are attending to the world-in-itself, it must be the case that the world-in-itself is related to something beyond itself. And this relation cannot be purely *physical*. There is a necessary orientation of our participation in the world in relation to what lies beyond the world-in-itself. This orientation is an *Ordering*. Ordering occurs beyond the particulars of the physical world and brings them into general patterns or forms through relations by way of rules or natural law. Ordering is *meta-physical*.

In this light, we might say that physics is a way of Ordering in which our attention is fixed on the world-in-itself *in relation to something beyond itself that is not directly conceived*. And from this

we might ask, what is the Order of ordering in physics? Perhaps the Order of ordering in physics, by way of analogy, might tell us something about our own relation to God.

All science is the search for unity hidden in likenesses ... The scientist looks for order in the appearance of nature by exploring such likenesses. For order does not display itself of itself; if it can be said to be there at all it is not there for the mere looking. There is no way of pointing a finger or a camera at it; order must be discovered and, in a deep sense, it must be created. What we see, as we see it, is mere disorder ... We re-make nature by the act of discovery, in the poem or in the theorem.

[Bronowski, 23;24;32]

What is the Ordering of Classical Physics¹?

Ordering, in the way we have been using the term, is concerned with or signifies the way in which the many are (or are not) united as one. If physics seeks to abstract the general patterns of things and their rules or natural laws from among the particulars of the physical world, then we might think of the notion of Ordering in physics as a reflection on the “pattern” of abstracting patterns.

Ordering in classical or Newtonian physics is dominated by the notion of Space and classical physics seeks Orders that are formally spatial. Newton proposed the concept of Absolute space as an unmovable “container” in which the physical universe is embedded. This concept or likeness, *for Newton*, was a metaphor for God’s omni-presence to all creatures.

Space is a disposition of being qua being. No being exists or can exist which is not related to space in some way. God is everywhere, created minds are somewhere, and body is in the space that it occupies; and whatever is neither everywhere nor anywhere does not exist. And hence it follows that space is an effect arising from the first existence of being, because when any being is postulated, space is postulated.

[Newton, *De Gravitatione*, cited by Huggett, 112]

Newton's Absolute space is a Euclidean structure in which the spatial points are possible locations for material bodies. No body can exist without space. Spatial points, on the other hand, exist whether or not they are occupied by bodies. Eternal in duration, immutable in nature, Newton's Absolute space situates an ontological structure for the universe.

Using the concept of Absolute space (taken as the tenor of a metaphor for which Euclidean geometry is the vehicle), Newton crafted what we might now call *thought experiments*.

¹ This interpretation of Newtonian metaphysics is more fully developed in *The proximity of light: a deconstruction of space*.

Thought experiments are not based on real encounters with the physical world which might test a theory against reality. Rather, a thought experiment is a speculation about a hypothetical situation that is constructed entirely in the imagination for the purpose of thinking through its consequences *according to the theory*. In this sense, thought experiments implicitly explore the ordering principles of a theory by way of inference.

Newton's thought experiments typically begin with empirical, embodied observers interacting with a physical system, like a rotating bucket or two rotating globes, all within the physical universe of observers, observed system, earth, stars and everything else. He then imaginatively transports the observed physical system outside of the physical universe into a vacuum that is Absolute space. The physical system is assumed to maintain its identity of internal relations (as a total or whole) but it no longer has external relations to the rest of the universe, apart from imagined observers. In his thought experiments, it is unclear where the observers stand in this vacuum, but it seems as if they are imagined to be "outside" of the finite universe which is now the observed system, yet connected spatially to it, and able to interact with it. In some sense, the empirical, embodied observers are continuously transported, *without rupture*, into an ideal observer who take in the whole universe at once and as separate from one's self. This is the metaphorical trope of Newton's objectivity. It can be seen as an *effacing* of the physical embodiment of the observer. In this trope, there is the presumption that embodied experience is identical with an ideal observer who can, in some sense, be outside of the universe, grasping its totality at once. Newton's Absolute space is the medium that enables this identity by connecting the ideal observer to the metaphorically finite (whole, total) universe at an Instant. Newton postulates that an ideal observer grasping the totality of the universe would be embodied in the same substantive space as empirical observers, such as ourselves, who are bound in the physical universe. Or, put another way, Newton's Absolute space is the transcendent continuum that connects embodied empirical existence with ideal observation of totality. Absolute space can play this role because of its indifference to the physical universe. Because, as Newton wrote in *Principia Mathematica*, "Absolute space, in its own nature, without relation to anything external, remains always similar and unmovable." [as cited by Huggett, p118].

In Newtonian physics, Absolute space becomes the primordial structure ordering creation and it is assumed to have substantive existence even in the absence of observers. The form of this primordial structure is determined and fixed by the rules or laws of Euclidean geometry. Objects placed within this structure must also be taken as determined and fixed by these laws. The laws fix the internal relations of parts to one another and to any whole. They also fix external relations of any whole object to what lies beyond its spatial limits, including any observer interacting with that object. Lawful relations are governed by the principle of equality which comes from Newton's third law: *For every action, there is an equal and opposite reaction*. Thus, Absolute space might be said to mediate sameness or *equality* by way of determinate Law.

The primordial structure of Absolute space—when taken as a grounding container within which all of reality is embedded—necessarily leads to reductional meta-physics because relations in Euclidean space are analytical. Embedded whole objects can always be reduced to component parts if they are formally spatial which they must be if they are embedded in Absolute space. But if a whole object can be reduced to its parts, then it has no independent identity. All of creation is reduced, by Absolute space, to finite “elementary particles” which are eternal in-themselves and metaphorically *like* Euclidean points. These elementary particles obey fixed and immutable laws of determination. This is the Ordering of objectivity in classical physics.

But can this be the case for our world?

Leibniz objected to Newton’s notion of Absolute space [Huggett, 143-67] because of its failure to accommodate the distinction between the particular and the general. Euclidean space is formal and general—it is a structure that manifests physically through likeness of multiple instances. Reality, on the other hand, is particular—it is *this* world or universe and not some other. What would be the reason, Leibniz argued, for God to place the universe *here* in Absolute space and not somewhere else—two meters to the left, for example? Both instances would be indistinguishable according to Absolute space. What this question surfaces, for our modern understanding, is the fact that general structures, like Euclidean space, possess symmetries that must be *broken* in order for the structure to manifest in a physical instance. These symmetries are necessarily present because a general form unites multiple particulars as indistinguishable instances or tokens of that form. Leibniz further maintained that space is purely relative and therefore not Absolute. The relativity of space is consistent with the recognition that the Euclidean point actually does not exist in-itself. In isolation, a point is reduced to nothing. Euclidean points are limits within a relational ordering that is structured by Euclidean geometry and this relational ordering is the basis for the calculus of infinitesimals invented by Leibniz and Newton and mathematically formalized in modern analysis. Calculus is formally grounded in the notion of limits. The limit can be approached but never exceeded by the structural order. Yet something about the limit-boundary always remains external to the (spatialized) structure and this Otherness is related to particularity through broken symmetry.

Kant, on the other hand, argued that physical space cannot be purely relative [Huggett, 197-212]. When physical objects are uniformly translated or rotated in space, they do not change their internal spatial relations. A car, once rotated about an axis, is indistinguishable from the unrotated car with respect to its spatial form. Therefore, the internal spatial relations that characterize objects can be said to be relative. However, Kant noted that physical objects in the three-dimensional world we live in can possess an internally distinct orientation of “handedness”. A right-handed object (for example your right hand or a right-handed screw) can be distinguished from a left-handed object (for example, your left hand or a left-handed screw) even though the internal relations are the same—one is a *reflection* of the other in respect of its spatial form and is distinguishable with respect to an external orientation. The property of orientation might be said to be *internal* to the object as an entity-in-itself and it manifests by way of relation to an *external* Other for which the opposite property holds. However, Euclidean

space does not support internal properties because the Euclidean point has no interiority. Physical space, as represented by Euclidean geometry, involves an arbitrary breaking of the symmetry of orientation that is absolute in the sense that it is external to the geometry of the space. This broken symmetry—an *interiority*—comes from beyond Absolute space which is purely *external*.

The challenge from Leibniz and Kant is that there appears to be something about physical space that deconstructs the Absolute Euclidean geometry grounding Newtonian meta-physics. The challenge comes from the nature of relationality. Newton began by taking space as a metaphor for the transcendental relation between creatures as physical bodies-in-the-world and the Infinite (Creator). But Euclidean space, if reduced to Euclidean points and their lawful relationships of equality², only supports relations of equality. So while space might mediate relations that are *like* the mediation of Infinite presence, spatial relations are also unlike Infinite presence in that the spatially mediated relation involves an equality between two or more bodies that are reciprocally related through co-presence. Spatial relations exclude the formal *Otherness* of the transcendental.

Because *we* are embodied in physical space, *we* experience physical co-presence with other creatures in the world that is mediated by space. Newton claimed that the mediation of this physical co-presence is *like* the mediation of God's omni-presence to his creatures. Leibniz argued that the mediation cannot be like God's presence to his creatures because space is not Absolute. Kant argued that the mediation cannot be purely relative in-itself either because objects in physical space can possess an orientation that exceeds the internal relations of Euclidean geometry. Orientation is a directed (one-way) relation that points from the interior to something beyond the interior. Orientation is a *sign* of the Absolute.

If we take physics to be a way of Ordering in which our attention is fixed on the world-in-itself *in relation to something beyond itself that is not directly conceived*, then classical physics suggests that the nature of this Ordering to the Beyond is like the intentionality of *signs*. There is a bifurcation of *ourselves* involved inasmuch as the subject of physics is the world-in-itself while, at the same time, the meaning of physics is found in the way in which it is a sign of the Infinite. This bifurcation distinguishes the physical body from the mind as Descartes had observed, *but it does not disconnect or absolutely divide them*. The duality is contained within the three-fold relationality of the sign which unites particular exterior physical bodies to communal and formal interior re-presentations. However, if we ignore the Orientation to the Beyond and take physics to be merely a way of ordering the world-in-itself we may lose touch

² Euclidean space actually does not reduce to points because points-in-themselves do not exist—they are relational objects. The problem is that I have gone from Euclidean space to objects embedded in Euclidean space and then *back* to Euclidean space again and this has created a confusion between metaphor and substance. You may object to this form of reasoning. But my point is that this is the type of reasoning that characterizes the meta-physics of modern interpretations of Newtonian physics.

with the proper connection between an external physical body and its interiority. Moreover, we may confuse the tenor and the vehicle of our deep metaphor of space, and wrongly assume that the mental formalism (a model of reality) is identical *in every way* with experienced physical reality.

In *Space, Time and Incarnation*, Torrance makes explicit the theological limitations, from within the Christian tradition, of using spatial metaphors to speak of God. He points out that the relation between God and space is not itself a spatial relation. God stands in a creative, not a spatial (or temporal), relation to space. When we speak of the Incarnation in terms of Jesus “coming down” from Heaven, this should not be taken as a spatial metaphor. It is an act of kenosis, or self-emptying, through which God “humbled himself to be one with us and to take our finite nature upon Him, all for our sake” [Torrance 1969, 3]. Christ is *in us* through sharing in our bodily existence here on earth, yet he is also *in the Father* through his Oneness with Him. The Divine and human are united in Christ even while they remain separate and distinct. From this comes *paradeigma*, according to patristics, which is the act of *pointing*.

Paradeigma is essentially an operational term in which some image, idea or relation is taken from this worldly experience to point beyond itself to what is quite new and so to help us get some kind of grasp upon it ...

... It is in Christ that the objective reality of God is intelligibly linked with creaturely and physical forms of thought, so that the latter may be adapted and given orientation enabling them to direct our minds to what God really makes known of Himself, although in view of His infinite nature they will not be able to seize hold of Him as He is in Himself.

[Torrance 1969, 16]

Unlike the transcendental movement of *paradeigma*, in modern physics space is taken as a reciprocal and lawful coordination between two or more bodies that are themselves taken to be mutually co-present in their totality. In *Otherwise than Being or Beyond Essence*, Levinas makes explicit, from within the Jewish tradition, the ethical imperative to overcome the limitations of space as a deep metaphor. Not only is the relation between God and creation *Otherwise than spatial*, so too is the relation between persons. The condition of a human person, according to Levinas, is to be in a relationship of responsibility to the Other which takes the form of giving of oneself wholly *for* another person. Without this prior ethical imperative, the human person becomes bound within systems of reciprocal relations which take the other person to be the same and deny the particularity of Otherness which is the source of freedom. Such systems *in-themselves* are systems of power that are constitutionally oppressive.

Neither is the relation between God and creation spatial, nor is the relation between human persons purely spatial. This suggests that the deep metaphor of space may be inherently misleading for physics too. Hegel has argued that the determination of space subverts our capacity to conceptualize any form of creativity or self-realization to physical bodies.

Space is the existence in which the Concept inscribes its differences as in an empty lifeless element, in which they are just as inert and lifeless. The actual is not something spatial ... In a non-actual element like [space] there is only a truth of the same sort, i.e. rigid dead propositions. We can stop at any one of them; the next one starts afresh on its own account, without the first having moved itself on to the next, and without any necessary connection arising through the nature of the thing itself ... [this kind of] knowing moves forward along the line of equality. For what is lifeless since it does not move of itself, does not get as far as the distinctions of essence, as far as essential opposition or inequality and therefore does not make the transition of one opposite into its opposite, does not attain to qualitative, immanent motion or self-movement.

[Hegel, §45]

If space is not Absolute, then taking space to be the grounding for theories of the physical world—either explicitly or metaphorically—may result in what Smith calls an inscription error.

An inscription error [is] a tendency for a theorist . . . to read [ontological] assumptions or their consequences back off the system, as if that constituted an independent empirical discovery or theoretical result.

[Smith, 50]

An inscription error happens when a re-presentation of reality is taken to be the same as reality itself.

Modern physics no longer takes space to be Absolute. In fact, through Relativity Theory, the deep metaphor of space is replaced with the deep metaphor of Light. God's omni-presence to creatures is not like determinate space, it is like creative *Light*. Yet, the physics community still tends to cling to the deep metaphor of space in the way that theories are constructed and interpreted and thereby it may be vulnerable to entrapment in inscription error [Unger and Smolin].

Where is the Subject³?

In a nutshell, the reductional Ordering of classical physics takes physical bodies to be determined material objects interacting through universal laws of reciprocal equality. The material objects reduce to collections of disjointed and metaphorically finite elementary “particles” which exist eternally in them-selves. Within this reductional Ordering, there is no place for *interiority*, no place for individual identity, or agency, or creativity or personhood. The deep metaphor of Euclidean space rules whereby material objects are formally *like* Euclidean

³ This interpretation of subjectivity is more fully developed in *On the embodiment of space and time: triadic logic, quantum indeterminacy and the metaphysics of relativity*.

points and creation is taken to be embedded in an empty, inert container of nothingness. From this comes the notion that elementary physical objects exist eternally in-themselves; they are not created *ex nihilo*.

This spatial metaphor, however, cannot be Absolute. Euclidean points are not discrete objects-in-themselves. Euclidean points are relational objects that exist by way of the formal laws of Euclidean geometry which bind Euclidean points into formal relations that create a *whole* structure. Euclidean points only exist by way of being part of the whole structure in which they are embedded. The calculus of differences, which underwrites classical physics, reduces Euclidean points to discrete objects forged from reciprocal relations of equality. What is excluded in the limiting processes of differential calculus is the way in which Euclidean points, within a *Real* continuum, are related to their neighbour in a likeness or image of self-emptying *for the Other*. There is a form of proximity and substitution through which one point constitutionally implicates and merges with its neighbour. It is an asymmetric, directed relation of orientation, like the arrow of time. It is the act of *pointing*. In this sense Euclidean points can be said to possess an interiority which is pure reference to Other. And this interiority is an image of the exteriority of the whole structure of space which also possesses a broken symmetry of reference to Other.

Within the calculus of differences, the limiting processes exclude the implicate order of interiority. Reference to what lies outside of the whole structure or *Explicative Order* is cut off at the same time as reference to what lies within the interior of the elements or *Implicate Order* is cut off. There is nothing outside the whole structure in the same way as there is nothing inside the elementary units constituting the whole structure. What is cut off in this limiting process is the asymmetric act of pointing, the act of being-in-relation-for-another, the act of Love.

Paradeigma.

Paradeigma is time. It is interior reference to exterior presence. It is intentionality. Without paradeigma, the spatial metaphor of Euclidean geometry, taken as Absolute identity, leads to an infinite regress of fragmentation such that no physical body can be said to have *individuality*. Geometrical space is a general formalism that creates indistinguishable, relational tokens of multiplicity that lack *particularity*.

Newton's trope of objectivity is the culprit here. Namely, the trope of *effacing* the physical embodiment of the observer. Newton takes objectivity to be a vantage that is accessible to a *single* human mind, as an observer, by way of its embodiment in physical space. Yet what we take to be objective is that which is general and common to multiple persons. Objectivity involves communion of persons and in communion there is relationship. The many participate in One by way of their relations. In Newtonian physics, relations are governed by universal Law and result in equality or justice, but they lack *Paradeigma* or Love which relates to particularity.

Perhaps the way in which the individuality of human personhood involves communion tells us something about the nature of individuality itself. Specifically, individuality involves particular interiority that re-presents the general, whole forms of exteriority as communally enacted relational signs. The individual is a particular *subject* in communion with others by way of signs that represent objectivity as generalized, external forms—an outward and visible sign of an inward and invisible grace.

Individuals are relationally created in Love.

“Here I am ... for you.”

Does Quantum Theory Signify a Different Ordering?

T

he strangeness of Quantum Theory, from the vantage of classical Ordering, manifests in the double-slit experiments which are described in introductory textbooks on quantum mechanics. In classical terms, the experimental set up involves directing a beam of electrons at a screen that can have either *one* single narrow slit or *two* narrow and closely spaced parallel slits. The screen is placed perpendicular to the trajectory or path of the electrons and the slits are aligned directly in the path of the electrons. Some of the electrons will pass through the slits and travel onward to a second screen that is parallel to the first. The second screen has a coating that emits a tiny flash of light whenever an electron strikes it.

If the first screen only has one slit, then a strong electron beam, containing a large number of electrons per unit volume, forms a single band of light on the second screen, mirroring the slit but slightly spread out because of diffraction of electrons from the edges of the slit. If the beam is made very weak, such that only one electron passes through the slit at a time, then the second screen emits individual flashes of light. By keeping track of these flashes, it is found that after a large number of electrons have hit the second screen, the same pattern appears. This finding is consistent with what one would expect with classical Ordering assuming the electrons are *discrete particles*.

If the first screen has two slits closely spaced together, then a strong electron beam will form, on the second screen, multiple bands of light separated by dark bands. This is also consistent with classical Ordering if the electron beam is considered to be a *continuous wave* that passes through both slits and forms an interference pattern on the second screen. The characteristic interference pattern occurs because the part of the wave passing through one slit interacts with the part of the wave passing through the second slit.

However, if the beam is made very weak, such that only one electron passes through the first screen at a time, then something quite strange happens. Each electron passing through the double-slitted screen will emit a small flash of light on the second screen. By keeping track of these flashes it is found that, after a large number of electrons have hit the second screen, the

same interference pattern is formed as with the strong beam. Because classical Ordering leads us to believe that a single electron will pass through either one slit or the other—*but not both*—it is difficult to understand how an interference pattern can form since such a pattern results from the interaction between the part that passes through one slit with the part that passes through the other slit. Moreover, if the experiment is set up in a way that allows us to observe which slit each electron passes through, then the interference pattern will not form. Instead, it will be the like the pattern that forms with just one slit in the screen. Somehow, the act of observing the electrons disrupts the interference.

These experiments show that electrons exhibit wave-particle duality. Under certain experimental conditions they behave as if they were discrete entities-in-themselves, like particles. Under other experimental conditions they behave as a whole wave which does not reduce to discrete entities in-themselves. There is no apparent resolution of this duality within classical Ordering that excludes the asymmetrical relation of reference or orientation. Electrons, as metaphorical particles, are irreducibly entangled with one another to form a whole like a wave. Yet the whole can collapse into a discrete and localized event such as the flash of light on a screen. This is not just true of electrons. It is true of all matter and energy. Given our exploration of classical Ordering, perhaps we might conjecture that the conundrum of Quantum Theory lies in an inscription error regarding the nature of individuality. Classical Ordering pushes us to assume that individuality has the form of *being-in-itself* because the irreducible relation to Otherness—*being-for-another*—is either excluded or deeply implicit and unexpressed. If individuality in our world is relational, then we need to be careful about how we approach the notion of unity.

Maudlin has argued that there are, in fact, three categories of Quantum Theory that differ according to their orientation to the Real, namely collapse theories, pilot-wave theories, and many worlds. Each has its strengths and weaknesses and so far none has subsumed the others wholly by way of experimental verification. Given our theological desire to avoid a determinate image or re-presentation of One, suppose we take this to be the nature of theory. Namely, theories come in categories and there is no higher unifying *Category* under which all theories can be subsumed into One.

Let our current exploration be located within the category of pilot-wave theories proposed by de Broglie and Bohm. According to this form of theory, the electron can be considered as an individual particle that is guided by a quantum wave. The quantum wave presents to the particle the form of the experimental set-up such that the particle is guided through the experiment's single or double-slitted screen to the second screen where it is detected by the experiment. Each individual particle is particularly guided by the quantum wave such that, as a whole, the ensemble of particles in the experiment will form the observed pattern on the detection screen. This general pattern will be the pattern of a single band if only one slit is open and it will be the inference pattern if both slits are open. The individual electrons thereby make *explicit* the *implicit* ordering of the quantum wave. The explicit order is a real physical pattern on the detection screen. The implicit ordering comes from the quantum wave that is inferred

but not physically embodied in a single instance of the experiment. In other words, each individual electron is a particular sign of the overall quantum wave that characterizes the general form of the physical set-up of the experiment.

If inscribed in Absolute space, the pilot-wave theory reduces to a theory of electrons as discrete and separable particles that are deterministically directed by trajectories that clearly distinguish where each electron precisely begins, which slit each went through and where each precisely hits the detection screen. The mystery of the interference pattern becomes inscribed into the precise articulation of the initial conditions of the electrons. However, this precise determination is not experimentally accessible *in principle*. The pilot-wave theory provides the relational logic of inference: *if* the electron begins precisely at this point in space and time, *then* it will follow a particular trajectory and reach a particular location on the detection screen. Yet the events that are being related—the relata—are experimentally indeterminate because electrons cannot be fully localized in space and time. Their locations have an inherent indetermination that comes from Heisenberg's uncertainty principle for actualized experiments (and also from the absolute limit to the speed of light in Relativity Theory).

Perhaps there is an inscription error here.

Indeed, Bohm thought otherwise. He proposed that the quantum wave is *Active Information*.

The basic idea of active information is that a form, having very little energy, enters into and directs a much greater energy. This notion of an original energy form acting to "inform", or put form into, a much larger energy has significant implications in many areas beyond quantum theory.

[Bohm and Peat, 93]

Active information is a general form that carries a signal which can be received or interpreted by a particular electron. The information in the quantum wave is *potentially* active everywhere but only *actually* active when its form enters into and directs a particular, embodied electron. In this sense it is like a radio wave whose form carries a signal that is actualized by a specific receiving device, such as your cell phone or my grandmother's radio. The particular receiving electron, in turn, must possess an interiority that is capable of responding to and interpreting the form of the quantum wave *for itself*, for its own particular situation in the world, and then expressing that form through its particular action-in-the-world *for others*.

Within the Ordering of classical physics the differential notion of active information is redundant and superfluous because particulars are empty tokens of general form and what directs their action is determinate natural law. Any body inscribed in Absolute space will deterministically follow the form of law applicable to its location. But, as we have seen, such a body is merely a fragmented collection of disjointed null points. It is merely dust.

Or so it would seem.

Yet, if we remember the paradigmatic *pointing* that is excluded from the calculus of differences, then we might say that the fragmented bodies of classical Ordering do possess an interiority that is obscured by the Explicative Order itself. This interiority is the implicate order of time. And, for externally unformed bodies that are like Euclidean points, the implicate order generates uniform or inertial trajectories in spacetime according to Newton's first law of motion.

An opening.

Furthermore, Relativity Theory signifies *Light* as a likeness or sign of the Absolute rather than space. Light is found to mediate space and time by way of signaling processes that are absolutely limited by the finite speed of light. In Relativity Theory the instantaneous structures that are required for embodiment in space cannot obtain physically because that would require infinitely fast signaling. (A spatialized structure is an instantaneously synchronized form.) Perhaps the interior of physical bodies should be categorically differentiated from the exterior in Relativity Theory. From this we might speculate that electrons could possess an interior that cannot be subsumed by the external geometry of spacetime. This interior is in a state of responsivity to the active information of the exterior "geometry" of the whole. The interior of a particular electron processes active information and then responds in synchronicity with the processing of active information of other electrons. That is to say, Relativity Theory concerns itself with the synchronization of processes in spacetime where processes involve particular responses to general, communally constituted forms of active information. What unites the particular to the general in these processes is the way in which a particular electron contains within itself images of the whole and these images are signs (sign-vehicles) that reference external form (sign-object) by internal form (sign-interpretant).

The arc of our trajectory leads us to speculate that non-relativistic Quantum Theory might involve an inscription error that excludes the interiority of time. And Relativity Theory might be understood as a theory of particular processes that can never reduce self-consistently to a spatialized geometry of the general because actual physical embodiment is particular and involves the act of breaking general symmetries.

What might be the Ordering of Orders or the Order of Ordering in Quantum Theory?

How might we go about interrogating the Ordering of Classical physics with respect to its aptness or appropriateness as a fit for Quantum Theory? The challenge is that if we are implicitly seeking a structural order that resolves the paradoxes of Quantum Theory, then we continue to seek a suitable Ordering that is metaphorically spatial. But this might lead to inscription error. Is it even possible to look for a different form of Ordering within physics?

Furthermore, Relativity Theory is based on the principle that space and time are interwoven through a deeper, implicit ordering of Light. Perhaps this ordering is also non-spatial in the same way that Quantum Theory involves non-spatial ordering. How might that work?

In *Science, Order and Creativity*, Bohm and Peat take on this challenge of reflecting on the notion of Order in relation to Quantum Theory. They introduce a threefold categorization of Ordering in which the three categories are interwoven spatiotemporally by way of processes. These three categories are: Explicative Order, Implicate Order, and Generative Order.

Explicative Order

Explicative Order involves the general patterns or invariants in time that are manifested *externally* by a system and usually have well defined locations in space. For example, the patterns that form on the detection screen in the double-slit experiments are Explicative Ordering. Explicative Order involves determinate structure and it is metaphorically spatial. The Ordering of Classical Physics discussed above belongs to the category of Explicative Order. The expectation of most physicists that all Ordering must be Explicative Order [Unger and Smolin] is what leads to problems with interpreting Quantum Theory according to the categorical approach to Ordering of Bohm and colleagues.

Implicate Order

The *Implicate Order* involves an implicit Ordering that constitutes the Explicative Order by way of an irreducibly dialectical or (metaphorically) dia-logical relationship. The quantum potential that forms a pilot-wave that guides particles, such as electrons, is an example of Implicate Ordering. The Implicate Order makes manifest or *expresses* the Explicative Order of the double-slit experiments. However, unlike the Explicative Order, the Implicate Order cannot be made explicit *as a whole*. The Implicate Order therefore opposes or deconstructs the totalizing presumptions of Classical Ordering because it always exceeds any attempt to be made fully explicit. The Implicate Order constitutionally relates that which is *interior* to that which is *exterior* where interiority and exteriority are categorically distinct.

According to Bohm and Peat, the Implicate Order can be thought of in terms of successive levels or degrees of enfoldment without end or culmination in an Ultimate Order that might be made Explicit. The Implicate Order unfolds successively into the expression of successive Explicative Orders and from a given Explicative Order, the next degree of enfoldment of the Implicate Order can be inferred.

What is essential to [the Implicate Order] is the simultaneous presence of a sequence of many degrees of enfoldment with similar differences between them ... such an order cannot be made explicit as a whole, but can be manifested only in the emergence of successive degrees of enfoldment. This may be contrasted with an explicate or unfolded

order, in which the similar differences are all present together, in a manifest and extended form.

Particular kinds of entities, such as electrons and neutrons, [have their] own implicate order. But there may be a further unknown set of entities, each having its implicate order, which goes deeper and deeper without limit and is ultimately unknown.

[Bohm and Peat, 180]

The Implicate Order is *categorically different* from the Explicative Order—it does not reduce to a hidden Explicative Order that has yet to be unfolded in its final totality. Using the spatial metaphors of Classical Ordering, the Explicative Order is like the ordering of *objects* that are *seen* in their totality as external and unaffected by any form of interiority of the observer or the observed. Using temporal metaphors excluded from Classical Ordering, the Implicate Order is like the ordering of *music* that is *heard* from within the experience of the whole musical composition and never manifests a fully present external object.

At any given moment, a number of [musical] notes are present in awareness in various degrees of enfoldment. The simultaneous awareness of all of these is what constitutes the sense of unbroken differences that are present simultaneously in different degrees of enfoldment of successive notes.

[Bohm and Peat, 189]

Yet it is important to recognize that, for Bohm, this does not mean that the Implicate Order is contingent on human participation or consciousness. Electrons for example, by way of their interiority, are in resonance with the Implicate Order of the Quantum Wave and such resonant interactivity guides the interior responsivity of particular electrons (which might otherwise be wholly random) to outwardly express or unfold an Explicative Order that is thereby made manifest *in the world*.

Generative Order

To overcome the tyranny of Absolute space that rules Classical Ordering, a third category of Order is also required such that the relation between the Explicative Order and the Implicate Order is not itself deemed to be explicative or spatial. From the perspective of the Explicative Order, its own relationship to the Implicate Order is paradoxical and can only be articulated through a temporal dialectic of opposition or complementarity. That is to say, the relationship is asymmetrical like time and it subverts the formation of a totalizing Explicative Order.

Yet, neither can the temporal relation of successive unfolding of the Implicate Order be taken as Absolute because such a relation *in-itself* could never generate an Explicative Order. The asymmetric relationality of time lacks *Return*, which is necessary for stasis, structure and self-identity.

If the Explicative Order be like space in its structural unfoldment, and the Implicate Order be like time in its processes of unfolding, then the third category, the *Generative Order*, is like Light.

The Generative Order *creates*. Whereas the Explicative Order is the extensional *form* of Ordering and the Implicate Order is the intentional *act* of Ordering, the Generative Order is the *source* of Ordering.

[The Generative Order] is primarily concerned not with the outward side of development, and evolution in a sequence of successions, but with a deeper and more inward order out of which the manifest form of things can emerge creatively.

[Bohm and Peat, 151]

The Generative Order creates or *generates* by way of generalization. Generalization is the process through which particulars are united in common forms. The Generative Order creates hierarchies of Ordering which unfold in space and time by *expressing* the general.

... the inclusiveness of orders, one within the other, is no longer a mere abstract subsumption in the sense that a more general category contains its particulars. Rather the general is now seen to be present concretely, as the activity of the generative principle within the generative order. This suggests a new notion of hierarchy, in which the more general principle is immanent, that is, actively pervading and indwelling, not only in the less general, but ultimately in reality as a whole. Emerging in this fashion, hierarchies are no longer fixed and rigid structures, involving domination of lower levels by the higher. Rather, they develop out of an immanent generative principle, from the more general to the less general.

[Bohm and Peat, 164]

Looked at in this way, we might say that Classical Ordering is a particular form of Ordering in which the Implicate Order is inert and the Generative Order is excluded. Quantum Theory (and Relativity Theory), on the other hand, might signify a more inclusive Ordering that is generative. Bohm and Peat use the image of a stream to portray the generative flow of Ordering at all levels of creation.

... science has, up to now, emphasized the sequential order of successive changes. In the larger scale this includes, for example, the theory of evolution. In the generative order, however, time is not put into the first place. Rather, time has to be related in a fundamental way to the generative order. The image of a stream is helpful in this respect. The stream can be studied by following an object that floats along it, in a time process. However, it is also possible to consider the entire stream all at once, to reveal the overall generative order that goes downstream from the source or origin ...

... the temporal process of evolution of the universe is constantly generated within this flow from a "source" or "origin" that is infinitely far into the implicate and generative orders. To see the universe in this way is to see "the whole stream at once" and this perception may be called timeless, in the sense that what is seen does not involve time in an essential way. However, the modes of generation and unfoldment in the stream imply that everything changes in successive moments of time. So in the flux described above, the timeless order and the time order enter into a fundamental relationship. However, because this relationship is now seen through the generative order, the time order appears very different from what it is in the traditional approach. It is not primarily a transformation within a given level of organization and explication. Rather it is, in the first place, a transformation of the entire "stream" of the implicate and generative orders that takes place from one moment to the next.

[Bohm and Peat, 197-8]

Categories and Processes⁴

A key insight Bohm and Peat draw upon in developing their notion of three Orders comes from reflecting on the way in which human thought, like human perception, works through *categorization*. Categorization, according to Bohm and Peat, is a creative process that involves the mutual interplay of differences and similarities. Categories are formed when entities are selected or abducted or abstracted from the environment by a subject through the perception of *differences* from the diffuse and undifferentiated background. These selected entities can then be collected together as *likenesses* by regarding their differences from each other as unimportant while still maintaining their differences from the background as important. For example, birds of different size and colour may be abstracted together from the general background of a tree by attending to their likenesses and ignoring their particular differences.

Categories ... emerge through the free play of the mind in which new forms are perceived through the creative action of intelligence and are then gradually fixed into systems of categories. But this system of categories always remains fluid and open to further change, provided that the mind itself is open to the creative action of intelligence.

[Bohm and Peat, 115]

The treatment of categorization, by Bohm and Peat, is formally like that of Charles Sanders Peirce although they make no explicit reference to his work. Peirce proposes three interwoven categories, called *Firstness*, *Secondness* and *Thirdness*. Like the three Orders in Bohm and Peat, Peirce's three categories are not fully differentiated nor mutually exclusive. Being constitutionally entangled, they flow in and through one another essentially. They are not further reducible (for example, to a combination of unitary and/or binary categories). However,

⁴ This interpretation of Peirce's three categories is more fully developed in *Light signifying form: Peirce on creativity, responsiveness and emergence in quantum, biological and linguistic systems*.

Peirce claims that any additional categories (for example, four or five categories) are reducible to three. Because the three categories are not reducible, they cannot be individually defined *per se*. They relate as a whole such that their identities and their differences are brought into play at the same time. The more we speak about and work with the categories, the more clearly they might come into view:

- *Firstness* is “that whose being is simply in itself, not referring to anything nor lying behind anything” [Peirce, 248]. It is potential that is not yet actual—pure indeterminacy that is dynamic and self-othering. Firstness only appears in and through Secondness and Thirdness. It is fresh, spontaneous, whole. Peirce often refers to firstness as *quality*.
- *Secondness* is “that which is what it is by force of something to which it is second” [Peirce, 248]. It is event, effect, otherness, compulsion. Secondness is constituted by things and facts which inter-act. It is the domain of pure *experience* or “brute actuality”.
- *Thirdness* is “that which is what it is owing to things between which it mediates and which it brings into relation to each other” [Peirce, 248]. It is mediation, laws and habits, *generality*. The Third connects the First and the Second and weaves “a fabric of concrete reasonableness in and through the world” [Corrington]. The Third relates “things” to generalized “systems” from which Firstness re-emerges.

Within this metaphysical orientation, the *Generative Order* would belong to the category of *Firstness*, the *Implicate Order* to *Secondness*, and the *Explicative Order* to *Thirdness*. The three Peircean categories animate and sustain a continuous evolutionary process that takes the form of growth or progressive *learning*. The process is both hierarchical and emergent, such that higher levels of complexity are forged from lower levels. Each progressive level involves more intricate bodily forms with deeper interiority that grows in responsiveness and intentionality.

Peirce’s metaphysics of categories is based on the notion of a *sign* which also involves an irreducibly threefold relationality. The three elements of a sign are: the *sign-vehicle* (also called representamen or simply “sign”) which stands for an *object* to which a response may be made by an *interpretant*. The sign-vehicle does not signify anything in itself. Rather it is able to signify because it is affected or determined in some way by the object and, in turn, it is able to affect the interpretant. The interpretant is a change of state that allows the sign to mediate between the object and an interpreting entity. Often the interpretant will be a change in an interior state of an interpreting entity. For example, it may be an “image” or “thought” in someone’s mind (i.e. what is signified to someone by the sign). However, the interpreting entity need not be a person, it could be any physical body whose inner state may be changed in response to the sign, such as an electron or an amoeba.

It is important to note that Peircean signs and categories are not necessarily contingent on human consciousness and do not require human actors. They represent a more robust form of Ordering than is possible with the theories of Classical Physics. The notion of three categories,

in Peircean metaphysics, replaces the notion of a *Grand Unified Theory* in Classical Ordering. In the context of physics and the natural sciences, the three categories are potentiality, actuality and generality. The notion of a *Sign*, in Peircean metaphysics, replaces the notion of an *Object* in Classical Ordering. In the context of physics and the natural sciences, a sign is a repeatable bodily *process* whereby particular interior action and common exterior form are functionally related. The quanta of Quantum Theory are thereby taken as embodied signs that signal communal and lawful processes.

How might the Process-Ordering of Quanta be considered both Individual *and* Relational⁵?

Quantum Theory, complemented by Relativity Theory, might lead us to conceive a different Ordering of physics such that physics is concerned with *the physically embodied processes of individuation*.

Within this way of conceiving Order, an individual is a particular body that enacts physical processes, which are iterative in time, formally replicable in space, and synchronously related to other individuals. An individual possesses an interior which responds to the whole by way of general forms. The general forms, enacted by a community of like individuals, interpret the world for the individual through relational signs. An individual, in its particularity, possesses degrees of indetermination, randomness or freedom commensurate with the communal forms and its interior possesses images of the whole that reference external form and sustain the individual as temporally enduring and spatially structured *being-in-itself-for-another*.

An individual, in its particularity, is a *Subject*. Subjectivity belongs to the category of *Firstness*. A Subject is a unique locus for agency in the world. A Subject possesses an interior that is in a mediated relation with the external world. The individuality of the Subject is sustained relationally in its spatiotemporal inter-actions with other individuals by way of general patterns, rules and laws. The *being-in-itself* of the Subject is given to the Subject by the community of individuals who are mutually entangled and inter-acting in the world. Yet, *in-itself*, the being of the Subject is not Real because it has no *significance*.

The general patterns, rules and laws belong to the category of *Thirdness* and are sustained by common or general signs that are collectively processed by a community of individuals. Each individual Subject is in a mediated relationship with Others by way of the formal system of patterns, rules and laws which constitute a creative grammar for the community. Thirdness mediates the relationship between the interior of an individual and its exterior world. Because a Subject is particular and unique, the interior of an individual possesses some degree of indetermination (or randomness) which also grants the individual limited agency in the world.

⁵ This interpretation of relational ontology is more fully developed in *Spacetime as a Formal Semiotic Process*.

For example, the interior of an electron possesses quantum spin which is indeterminate *in-itself*.

The individual Subject stands in a relationship of objectivity to the external world, such that other individuals manifest to the Subject as individuals through the mediation of general forms. This mediated relationship occurs through communal sign-processes. There is a categorical difference between a Subject and an *Object*. A Subject is an agent that is particular, responsive and possesses an interiority that is immediately inaccessible to other individuals. An Object is an image that is external, formal and interpreted by a community of individuals. Through *inter-action* with other individuals, the individual Subject puts forward an externalized image-of-itself that is available for an Other individual to respond to. This is a referential *being-for-another* that brings the Subject into relation with another individual as a potential sign. For example, an electron puts forward an image of physical extension in space and time that has the form of spatially constrained and temporally repeated resonance or vibration, which can be responded to by another individual electron to form a synchronous couplet. Yet *in-itself*, the couplet is still not Real because there is no external relation to what lies beyond the couplet. The internal vibration of the Subject is a potential sign of the vibration of another electron with which it is entangled. What is required to obtain Reality is that the Subject and each Other to which it is synchronously coupled communally form a *system or manifold*. This systemic manifold forms the image of each constituent electron as a general, shared form from the common standpoint of every individual electron in the system. This shared general form—the image—is the externalized image-of-itself that is given to the Subject to express through its synchronous inter-action with all Others in the system.

This is a circular process that is created and sustained through Return.

The vibrational mode of the Subject is an internal image that comes from the entangled system or manifold of electrons as a whole. In acting out this internal image the Subject makes the image available to Other Subjects in the system or manifold. The internal image references the external image as a sign. As long as all the electrons continue to reference or interpret one another in the system through the generalized image of constrained vibration, they communally enact the Real which becomes a vibrating manifold of extensional objects.

In more complex systems, such as those formed by the double-slitted experiments, the internal subjectivity of an individual is a microcosm that stands in relation to the whole as an inexhaustible source of signs [Bohm, 196]. The individual, as Subject, receives *Active Information* from the whole in the form of generalized images which it then processes internally. Through the internal processing of Active Information, the Subject thereby *acts* in the world *for* Others by expressing its own internal images. This action-in-the-world for Others presents to Other individuals the Explicative forms of Active Information which are the general forms of communal interpretation.

Wherefore Order?

The Ordering of classical physics takes *Space* to be the highest universal category. The privileging of Absolute space can be traced back to Newton. When space is taken to be the highest category, the universe becomes parsed into timeless, finite “monads” whose being exists *in-themselves*. The result is a formal system of monadic relations in which relation is derivative to self-sufficient monads that have eternal existence and are not created *ex nihilo*.

Within classical Ordering, God’s immediate relation to creation becomes wholly transcendent and the notion of relation becomes derivative. The core problem with such monadic relationality is that it can lead to false images of One. In Christian theology, this metaphysical problem can be linked to Arian-like views regarding God’s Oneness that mis-represent the relational mystery of Trinity. Perhaps not coincidentally, Newton—for whom physics and theology were deeply connected—held such views and apparently did not believe in the Christian formulation of the Trinity [Westfall, Torrance 1969].

Quantum Theory and Relativity Theory are perhaps more coherently understood through a different orientation to Ordering whereby quanta become manifestations of relational processes. Such a relational ontology [Zizioulas] provides an alternative paradigm for interpreting modern physics. Within this metaphysical approach to Ordering, a system and its constituents are formally connected through semiotic processes of signaling or communication [Deely]. Whereas the fundamental constituents of monadic relationality are objects, the fundamental constituents of relational ontology are signs. An object exists *in-itself* and terminates in a timeless, spatialized *Self-image*. A sign, by contrast, exists *in-itself-for-another* and always remains relational, pointing towards something *Other*.

Relational ontology is consistent with Trinitarian theology [Zizioulas]. Therefore, starting from God’s revelation of His Trinity we might begin to trace “vestiges” or *hints* of Trinity in modern physics [Augustine]. Theologically speaking, this is proper to metaphysics; whereas the path that involves using Self-images from creation to determine or delimit God’s loving essence is improper [Augustine].

References

Augustine. *The Trinity*, Second Edition, trans. Edmund Hill, ed. John E. Rotelle. New York: New City Press, 2012.

Bohm, David and Peat, F. David. *Science, Order and Creativity*. Second Edition. New York: Routledge, 2000.

Bronowski, Jacob. *Science and Human Values*. New York: Harper & Brothers Publishers, 1956.

15. Notion of order in physics and the natural sciences

Corrington, Robert S. *An Introduction to CS Peirce: Philosopher, semiotician and ecstatic naturalist*. Maryland: Rowman & Littlefield Publishers Inc., 1993.

Deely, John. *Purely Objective Reality*. Semiotics, communication and cognition Vol 4. New York: De Gruyter Mouton, 2009.

Hegel, GWF. *Phenomenology of Spirit*. Trans. by AV Miller. Oxford: Oxford University Press, 1977.

Huggett, Nick. *Space from Zeno to Einstein: Classic Readings with a Contemporary Commentary*. Cambridge: MIT Press, 2002.

Levinas, Emmanuel. *Otherwise than Being or Beyond Essence*. Trans. Alfonso Lingis. Pittsburgh: Duquesne University Press, 2002.

Maudlin, Tim. *Philosophy of Physics: Quantum Theory*. Princeton: Princeton University Press, 2019.

Peirce, Charles Saunders: *A Guess at the Riddle*, 1887-8. [Available January 10, 2015: <http://www.iupui.edu/~arisbe/menu/library/bycsp/quest/quest.htm>].

Smith, Brian Cantwell. 1998. *On the Origin of Objects*. Cambridge: MIT Press, 1998.

Torrance, Thomas F. *Space, Time and Incarnation*. London: Oxford University Press, 1969.

Torrance, Thomas F. *Reality and Scientific Theology*. Edinburgh: Scottish Academic Press, 1985.

Unger, Roberto Mangabeira and Smolin, Lee. *The Singular Universe and the Reality of Time: A proposal in natural philosophy*, 2015.

Westfall, Richard S. *Never at Rest: A biography of Isaac Newton*. Cambridge: Cambridge University Press, 1998.

Winslow, Rev. Dr. Lianne. *Trinitarian theology of nature explored as analogical*. [Available March 13, 2021: [\(4\) \(PDF\) Trinitarian Theology of Nature Explored as Analogical | Rev. Dr. Lianne D'Andrea-Winslow - Academia.edu](#)].

Zizioulas, Metropolitan John. Relational Ontology: Insights from Patristic Thought. In *The Trinity and an Entangled World: Relationality in physical science and theology*, Ed. John Polkinghorne. Grand Rapids: William B Eerdmans Publishing Company, 2010.

DRAFT

Opening

16. A physicist's guide to [Hegel's] *Phenomenology of Spirit*: resonance, disambiguation and the genesis of spatial orientation

An exploration of how Hegel's triadic "logic" as developed in *Phenomenology of Spirit* might be applied to the functional role of light in relativity theory. In this exploration, the triadic form of light produces an exteriorization of spacetime separation at the same time as it interiorizes orientation in the form of quantum spin. Spacetime embeds quantum properties as a result of the three-fold relational nature of substance, namely: being in relation to self (sameness), being in relation to another (alterity), and being in relation to a whole (return).

Introduction

*All beings stand in opposition to one another;
what they do takes on an order thereby.*

Opposition means estrangement.

—I Ching: 38.K'uei

In *Philosophicae Naturalis Principia Mathematica*, Newton sought the unity of heaven and earth in a logical system of relatedness¹. At the time, his work was theologically motivated; one of his central concerns was the absolute One. His theoretical framework was grounded in a Euclidean concept of Absolute space and its related notion of negation or nothingness as "void". Subsequently, his theory has been fully secularized and, in the last century, superseded by modern theories that better match experience in the form of scientific experimentation, while deeper connections with theology have faded from mainstream physics [see, for example, Richardson]. Drawing from formal aspects of Hegel's *Phenomenology of Spirit*, this paper is an exploration of images of unity which un-ground the way in which Newton's epistemic and ontological framework has been taken up and developed into modern theories of physics. Specifically the paper involves an application of Hegel's triadic form of "logic" to the role of light as the source or genesis of spacetime. Hegel's alternative approach provides a hermeneutical framework for understanding quantum ontology as an emergent phenomenon of light.

¹ For a fuller discussion of the Newtonian or "classical" view of space and time, see *The proximity of light: a deconstruction of space*.

In Newtonian physics, the universe presents as an instantaneous totality in a purely passive container called Absolute Space. This totality progresses deterministically through Absolute Time according to natural law. In so doing, Time becomes just another dimension like Space. Empty space is populated with elementary particles or “units”—unchangeable things-in-themselves—which interact to form the complex forms we observe in our world. Nature appears as fully externalized. There is no place for freedom, interiority, subjectivity or creativity in Newton's theoretical framework. The “ideal observer” watches the universe unfold from an indifferent vantage. These core images and their relations, which characterize the substance of nature in Newtonian theory, are difficult to unpack. Yet my claim is that this is precisely the exercise required if we are to encounter deep prejudices and disconnections in modern theoretical approaches to physics.

The most deeply entrenched of these images is Absolute Space—*negation*—what remains when the universe is emptied of all “things”. Absolute Space is an image of the void, the abyss, *tohu wa bohu*. But it is a determinate or formed image. Absolute Space has geo-metry and gives itself over to analysis. It is a passive theatre of symmetry or sameness wherein all points are identical. “Things” placed within Absolute Space become fundamental images of unity (elementary, unchangeable particles) and *difference* or separation is derivative and inert. Absolute Space is pure abstraction from context that is ready-at-hand, as it were.

Space is the existence in which the Concept inscribes its differences as in an empty lifeless element, in which they are just as inert and lifeless. The actual is not something spatial ... In a non-actual element like [space] there is only a truth of the same sort, i.e. rigid dead propositions. We can stop at any one of them; the next one starts afresh on its own account, without the first having moved itself on to the next, and without any necessary connection arising through the nature of the thing itself ... [this kind of] knowing moves forward along the line of equality. For what is lifeless since it does not move of itself, does not get as far as the distinctions of essence, as far as essential opposition or inequality and therefore does not make the transition of one opposite into its opposite, does not attain to qualitative, immanent motion or self-movement. [Hegel, §45]

Absolute Space is a completed totality in the sense that, through it, reality presents *all-at-once*. If given an initial, present condition for all things in Absolute Space, the universe is fully determined for all times past and future. Absolute Space supports the image of a disengaged observer who can experiment and reason about natural substance *externally*, controlling for all interaction between the observer and the observed.

Dealing with something from [this] perspective of the Absolute consists merely in declaring that, although one has been speaking of it just now as something definite, yet in the Absolute, the A=A, there is nothing of the kind, for there all is one. To pit this single insight, that in the Absolute everything is the same, against the full body of articulated cognition, which at least seeks and demands such fulfillment, to palm off its Absolute as

the night in which, as the saying goes, all cows are black—this is cognition naively reduced to vacuity. [Hegel, §16]

There is no beyond with Absolute Space. It provides a vantage which might be seen to either fully unite human subjectivity with divinity or, equivalently, absolutely divide them. With the former, God becomes empty; with the latter, irrelevant. Herein lies a deep prejudice which continues in modern physics. That which opposes and therefore determines space—namely time—has been subverted in its otherness. Physicists assume that *time is the same as space* [see, for example, Barbour].

As for time, which it is to be presumed would constitute, as the counterpoint of space, the material of the other part of pure mathematics, it is the existent Concept itself. The principle of magnitude, of difference not determined by the Concept, and the principle of equality, of abstract lifeless unity, cannot cope with that sheer unrest of life and its absolute distinction. It is therefore only a paralyzed form, viz as the numerical unit, that this negativity becomes the second material of mathematical cognition, which, as an external activity, reduces what is self-moving to mere material, so as to possess it in an indifferent, external, lifeless content. [Hegel, §46]

To be sure, through experimentation with nature, modern physics has found the Newtonian picture to be false. But, my claim is, the prejudice towards space remains and because of this both space and time are falsely understood.

In *Phenomenology of Spirit*, Hegel provides a philosophical exploration that mirrors this deep prejudice in modern physics. For Hegel, what moves the interior of the object—essence—is the same as what lies beyond its horizon—substance. With Absolute Space, essence and substance are imaged as unchanging, empty and meaningless. Humanity and Divinity are reduced to ashes. Starting from consciousness as interiority, Hegel arrives at a different form of relatedness between interior and exterior, a form that is more consistent with the findings of modern physics. With Hegel's approach, objects, as images, remain embedded in their contexts and connected to other objects holistically, such that relatedness to Other is intrinsic to their being. Substance/essence supports a triadic form of reflection or *return* through which this same-other duality is maintained. While objects in Hegel's theory cannot be abstracted from context, as would be the case with Absolute Space, they always point, signify or *refer* beyond themselves. Like time, reference is asymmetrical. This referencing is a form of drawing out in which objects organically unfold through time in their unity, externalizing their interiority and making that externalization available for uptake into the interior of other objects. In this way, objects "work out" their interior principle which is given to them through the "working out" of objects in their past. The form of this self-determining action is collective—each object in the ensemble impacts the whole ensemble which, in return, impacts the objects. Substance/essence takes the form of word. Spatiality, as co-presence, becomes textual and temporality, as process, becomes vocal (speech).

Opposition and Return

*Return is small yet different from external things;
Return leads to self-knowledge.*

—I Ching: 24.Fu

“In my view, which can be justified only by the exposition of the system itself, everything turns on grasping and expressing the True, not only as *Substance*, but equally as *Subject*” [Hegel, §17]. We begin through an encounter with the excluded initiative, an encounter with an unknown assumption which structures thinking about the world although is not itself thought. We begin with experience *as experience*. Interiority. What is immediately present to consciousness.

Throughout the text, Hegel repeatedly traces the movement of interiority in time as a progressive series of moments. The vantage, which is *Subject*, might be thought of as complete immersion in time, without horizon and without externality. Complete immersion in what is immediately present to me now. All is movement and change, like thinking. This movement is *not* like the movement of objects or things in my field of vision. That traditional or classical view of “thingliness” already sets up Subject as merely another enduring object which is related to other objects in the duality: subject-object. The problem with the classical view of thingliness is that it takes subject and object to be externally defined *a priori* (eg. a-temporally defined) and their relatedness to be derivative. This is the vantage of Absolute Space. In fact, Absolute Space can be thought of as pure abstraction, the classical view *against which* Hegel is thinking. Hegel is seeking a vantage of immediate context in which there is no “framed whole” or “objective thing” that might be extracted. His interest then turns to the question of how subject and object come into definition over and against one another. How is the immediate mediated? So attention shifts away from subject and object as “things” to the relatedness that mediates and unifies them both and brings one into determination over against the other. A key intuition in making this shift is that any portrayal of subject-object relatedness as a duality will lead back to the problems of Absolute Space because it will determine relatedness as inert symmetry. If object is the Other of subject, then we need to cast relatedness as the Other of the other. That is to say, self-emerging opposition is an *irreducible triadic form*. This has significant implications for how we might come to understand truth, language (meaning) and light (matter).

There is no substitute for reading Hegel to experience the triadic rhythm of his thinking whose form reflects the content of his logic. Here I will attempt to crudely trace its figure through a “thought experiment” or reflection on immediate awareness. As you read this, try to think about the experience of awareness as immersion in an implicit whole or plenitude for which there is no *a priori* division or horizon of outer and inner, object and subject.

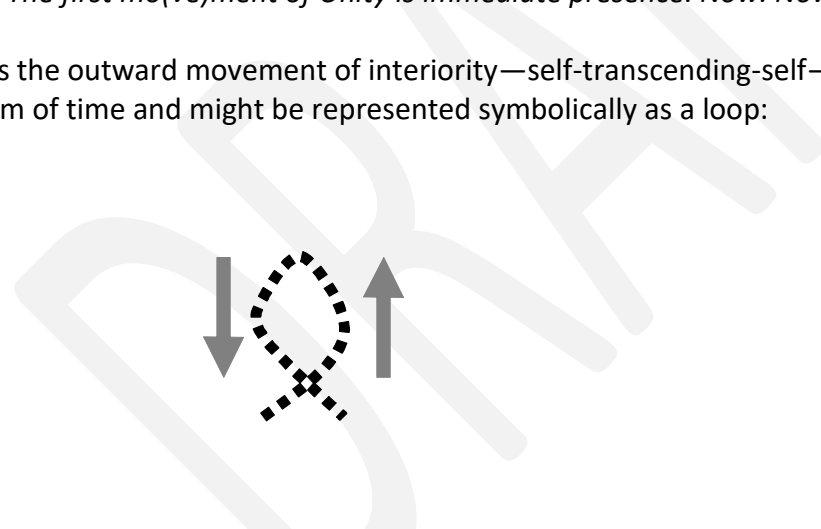
The first mo(ve)ment of Unity is immediate presence. Now.

Now is immediately past. Change. The second mo(ve)ment of Unity is a spontaneous breaking of symmetry. Interiority—same—against Other. Response and counter-response. Movement. Change. Duality as experienced from within. What Hegel calls negation.

As the same begins to oppose Other we enter the third mo(ve)ment of Unity. Opposition brings Other into determination as other-of-the-same and same into determination as same-to-another. (Opposites are opposites by virtue of sameness. Stop is the opposite of go, not pink, nor pebbles, no my cousin Kevin.)

*The “middle term” emerges as the relating of opposites from within—the other of the other who is also another to me. What Hegel calls the negation of negation. The middle term brings return. Determining opposites are brought into reflection or recognition—self-reflecting-self—and that immediate unity is the middle term immediately present. Freedom that transcends opposition. “The middle term is self-consciousness which splits into the extremes; and each extreme is this exchanging of its own determinateness and an absolute transition into the opposite” [Hegel, §184]. *I am that immediate freedom. The first mo(ve)ment of Unity is immediate presence. Now. Now is immediately past ...**

Seen as the outward movement of interiority—self-transcending-self—the progression takes the form of time and might be represented symbolically as a loop:



The key to this figure is that it is reflective; it returns back upon itself. The experience is an unbroken whole in which the opposition of inner-outer is held in suspension. Inner awareness (consciousness) comes to the threshold of exterior world (substance) only to withdraw again, but with a richer more fully formed self-awareness. The process of opposition focuses consciousness into a determinate awareness over against an emergent exterior which likewise comes into determination, like the dividing of water from water. The moment of complete division, however, is suspended because it is overcome. In the moment that inner and outer become fully determined over against one another, consciousness realizes it is the middle term between the two. The determined opposites lie in the past as moments available for recollection, while present awareness remains an unbroken whole. The still point of this reflective movement is the Subject, “I”.

This still point in a sea of continual change holds together the movement of abstraction into the past and the Subject—I—is a process of self-othering. The figure traced is the movement of self-consciousness through which I project an image of myself as object or other and then take that image back again into myself through return. It is *action*. The figure holds together identity and difference as it holds together symmetry (or equality) and asymmetry (or inequality). “I” splits into difference wherein the same and the other are opposed as unequal. Yet in the limit of opposition their relatedness is seen to be the unifying principle over time and that realization is a moment of reflective Return. The first split, or negation, brings about a continually deferred union in difference, not unlike what Derrida calls “Différance” and what I will later describe as the “quantum vacuum” (for further discussion, see Rogers). This is pure *rupture*, which has no equivalent in Absolute Space whose structure is based on an underlying sameness. It is the limit of duality. The false construct of Absolute Space can be seen to come from privileging one aspect of duality (namely equality) and subverting the other (inequality). In so doing, the underlying dynamic is subverted: Space is made absolute and Time becomes the excluded initiative of the construct. (The method of Deconstruction concerns itself with this primal negation, for example. In a separate paper I have attempted to show how Absolute Space might be “deconstructed” [Rogers].) The moment of Return is the negation of this negation—the Subject is the still point who can perceive the dynamic of rupture. Return is a process of *coming to equalization* in which the determined equals are “left behind” as externalizations, which is to say they are spatialized. It is the threefold form of Return which overcomes the eternal deferring of primal duality or opposition by simultaneously externalizing and internalizing a particular determination.

The above exercise does not do justice to Hegel. However, I hope it brings forth enough of Hegel's insight to begin to make connection with modern physics. Through Hegel's approach we encounter objectivity and its “thingliness” as an emergent process; objects are not *a priori* abstractions made possible through the inert symmetry of space. Objects, as exterior determinations, come into being through inter-action which simultaneously brings interiority or in-formation. Recall, in the classical view the “still point” was Absolute Space which is the negation of objects. For Hegel, the “still point” is a double negation. The first negation brings the process of determining—nothing is nothing *in relation to something*. The second negation overcomes this duality by negating the opposition. The bearer of this double negation is the Subject, I. For theories of modern physics, I want to say, the bearer of the double negation is Light, which is Substance. *Light has an irreducible triadic form like Subject*. Hegel's insight is that objects, like subjects, can be seen to have interiority. In a sense they become the externalized form of interiority.

That light is a window on the absolute is a cornerstone of relativity theory which I have discussed elsewhere for the interested reader [Rogers]. Here I will try to present one key aspect of light which suggests its significant connection with Hegel's work. Photons, or particles of light, can form as correlated pairs that travel in opposite directions. Each photon possesses an interior property called “spin” which can have one of two values, say “up” or “down”. Regardless of how far separated in space the photons become, they are correlated in the sense

that if one photon has spin “up”, the other photon will have spin “down”. However, which photon has which spin is undetermined—they are in opposition, but that opposition is indeterminate. Through an act of measurement, which is to say interaction with the world, the spin of one of the photons can be determined. What is then found is that the spin of the other photon is also determined as the opposite of the measured photon. The photon pair is said to “collapse” into a determinate opposition as a result of the measurement. Before the measurement, however, not only is it impossible to say which photon has spin “up” and which has spin “down” but, more fundamentally, the photon pair exists as a superposition of all possible outcomes of the measurement. Only after the measurement does the “state” of the photon pair become determined. This example of correlated photons strikes at one of the core mysteries of modern physics. It seems particularly mysterious because, in theories of physics, we tend to have the prejudice that determination is something that exists eternally, rather than seeing it as the emergent result of an enacted process.

Hegel provides a way to entirely reframe the way we look at this problem. The correlated photon pair can be seen as a unity that possesses interiority. This interiority is the very essence of other-in-the-same. We might call this negation. The act of measuring then becomes the negation of negation, which results in determination for the external world (i.e. “the measurement”). The connection with Hegel goes much deeper, however. The correlated photon pair exists at the threshold of space and time. In the “frame of reference” of light, there is no passage of time nor separation in space. (For the reader who has not encountered relativity theory before this may seem like a contradiction because I have already described the photon pair as separated in space and enduring in time. The reason why this is not a contradiction is because space and time are relative to the frame of reference. Before I was talking about the frame of reference of an observer who is not traveling at the speed of light. As the speed of light is approached temporal intervals become infinite and spatial intervals become infinitesimal. For a more detailed discussion see Rogers.) The correlated photon pair is always in immediate proximity. So the collapse of the photon pair can be seen to be a reflective process of Return. The photon pair is a unity and the spatial points at which the “spins” are measured are the extreme points of that unity. The determinate “collapse” of the state of opposition might be seen as the very essence of time itself and the correlated determinate spins as the essence of space. Thus Hegel might offer some insight into how light contains within itself the principle of space/time, or, equivalently, how the unfolding or fulfillment of light *is* the becoming or externalization of universal substance, beginning with the creation of space/time.

Another aspect of modern physics which might come into greater clarity through Hegel's triadic formalism concerns the nature of the quantum vacuum. Recall that Absolute Space can be conceived as a negation of objects or things. Absolute Space, once emptied of all things, is an inert or empty “void”. However, quantum mechanics and the related measurements which support the theory, suggest that the vacuum—“nothingness”—is neither passive, nor empty. Creation rests upon a scintillating, bubbling, almost-differentiated-but-not-quite, “sea” of virtual quasi-states (see, for example, Krauss). For modern physics, nothingness is pregnant

with reality. Every existent particle has an anti-particle which is its opposite—they are created in correlated pairs and when they meet they annihilate one another. For small enough times and distances, the determination of this opposition no longer holds. Space/time is filled with an indeterminate abyss of unrealized opposition called “virtual particles”. This situation is not unlike Hegel’s concept of absolute negation. What Hegel further brings to the discussion, however, is an extended exposition on the way in which a second negation, as Return, might create and sustain *something* in the vacuum. That is to say, the way in which light (or Substance) might sustain enduring, individual “objects”. As I will attempt to show in the next section, Hegel’s approach naturally leads to an understanding of the holistic quantum nature of such objects.

Repeated Return: Resonance and Reference

*The well abides in its place,
yet has influence on other things.*

The well means union.

—I Ching: 48.Ching

Absolute Space supports an ontology or universe of “elementary particles”. These particles are fundamental analytical units which interact through natural laws to form complex entities. The fundamental unit itself—the image of unity—is spatially limited, inert, eternal and without interior. It is the image of the thing-in-itself as finite, formless abstraction. Hegel calls this image the “numerical unit”. Because our understanding of both mathematics and theories of space/time have advanced significantly since Hegel’s time, I will use the term “Particle” to refer to what Hegel calls the “numerical unit”².

What is significant about the particle as the analytical unit of ontology (i.e. the elementary particle theory of being) is that it presents as unchangeable and intrinsically available for

² He probably took the image of the “numerical unit”, at least in part, from an understanding of the natural numbers as discrete, separable units-in-themselves. With current knowledge of mathematics, particularly developments in the twentieth century such as the work of Godel, this terminology becomes problematic. The important point Hegel wants to make, however, is that the “numerical unit” that characterizes beings in mathematical theories such as physics is determined by the underlying construct of “spatiality” and that, at least in his time, this analytical picture had no intrinsic connection to actuality. Since then, there has been a great deal of development in our understanding of the non-analytical aspects of mathematics as well as the non-analytical nature of space/time, particularly in the theory of complex numbers. This is undoubtedly one of the reasons why complex numbers are essential to modern physical theories. Incidentally, the form of “Return” is a fundamental aspect of Unity in complex number theory and is represented by the “Phase” of the number.

abstraction from context—it exists in-itself³. Hegel critiques this way of understanding the unity of things-in-the-world because the “in-itself” of the particle has no necessary relationship to the actual things that manifest in the world. Hegel calls the image of the particle *non-actual*. By contrast, he seeks an understanding of unity in which finite things-in-the-world necessarily develop into what they are as a result of a process of becoming or unfolding. The process of becoming is therefore intrinsic to the unity of the thing-in-itself. For Hegel, the particle is a false image of unity because it only exists “for itself”; the particle has no interiority, no immanent motion, no self-movement. If the *actual* world is understood to be made of such elementary units, then that understanding has been imposed externally onto the world according to Hegel. It does not emerge necessarily from the actual experience of things. Such an understanding, which Hegel calls “picture thinking” or “dead propositions”, only scratches the surface of objects in the world; it does not penetrate into the inner truth of the object. What comes from this type of understanding Hegel calls *unessential* determinations of the object because the understanding comes externally, from the imposed system of analysis, rather than intrinsically from the experience of the object.

Philosophy, on the other hand, has to do, not with unessential determinations, but with a determination in so far as it is essential; its element and content is not the abstract or non-actual, but the actual, that which posits itself and is alive within itself—existence with its own Concept. It is the process which begets and traverses its own moments, and this whole movement constitutes what is positive [in it] and its truth. [Hegel §47]

What is missing from the elementary particle theory of being is an understanding of how relatedness is essential to the “thingliness” or wholeness of individual objects. I will use the term “Einzelheit” to refer to this image of a singular wholeness in things in order to set it apart from the image of “particle”⁴. In *Phenomenology of Spirit*, Hegel seeks to understand Einzelheit as intrinsically relational. My intention here is to crudely sketch the core formalism Hegel uses and show how it might relate to the objects of concern in physics. Bear in mind, however, that Hegel's primary concern is Einzelheit of human persons which is much richer and more complex than the Einzelheit of electrons! Once again my presentation does not do justice to Hegel.

In the “thought experiment” presented earlier, holistic awareness was presented as *my* awareness, where *I* am a particular individual. The subject—“I”—was imagined to be an interiority in-itself which fills the plenitude immediate being. To call this “interiority” is misleading, however, because it could equally well be thought of as exteriority, as all that exists

³ In fact, this is also an illusion because the analytical units are actually the image of Euclidean points which collectively constitute Absolute Space. Again this returns us to the problem of time as the excluded initiative of space in theories of physics.

⁴ I will continue to use the term “individual” to refer to instances of singular wholeness. However, at least in English, the term individual has connotations that we have already identified as misleading. The “individual” is self-ottering and so contains within itself division. Einzelheit is the form of unity that instantiates individual objects.

in my immediate now. The thought experiment traced the movement of this interior/exterior as the reflective movement of action-reaction or response-counter-response in which the “still point” is the Subject, I. However, in the moment of return the plenitude was renewed and nothing *broke through* as another determinate being-in-itself over against the subject⁵. At best there was the determination of such opposition as a recollection of the immediate past. There are two key trajectories I want to carry through from this contemplation of immediate awareness⁶.

We began the thought experiment from the perspective of internal awareness or consciousness—subject. In this beginning there is an implicit privileging of interior over against exterior that comes from the very language we use. This is similar to the way Hegel begins *Phenomenology of Spirit*. However, we might have considered beginning from the external perspective of world—Substance. The “still point” would then be the *origin* of the object as thing. This is the common starting point in physics—the origin of the frame of reference to which everything else is related. If the world or universe is seen to be embedded in Absolute Space, an origin is unproblematic. Absolute Space (and Time) is filled with Euclidean points, all of which are the same and any one of which could be taken as a neutral, inert origin. However, this abstract construct is not *actual in the world*. With Hegel's approach, the origin must be understood as an enacted object, that is to say an event. Based on relativity theory, *light* presents itself to us as indicative of primal substance. We then need to consider how origins of objects (and their frames of reference) are forged from the reflective process of return inherent to light. My claim is that the process described earlier as collapse or determination—the event—is the enactment of an origin to a frame of reference.

Objects always exist in relation to other objects. In the thought experiment, awareness was merely an individual experience—the awareness of one person. However, individuals, as subjects, are also objects existing in relation to other individuals as subjects. The relationship between two persons is a primary concern for Hegel, which he calls *mutual recognition*. Mutual recognition is a sustained form of inter-relatedness that embodies the opposition of same-other. In order to understand mutual recognition, it is helpful to first consider objects that are not persons. When I encounter another (impersonal) object, that object can become for me an image of myself. In our relatedness, I can externalize myself as an external image projected onto that object (the object is an object *for me*.) As far as the actual object is concerned, such a projection is empty in its content, however, in the sense that what I see in the object is merely what I have projected onto the object. It is the object in relation to my subjectivity as the origin of meaning. I don't see the object in-itself, in relation to its own origin. (The emptiness of

⁵ This sentence has a double entendre which more fully resonates its meaning. Nothing can be read in the negative or in the positive. This double entendre is the first negation which provides the opening for the concept I am trying to articulate.

⁶ These two trajectories, taken together, are the origin or beginning of the concept I am trying to articulate. If I am true to Hegel, the form of my thinking should reflect its content.

projection is the empty form of pure abstraction which Hegel calls “picture thinking”.) The situation is different when I encounter another *person*, however, because although the person presents as an object other than me, that person also possesses an interior subjectivity like I do. I can project my “self image” onto that person and, at the same time, that person can project her self image onto me. We can mutually recognize one another.

Mutual recognition is a form of *breaking through*. As object, the particular person I encounter is other than myself, as subject the person is also the same. There is an indeterminateness in this same-other opposition, a freedom to give and take self-image. This indeterminateness is the still point in the bond between two persons as a single unit. Each person is both “in-itself” and “for another”, yet in a way such that the two aspects are indistinguishable. This still point, however, is no longer centred at the origin of my personal awareness. The still point lies between us. We become a correlated pair.

We have already encountered this form in our discussion of correlated photon pairs. The term physicists use for mutual recognition is *resonance*. Resonance is a form of relatedness in which same and other are separable but not fully differentiated. They are separable by external co-presence (spatiality) while at the same time merged by interior dynamics (temporality). We might think of the correlated pair as an image of *Einzelheit*. For the case of photons (of light) the pair engages in an indeterminate exchange of in-formation. The fundamental unit of exchange is the binary unit of information, which we called “up” or “down” although any terminology of opposites would suffice (positive/negative, left/right, plus/minus, “<” / “>”, yang/yin, “0” / “1”, etc.). The exchange, which is enacted, is the fundamental quantum of *action*. The “middle term” of this triadic form is the bond itself. The bond is the enduring limit of the indeterminate information exchange.

The above discussion of mutual recognition or resonance was a discussion of the interiority of two. The pair (of persons or photons) were seen as in-themselves and their relatedness was an indeterminate exchange of difference as in-formation. Thus we return to the original thought experiment on awareness or interiority. *As a unified pair*, the interior dynamics involves differentiation through opposition combined with return. The still point of this reflective movement is the bond which determines the pair as a pair. However, now interiority can be seen to have greater definition; we have said something about it. Additionally, we have brought exteriority into our description of interiority because we can say that, although the pair is united, each is also differentiated in its co-presence with the other. In a sense, the correlated pair exists on the boundary between interior and exterior and the movement of return sketched at the beginning of this paper as the movement of subject also shows itself to also be the movement of exterior substance.

What this exercise shows us is that the individual subject/object always references another. *Reference is different from equality*. Recall that equality is the basis of Absolute Space; reference becomes its Other and has the asymmetric form of time. Whereas equality constitutes two (objects) as isolated things-in-themselves with are derivatively related as the

same, reference draws attention to a fundamental asymmetry in relatedness. Still, in our description the pair remains in isolation. The indeterminate exchange (of self-image for persons or information for photons) only becomes determinate when the isolated pair engages with and references the external world. Above I discussed this in the context of measurement. Throughout his book, Hegel discusses this in the context of “world”. To move beyond the isolation of duality, not only do we need to unpack the relationship between the One and the two, we also need to unpack the relationship between the One and the many.

Geist: the many and the one

*What is above places itself under what is below;
This is the way of the great light.*

—I Ching: 42.I

Geist is the term Hegel uses to discuss the unity of many individual persons within a community or world. In developing his concept of Geist, Hegel focuses on “religious consciousness” as the interiority of the community as a whole. Through religious consciousness the community externalizes a religious image or “Self-image” in which they are reflected. Like the self image of the individual person, the religious image of the community is a projection that comes from the community itself and in this sense is “empty”. It has no more content than what the community imagines itself to be. However, the religious image brings the community into relationship with what is beyond, namely the absolute. The nature of this relationship is reference. The religious image references a “beyond” to which the community as a whole is related. A form of momentary resonance with the absolute is enacted. In this resonance the content of the religious image becomes transparent and then is emptied as the community returns to itself. This movement of reflection, that of Substance and Subject, is constitutional for Einzelheit. The religious image, as object, is a momentarily enduring whole which points beyond itself while drawing the community into an awareness of its oneness.

The revealed religion of Christianity is the deepest expression or enactment of the unity of Geist according to Hegel. In revealed religion, the Self-image of the whole community turns back upon itself and becomes interiorized within each individual. Each individual contains within herself the image of the whole community and the whole community draws out or compels the individual to externalize or express that image. This reflective return of the exterior whole into the interior of each individual of whom the whole is constituted is what enables both community and individual to exist and sustain one another⁷. The constitutional form of this relatedness is self-referencing.

⁷ The mystery of the Eucharist might be seen as a ritual enactment of this return. The religious community, or Church as body of Christ, offers up the bread and wine which becomes the broken body and blood of Christ sacrificed, and then each individual member inwardly digests this gift of God.

To recapitulate: Immediate awareness brings the first person perspective, I. Mutual recognition brings the second person perspective, You as other-than-I. But only in community do we encounter the third person perspective, which is the universal or objective perspective. This third person is the other of the other who is also another to me [Levinas]. Said another way, because you have a different relationship to God than I do, there is Truth.

In our exploration of resonance we found that the essence of the individual object is to reference another. I will call this “substitution”⁸. Each individual object substitutes *for* another and, in isolation, has no being-in-itself. If the individual object merely references or substitutes for another individual object then the resonant pair are isolated from all context (substituting or exchanging in-formation back-and-forth) and do not achieve *actuality*. We described this as the quantum vacuum of virtual quasi-particles. However, when three or more objects are brought into mutual resonance as a whole, they can become constitutionally self-supporting. Hegel describes this triadic form or threefold relatedness of the object in the following way. The individual object has being for itself, which is empty. It has being for another individual object, which is resonance. It has being for the whole group or ensemble of objects. This latter being relates the individual object to the standpoint or origin of every other individual object in the whole ensemble. It is the constitution form of return which sustains the being-in-itself of the individual object. As long as the individual object remains in resonance with the whole group of objects it has being-in-itself-for-another, where the “in-itself” or *actuality* of its being comes from the whole and the “for-another” is the referencing or calling out. If isolated from the whole or ensemble, however, the object only has being-in-itself-for-itself. Because self is merely a projected image, the isolated object is vanishing, *non-actual*, or *false*. What I have just described, with Hegel's help, is like the fundamental structure of self-energy in the theory of Renormalization Group of modern physics, where *Einzelheit* is the invariant form or Unitarian Operator.

Here the connection with quantum theory seems immediate and therefore I offer the hypothesis that *quantum theory is a theory of Einzelheit*. In quantum theory, the individual “particle” (simple object) is holistically connected to the whole such that it has no existence in isolation from the whole. Each individual of an ensemble possesses interiority that is in resonance with the interiority of other individuals of the ensemble. Pairs can substitute one-for-the other such that their interiorities are in an indistinguishable state of resonance. Thus the individuals (“particles” or simple objects) are both distinguishable in an exterior way and

⁸ This term is borrowed from Levinas. I'm using a borrowed term here to try to articulate Hegel's description of self-reflection and self-sacrifice in a way that is suggestive of an object more so than a subject. Connecting with Levinas also brings into focus the ethical aspect of reference—Substance is primordially ethically. Levinas enters here as a voice that is Other than Hegel's voice which, in turn, is Other than my voice. This movement in the paper might be considered as the negation of the negation which brings about return.

indistinguishable in an interior way. The event of “collapse” of the superposition of resonant states of interiority is a collective temporal action which exteriorizes the resonant interior state in a particular form or determination. The whole can be seen to provide a limit or boundary to each individual member. The individuals collectively “work out” or enact or determine the indeterminate relation between their interior and exterior within the terms of this limit.

This description is similar to the way individual persons are embedded in their world according to Hegel. However, what Hegel further adds to the discussion is an extended exploration of the “whole” or world in which individuals are embedded. What he concludes is that the whole is not merely the ensemble of individuals *in the present moment* (this being a common prejudice for interpretations of modern physics). Rather, the whole is the present ensemble *plus* the environment or world or context which is the consequence of all determinations or events in the past *for that ensemble*. The whole is built up from the past and that past is embedded or encoded in the present world⁹. In this way we might understand how the concept of “history” has come to be relevant to the interpretation of quantum mechanics even though history has no relevance for classical physics, which is based on the concept of Absolute Space and which excludes time. That is to say, we might understand how the “arrow of time”, or reference, is foundational in a theory that is often still considered to be invariant to the reversal of time. Returning to the case of light, we might now interpret space/time as *the created world of photons*, where “space” results from the externalization of the interiority of the ensemble through time.

We began this paper by relating light to Substance. Drawing inspiration from Hegel we explored an interiority of light, namely *spin*, which was found to disambiguate information as the fundamental (binary) unit of action. The irreversible process of disambiguation was a collapse into a determinate state which was simultaneously externalized as space and superseded as an event in the immediate past. In a complementary paper [Rogers], drawing inspiration from Levinas, I have explored an exteriority of light which was found to generate the null metric of the light cone. I'm wondering if perhaps these two approaches, taken together, might provide some insight into how light creates space and time as a process of exteriorization which then turns back upon itself as the creation of matter through a process of interiorization.

⁹ In his approach to the interpretation of quantum mechanics, Barbour introduces the concept of a “time capsule” as a present whole which contains the traces of a possible continuous past history. However, Barbour excludes temporality in his theory so there is no inherent necessity, nor unfolding unity to time capsules. It would be interesting to compare Barbour's approach with Hegel's approach.

Limitation

*Things cannot be forever separate;
Hence there follows the hexagram of limitation.*

Limitation means stopping.

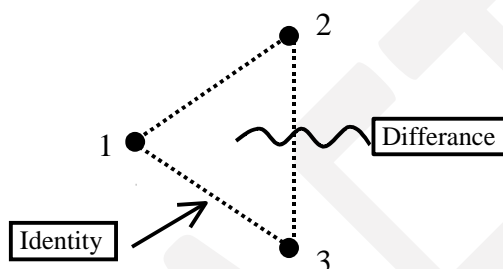
—I Ching: 60.Chieh

There is much more that might be said of the connections between Hegel's work and modern physics. Here I want to draw attention to one final significant aspect. The theoretical forms that come from Hegel's approach are concerned with the process of becoming. For Subject, the unity of thinking manifests in self-developing concepts whose unity is immanent in the beginning, progressively unfolding until fully developed in the end. This organic process likewise can describe Substance as the progressive unfolding of objects as things-in-the-world which are formed through inter-*action*. Put another way, objects-in-the-world "work themselves out" from their beginning seeds to their full unfolding in a process of relatedness to the whole of which they are part. From the perspective of Substance, the process brings into determination both the object as interiority and the world as exteriority. Properties of objects become embodied externally in the world and then taken back again internally as in-formed or encoded matter. Starting from the fundamental unit of action which we defined as the binary "bit" of information, we might hypothesize that objects externalize symmetry as space/time; internalize it as matter; externalize it as pattern; internalize it as molecule; externalize it as algorithm; internalize it as cell; externalize it as message; internalize it as body; externalize it as language ... During this unfolding, objects "communicate" with one another and externalize their determinations like "text". The underlying ordering principle can be seen metaphorically as language, where "Word" is a reflected trinitarian form that unites identity and difference in a process of progressive externalization and internalization.

Epilogue: Synchronicity, equilibrium and return

Now to bring these concepts into play, let's return attempt to trace the emergence of a model spacetime from the threefold essence of light.

We consider three in proximity: the Same, the Other and the Third Party, each of which is another to the others and none of which is the same to another.

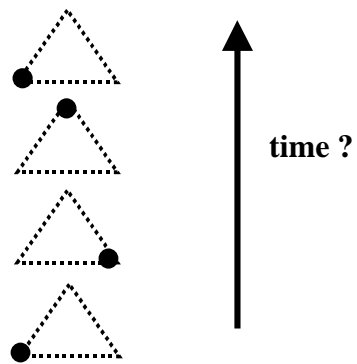


Each of the three is in immediate proximity with its neighbor—one-for-another in a continual process of substitution. There are three distinct indices, or origins, labeled “1”, “2” and “3” in the diagram. These three indices correspond to three distinct instantiations.

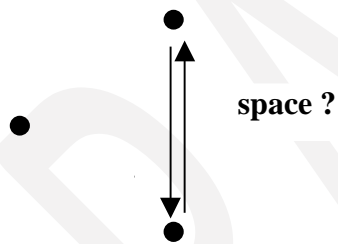
To see the working of this trope, suppose we establish “1” as the instantiated index, the *origin*. Then “1” is in a relation of proximity with the two others (here called “2” and “3”). This relation of proximity we call *identity*. “1” is identical to “2” and “3”, substituting itself for each. However, between “2” and “3”, there is a proximity that is inaccessible to “1” and we can call this *differance*. In the distinct instantiation of the three, there is both identity and difference.

This trope frames interiority through a process of *return*. In return, “1” substitutes for “2” which in turn substitutes for “3” which finally substitutes for “1”. In return there is a traversing of the inaccessible difference that is the proximity of “2” and “3” according to “1”. This gap becomes the gap or clearing in which creation manifests—the *synchronicity* of light and word. Moreover, because “2” and “3” can substitute one-for-the-other in the inaccessible gap, there is an indeterminateness at the core of this threefold relatedness.

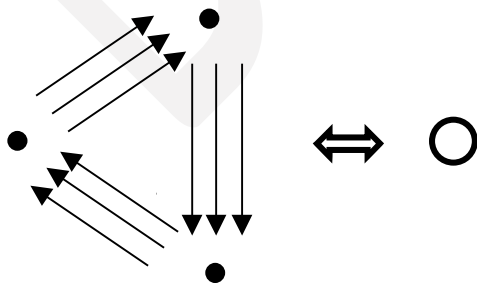
The epilogue of *The proximity of light: a deconstruction of space* explores how this threefold trope manifests temporality through *iteration*. Iteration is the circular movement around the three, which returns through difference to a different same. Iteration is particular. There is change in the loss and return of proximity, which we postulate as temporal.



Resonance is equalizing, the identity in difference through back-and-forth. Unlike the particularity of iteration, resonance is "whole" or "at-once", the same difference, which we postulate as spatial.

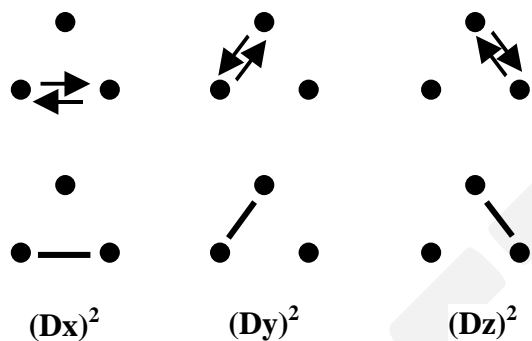


From the infinite iterability of return we defined a temporal element $(Dt)^2$, which we

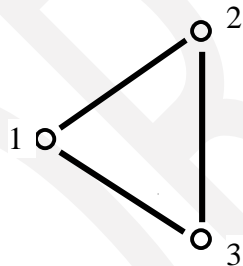


represented as an open circle

Likewise, the infinite back-and-forth of resonance brings a connector between two places, which we will call $(Dx)^2$ and represent by a solid line. There are three different resonances corresponding to proximity between the Same, the Other and the Third Party, which we labelled as $(Dx)^2$, $(Dy)^2$ and $(Dz)^2$.



Together these connectors form a 3-space. By postulating an equivalence between the resonance of 3-space and the iteration of temporality, we arrived at the figuration of a lightcone.



We considered the following two ways to complete a loop, which we postulated as the same difference. In the first way we pause at circle 1 (infinite iterability), then jump (in a finite number of back-and-forth motions) to circle 2 where we pause, then we jump to circle 3 where we pause, and finally back to circle 1. Another way is to infinitely resonate between 1 and 2, then, without pausing, infinitely resonate between 2 and 3 and finally, without pausing, infinitely resonate between 3 and 1. This is a method of combining connectors (resonances, space?) with pauses (return, time?). We represent this equivalence as the fundamental equation of the light cone:

$$(Dx)^2 + (Dy)^2 + (Dz)^2 = (Dt)^2$$

Of course we have been anticipating the solution from the beginning so this is not a derivation as much as a heuristic argument (previously I have used the term *étude*).

Yet something quite interesting has happened. We have postulated 3-space as a system of connectors (or line elements) but these connectors do not have directionality. So we have measure but we have no orientation. This is captured by representing the finite element as a squared quantity. What is missing is the spontaneous symmetry breaking that might establish direction (and therefore orientation). If we are to arrive at a model spacetime we need to *disambiguate* the temporal and spatial elements. Notice, however, that this disambiguation is prefigured within an overarching threefold relatedness. And the form of that relatedness is each-for-the-other and *not* each-for-itself.

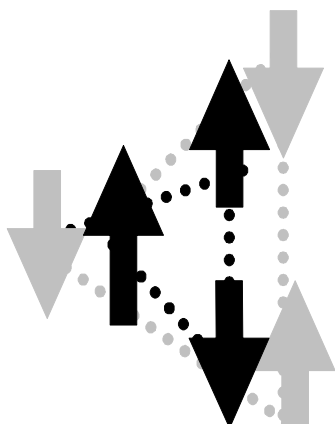
The disclosure of orientation requires surfacing a richer understanding of non-causal association—specifically symmetry creation—as the basis of spatiality. Orientation comes from the disambiguation of pair symmetry. Pair symmetry is already prefigured in the circularity of the temporal element which has two-fold equivalence – clockwise and counterclockwise traversal. Let's represent the breaking or disambiguation of pair symmetry by two oppositely pointing arrows¹⁰:



This is the fundamental connector, which brings about an emergent twofold relatedness.

The synchronization of orientation comes about through return. However, with the emergence of pair symmetry, return is now frustrated such that two cycles are needed to recapture identity.

¹⁰We might have chosen something less visually leading, such as “+” and “-”, except that the relatedness becomes visually derivative which is not the intention here. The arrows and the connector are one. Additionally, the arrow will become helpful once we define the concept of spin. However, at this point there is no spatial “direction” intended by the arrows. We are only trying to represent a difference operation that is binary or two-fold.



The structure of return has the form of a spinor or knot. The figure folds in on itself, as it were, to disclose a deeper interior structure to origin. The inward folding generates the fundamental unit of action – a single rotation or cycle of return – which we call spin. *Spin is an emergent property of spacetime that comes from the disambiguation of light.*

Suppose, now, that we synchronize an origin with a specific spin orientation. This will simultaneously index one of the three axes; let's call the indexed axis the z-axis. There is a two-fold symmetry which is also broken in choosing a specific spin orientation and this enables us to label the *direction* of spin along the z-axis. For example, we might call it spin up and label it as

$$|\uparrow\rangle_z$$

It is important to recognize that the broken symmetry, namely orientation, comes from a three-body process of synchronization. We—the observers as it were—are imagined to be in phase with the specific spin orientation that has been indexed. Of course, instead of we-as-observers, it may be some other origin which is brought into phase with the indexed spin orientation – this process is one of interaction not cognition. What is interesting now is that, for the other two axes, *the spin is mixed.*

$$|\uparrow\rangle_x \quad \text{and} \quad |\downarrow\rangle_y$$

$$|\downarrow\rangle_x \quad \text{and} \quad |\uparrow\rangle_y$$

Synchronizing spin-up along the z-axis at the same time causes mixing of spin along the remaining two axes (let's call them x and y). Synchronization of spin along another index axis (eg. x or y) would at the same time de-synchronize the spin along the z axis. The apparent collapse of spin along the x-axis might rather be seen as re-phrasing of three-body interactions. Because of its threefold essence, the disambiguation of light automatically generates the quantum properties of spin and this can be seen to come from the ontology of relativistic spacetime rather than a property of an individual or isolated particle. My hypothesis is that spin

is an emergent interiorization of light from which the fundamental unit of *in-formation* is created. A new form of difference operator, intrinsic to the “geometry” of relativity, which is absent from Euclidean geometry.

The archetypal process through which orientation (an interior structure) is externalized as rotational symmetry is the creation of correlated photon pairs. Correlated photons provide a connector between two origins in spacetime which brings their orientations into instantaneous relationship. When the correlated photons (which are a single entity) interact with the external “world”, symmetry is *created*. This symmetry brings two origins (potential centres of action) in spacetime into a particular, instantaneous relatedness of space-like resonance. This relatedness manifests, for example, in measurement.

References

Barbour, Julian. 1999. *The End of Time: The next revolution in our understanding of the universe*. Oxford: Oxford University Press.

Hegel, GWF. 1977. *Phenomenology of Spirit*. Trans. by AV Miller. Oxford: Oxford University Press.

I Ching. Trans. Richard Wilhelm and rendered into English by Cary Baynes. Princeton: Princeton University Press.

Krauss, Laurence M. 2012. *A Universe from Nothing: Why there is something rather than nothing*. New York: Free Press.

Levinas, Emmanuel. 2002. *Otherwise than Being or Beyond Essence*. Trans. Alfonso Lingis. Pittsburgh: Duquesne University Press.

Richardson, W. Mark and Wildman, Wesley J. 1996. *Religion and Science: History, method, dialogue*. New York. Routledge.

A cautionary note concerning Hegel's approach to absolute knowing

In Hegel's *Phenomenology of Spirit*, the section called Spirit shows the progression of self-consciousness as an interiorization of the finite self, culminating in the beautiful soul who must act responsibly and come to an understanding of herself and others. The section called Religion traces the progressive externalization of infinite spirit, culminating in revealed religion where the human person, as the inward site of encounter with the divine, must come to an understanding of himself through interaction with others. Thus, whether we give authority to human experience or to God we arrive at the same place. We find that the finite is the domain of expression of the infinite. And we find that in the domain of the finite, the life of the community is the thing that sustains us and we must engage in that life holding ourselves responsible. The final section called Absolute Knowing is an attempt to resolve the unity of these two.

In revealed religion, God becomes incarnate as a person. The religious community becomes aware of itself as a community of *individual persons* for whom God is present inwardly. This brings new awareness of the sanctity of the human person. In revealed religion, the religious image (I = I) has threefold relatedness [Hegel §789]. It has meaning for the individual I who puts himself forward. It has meaning for other people as individuals and it has meaning for the religious consciousness of the whole community. When I put forward an image of myself its meaning for me is nothing because I imagined it for myself. However, in putting forward an image of myself, meaning is also available for other individuals (for another). Additionally religious consciousness of community as a whole grasps the image from the standpoint of every individual. Thus, formally, the image is an object that has:

- being-in-itself (through religious consciousness)
- being-for-another (through other individuals)
- being-for-itself (through my positing the image as image).

Through this relatedness Hegel unpacks for us the formal structure of the process he calls "knowing" [Hegel §789]. The being-in-itself of religious consciousness sustains the image as a universal. At the same time the image becomes determined in the relationship between being-for-itself and being-for-another. That is to say, the religious community gives to me my sense of "I" and then, through my relationships with other individuals in the community, who I am develops in and through the process whereby I also participate in the coming to be of who others are. This formal structure discloses a previously implicit significance to interpersonal relationship. The relationship between myself and others-as-individuals is an equalizing movement of *mutual recognition* in which mutuality is mediated back and forth through the universal of religious consciousness. This back and forth movement takes on a core indeterminacy because it involves a mutual relinquishment of independent self-determination. The term for this from physics would be "resonance". In relinquishing independence, the being-in-itself of each individual becomes a cavity, as it were, which can form a resonant whole with

another (like a musical note) in which indeterminate “energy” (or in-formation exchange) can happen. Resonance mediates I=I. It is the middle term of what Hegel calls a syllogism. However, unlike the syllogism of traditional formal logic, where “=” is determination, now Hegel turns the middle term into an indeterminate *process of equalization*. It is aptly called a syllogism, because this is the “strategy for thinking” that Hegel has been applying throughout *Phenomenology*.

This form of resonance, made explicit in revealed religion, was already implicit in moral self-consciousness in the form of the beautiful soul. The beautiful soul found a certainty in her being-in-itself that was like an empty suspension on the edge of becoming. It is the certainty of her existence. In Religion we recognized this as the resonant cavity of being-in-itself that is gifted to each person through the religious consciousness of the whole community. The beautiful soul is called by conscience to action as a responsible agent in the world. In Religion, Hegel calls this knowing. Knowing is *both* externalization in action *and* an internalization through mutual recognition. The certainty in knowing is seen to come from *experience* in the life of the community.

From the side of consciousness, this resonance is the freedom or autonomy of the individual person. This freedom is given to the individual through the religious community and it is enacted in the relationships that individual has with other individuals. The essence of this freedom is to be *for another* within a religious community. Through entering into the community and acting *responsibly* on that freedom, the individual person grows into itself. But this growth, in its universal form, involves transgression against others. Mutual forgiveness, which is given through Spirit, allows the transgressions to become moments of learning through which the inner depth of each and all individuals grows. The learning, according to Hegel, is certain in the sense that it comes from experience and is self-correcting.

Self-correcting learning does *not* have the form of understanding. By understanding, Hegel means picture-thinking in which there is taken to be a determinate “thing” out there and thought conforms itself to that thing. Rather self-correcting learning has the form of coming-to-an-understanding. This process does not belong to an individual in-himself. It is the work of responsible individuals within a community where the life of the community provides the terms of determination. Burbidge provides a detailed discussion of this process [p28-9]. The self-certainty of the beautiful soul is seen to be the result of internalizing “all the experience of the individual and the culture that has been traced throughout *Phenomenology* to this point” [p28]. The beautiful soul has conviction that is grounded in this experience and he *acts* on this conviction. Having acted he finds himself condemned, not by an outside authority, but through his own principles which are the external form of his self-certainty. The good intention as universal becomes an evil action in particular because it is merely being-for-itself. The judgement comes from the accumulated wisdom of the community as a whole. The judge comes into external determination over and against the beautiful soul as opposition which also brings the beautiful soul into inward determination. But, for the beautiful soul, judgement is itself an action and the judge is seen to betray his own good intentions. This image of the judge is in reality an image of the beautiful soul himself. Once he reaches this self-recognition he

must admit his fallibility and the two become reconciled. "Each in relation to the other lets go of the independent determinateness with which it comes forth against it" [Hegel §796].

In a real sense then, learning *is* action. What is learned not only changes thinking and understanding, it also changes the substance of community life. What humanity has learned over its history is embodied in the world around us and presents as our implicit understanding. This understanding is implicit in the objects around us. For example, the artifacts we have crafted, our institutions, our interpretations of things in nature *as things*. We are indebted to this history. Because those before us both engaged with and thought through reality, we have the capacity to grow into who we are. The learning that came from their tortuous path through trial and error is available to us as a gift. "They externalized so that we could internalize" [Hoff, private communication]. At the same time we are also obliged to engage in and think through the challenges reality presents in our time. The world presents to us ideas and our ideas in turn stimulate the world to change. We are relative to our world and our time in history, but that relativity has a universal and essential form that implicitly unites humanity. The way in which we engage in this challenge also matters. Self-correcting learning has an *explicit* ethical form which is found in the union of the beautiful soul and the sanctity of the person. This way contrasts sharply with the indifferent stance of Observing Reason.

What is described above is Hegel's "absolute knowing" from the side of consciousness. In the final movement of *Phenomenology* Hegel talks about "absolute knowing from the side of spirit". While I'm not sure what this means or how it is possible to speak about it, I can try to trace the movement or form of his thinking.

First, it is helpful for me to consider that the universal form of knowing might already be found in the reconciliation of the beautiful soul and the sanctity of the person. What comes to mind is the implicit form of Jacob struggling through the night with the dark angel [Genesis 32.24-29]. In the struggle, the unknown man reacts exactly in opposition to Jacob. Only when Jacob seeks the blessing of the other does the struggle come to an end and Jacob is blessed. What we might see here is resonance between the individual person and God, but this individual person is also Israel, which is to say it is the whole religious community. The universal form of knowing brings both the individual and the whole community into "resonance" with God. But this reconciliation also has the explicit form of the life of Jesus as God incarnate and acting in the world.

Through the reconciliation of these images I hope to interpret Hegel's discussion.

What becomes explicit is the self-sacrificing of Spirit. Spirit *acts* in the life of the religious community [Hegel §796]. According to Hegel, this action, by its essential form, splits the primal unity. [Can primal unity be split? Perhaps rather, the sacrifice of Spirit is self-emptying and the apparent "split" is a consequence of original sin as Augustine suggests.] Spirit becomes self-limiting, entering finitude, in order to sacrifice its finitude both for individual people and for the religious community. This sacrifice brings forth individuals as free and autonomous persons (like "unresolved moments") who have an implicit capacity for unity with one another through an

open religious community. Each is created in the image of God. Through self-learning, the people of the community are given the capacity *collectively* to reconcile their world with spirit by actualizing the implicit unity within themselves. This implicit community bond, a gift of Spirit, has the form of love. I take this to be what Hegel means by the reconciliation of consciousness and spirit.

This reconciliation brings into consciousness what it means to be within the religious community. The developing form of this emerging community self-awareness is the recognition by each individual that she is in herself *in order to be* for another. Here the “in-itself” is the universal form sustained through the (open) religious community and the “for-another” is the implicit potential for reconciliation. The vanishing form is evil, wherein the individual seeks to be in-itself on its own terms (closed) [§796]. Because it is through the religious life of the community that being-in-itself is sustained, evil also has the form of exile from God.

Reconciliation with Spirit involves turning away from evil which is an empty Self-image for religious consciousness. In the universal form, the individual “dies to its being-for-self, disowns itself, and makes confession”[Hegel §796]. Religious consciousness similarly “dies to its lifeless Self and to its unmoved universality”[Hegel §796]. In this way, the religious community is called to go out into the world recognizing that all people are created in the image of God. In effect, the religious consciousness internalizes the substance of the world which is the externalization of the experience of humanity. It then relinquishes the empty Self-image, this relinquishment having been made possible through the sacrifice of Spirit.

How does this happen? Following Hegel becomes, for me, like following a psychotic or immolating mind and here is where brilliance really shines forth. Hegel, as the one with whom I am struggling, implicitly has shown me how I should answer *myself*. *I must stop demanding to understand*. The knowledge is beyond my understanding and my attempt to understand what I cannot know is the very form of evil. I have entered into an unthinkable mystery which is the mystery of Faith. My thinking is only an empty projection of myself. I must ask for blessing. Through the mystery of Faith I come to an understanding and that understanding is the understanding of the limit of my understanding.

In turning away from evil, I find that I am given a gift. Through the process of trying to come to an understanding I have learned something. Faith calls us to understanding. Yet in coming to understanding we must recognize our limits as finite beings and confess that in relation to the absolute we know nothing.

Looking back, I can now see that self-correcting learning can also lead us astray into error and evil. The life of the community is the source of meaning for individuals within the community. If that life is cut off from religious consciousness then the community *as a false or closed whole* becomes enslaved to the Self-image that it creates for itself. By denying God, the community becomes exiled from God. As members of the community, individuals have no power over this image because their understanding and their very form of self-certainty are rooted in the world

of the community itself. The Self-image is like a collective nightmare from which there is no awakening: a political ideology or a scientific nihilism. This is the awful lesson of the twentieth century. Yet religious consciousness calls exiled community back to Faith through internalizing the Self image and disclosing its evil, which is to say through the mystery of Faith.

I can also see the false form of Enlightenment's Insight. Indifferent Observing Reason has no life in itself. It cuts itself off from Truth to the extent that it seeks Totality. *Phenomenology's* form of "logic", as process or strategy for thinking, overcomes Reason's stagnant Self-image *through reasoning*. Reasoning becomes a form of *ethical action*. And I offer the following conjectures without demonstration. The form of "logic" which is made explicit in *Phenomenology* is the same form or strategy for thinking which is reflected in Wittgenstein's *Tractatus Logico Philosophicus*. The latter being read as a reflective transcendence of representational picture-thinking or propositional logic. It is also the same form or strategy used implicitly in Godel's incompleteness theorem which demonstrates that any axiomatic system of provable truth claims, such as number theory, must be incomplete—there are always true claims that are undecidable from within the system. Truth is beyond all such *systems* of logic.

And yet even Hegel's form of logical reasoning is nothingness in relation to the Infinite.

17. The entrainment of negation: a possible prologue for interpreting quantum mechanics through light

Suppose Quantum Mechanics (QM) is a theory of interpretation. Specifically, suppose QM is the interpretative framework for articulating the relational ontology of relativity theory.

Let me clarify. In proposing that QM is a theory of interpretation, I do not simply mean *human interpretation*. Interpreters can be electrons, or amoebas or scientists. What I do mean is that the implicit conceptual divide in physics between what is present (ontology or “being”) and what is represented (epistemology or “meaning”) does not *fit* for QM. And there is a long legacy of research outside the narrow purview of modern physics that suggests this divide does not fit our world either.

In this paper I intend to draw upon this legacy to re-orient questions concerning the foundations of QM. The re-orientation involves relinquishing physical law as a timeless determination of “being” and probing into how it might be that physical laws are instantiated and sustained *as laws*. That is to ask, what lies beneath or beyond or behind physical laws as their creative origin? Physical laws presuppose objects and their relations. But how does the world come to be parsed into abstracted objects, relations and governing laws in the first place?

The method of the paper is to trace the form of abstraction, the form of *bringing into representation*. It begins in the intuition or supposition that an identity may obtain between the processes of nature and the processes of human interpretation [Kruse]. *The identity is the unknown*. There is some sense in which nature and interpretation are the same and there is another sense in which they are different. The sameness must be worked out in relation to the difference as a dialectic. The dialectic holds the two particulars—nature and interpretation—in resonance. Through this resonance, a general form that unites the two particulars might be brought into recognition and abstracted. The presented *content* thereby becomes synchronously re-presented as harmonic *form*.

The method of the paper is its meaning.

Harmony

We begin in relation. We begin by positing an identity between the *interior* form of interpretation—what we might call subjectivity—and the *exterior* form of nature—what we might call objectivity. Let’s name this identity “Logic” —*from Logos*—where the term Logic refers to an abstract indefinite form that we intend to bring into determination. Indeed, the process of bringing into determination is what we mean by *Logic*.

First let me say what we are not going to do. We are not going to bring the term Logic into a pre-existing system of determination, at least not wholly or totally. We are not going to begin with definitions or axioms. In fact, we are going to begin by defining Logic through negation. Namely, *Logic is not Rational Understanding*.

Drawing from Kant and Hegel [Kerruish and Petersen], by the term “Rational Understanding” (RU¹) I mean the form that thinking assumes when it operates within a relational system of meaning formation that is rule bound. For example, the form thinking takes in deductive reasoning within Number theory. Within such a system, thinking takes the form of valid reasoning that is constrained by the rules or “laws” and classical or binary logic plays a truth preserving role. “This role is premised on truth definiteness, that is the validity of either-or reasoning as applied to the truth values true and false” [Kerruish and Petersen]. Wittgenstein’s *Tractatus Logico-Philosophicus*, Whitehead and Russel’s *Principia Mathematica*, and Habermas’ *Theory of Communicative Action* are all primarily concerned with RU, for example.

Because RU is an “essential moment of thought” [Kerruish], it is part of Logic. However, Logic (in the sense intended in this paper²) is more expansive than RU because it also considers the systems and their relations within which RU operates. At the same time as it moves within systems of RU (such as valid modes of deductive reasoning), Logic also moves beneath or beyond or between those systems. In this way of thinking, Logic is more than truth-preserving, it is also generative in truth. Generation or creation happens, for example, when a new concept is first recognized as something that has the possibility of being understood. The process whereby a new concept is recognized and brought into determination as something understood is called abduction or abstraction. With RU, the concepts have already been abstracted by the relational system within which RU is defined or determined.

Hegel and Kant use the term Reason to implicate this broader notion of thinking unconditioned by systems of understanding. We are not going to do this because it may inadvertently

¹ I am introducing this term and then using an acronym as a matter of method. The term “understanding”, as used in common language, is both vague and multi-dimensional in meaning. I want to focus on a more specific aspect of “understanding” that has do with classical (binary) logic and rule-bound reasoning and which I am calling “Rational Understanding” and labelling RU. The term “rational” is introduced by juxtaposition as a pointer to an aspect of understanding. As I focus on this aspect, the concept begins to take on an external, determinate form, but at the same time it loses the inner sense of what is usually meant by “understanding”. In other words I am trying to pull out from the experiential notion of “understanding”, a concept-image as an external form. The label RU helps to purify reference throughout this process.

² More on method. The notion “understanding” is the subject of the current discussion. But as a subject, this notion is “experienced from within” as it were, and is vague and multivalent. The term Logic refers to an external form, but one that I am trying to interrogate and expand. In classical logic, the term Logic is well defined and the interior process is determined by the mechanistic underpinnings of valid reasoning. If that was all that I meant by Logic, then Logic and RU would be the same concept. Instead, however, I have introduced the concept-image RU as a mediator that relates the *interior* experience of “understanding”, namely thinking, with the *exterior* form of classical logic. This wedge term is intended to open up a gap between inner and outer.

condition our perspective of the beyond of RU to be a *human process*. Instead, the term Logic seems apt for our purposes. In part, it is apt because it can move between the subjective and the objective. We can think of Logic as a human process of thinking. We can think of Logic as an abstract form of determining that is not bound to human thought processes, such as computer logic or the mechanistic manipulation of symbols. We can also think of Logic as the principle behind natural law, such as the law governing the behavior of a system of electrons.

Therefore, let Logic be the term we use to mediate the disjuncture between interior, subjective processes of interpretation and the exterior, objective processes of nature³.

Given that we have introduced the term Logic by defining it negatively as Other than or Beyond RU, we also need to be conscious of employing a form of thinking about Logic that is not constrained by the formal systemic structures that characterize RU, such as rule-bound valid reasoning. Logic (in the sense intended in this paper) is more than deductive reasoning and it is also more than classical or binary logic.

Therefore, in a contrapuntal movement, we will also consciously engage in a form of thinking that *opposes* classical logic, namely *harmonic thinking*⁴. This form of thinking involves bringing two particulars (in our case particular systems) into relation through an abstract indefinite locus. The relation between the two particulars becomes the *Deep Metaphor*. Like any metaphor, the two particulars are said to be the same although they are manifestly different. The locus acts a pivot in the movement from one particular to the other and back again in search of a more general abstract form that unites the two particulars. The two particulars that form the Deep Metaphor of this paper will be the systems of Nature and Thought. The locus will be that to which the word Logic points and which is to be brought into determination.

³ Further note on method. The goal is to use the interior processes of thinking to expand the external, formal aspects of Logic and then apply this expanded exterior form back upon the question of the interpretation of quantum mechanics. There is a reversal involved, such that when we apply the exterior form back onto physical systems we are no longer speaking about human thinking. Thus, in the movement of this discussion, exteriority is governed by form and interiority is governed by metaphor.

⁴ Harmonic thinking is the logical complement of deductive reasoning. Whereas deductive reasoning is informed by *differentiation* through the binary division of the excluded middle (either/or), harmonic thinking is informed by *integration* in which different particulars are harmonized by the identification of a generalized abstract form that is the same for each. Mathematical proofs involve deductive reasoning; metaphors involve harmonic thinking. These two logical complements together constitute the Logic of Two. (Note that what many logicians call “binary logic” is only the determined half of the complement and leaves out of consideration the Other to the same which is harmonic thinking.) The Logic of Two involves complementarity and requires two disjoint “voices” in open relation. The standard “Copenhagen interpretation” of QM uses the Logic of Two. This paper, however, does not use the Logic of Two. Instead, it uses the Logic of Three whereby the disjointed relation of complementarity is mediated by a Third as creative origin or source, namely *Light*. The inference is that there is a Logic corresponding to each Natural Number that characterizes its essential form. For more on the Logic of Two, see Gallagher. For more on the Logic of Three, see Marion. For more on the relation between the Logic of Two and the Logic of Three, see Levinas.

Reasoning will move through a series of harmonic progressions in which particular aspects of one system are carried over to the other system as relational movements and then the relational movement is given general form by returning back to the original system at a higher level of abstraction.

Through these harmonic progressions we hope to arrive at a new and more general understanding of both logic and determination.

First Harmonic Progression: Emergence

If Logic be not RU, then also let Logic be not Law. For if Logic is Law, then Logic is RU.

The negation carries through both aspects of our Deep Metaphor. Just as RU is not the highest category of interiority or subjectivity [Levinas], so Law is not the highest category of exteriority or objectivity [Unger and Smolin].

But if we begin in this radical negation, don't we lose our grounding? Doesn't Logic become an empty sign that might mean anything we choose? Aren't we entering into meaninglessness as the so-called logical positivists have decried?

Maybe. There is a risk. It all depends on how we take this negation or *limit*. The term Logic has been loosened from its determinate meaning as classical binary logic and is free in the way that a symbol abstracted from a lawful system like Number theory has a free or indeterminate reference *in itself*. However, the freeing up of the notion of Logic is not being undertaken *for itself*. The term Logic is first being taken as a zero point or "non-lieu" through which *we can turn back upon ourselves* to see the Deep Metaphor—Thought : Nature—in a new light. Rather than turning *towards* meaninglessness, this will hopefully prove to be a turning *away* from meaninglessness.

With this intention, let us look back upon the Deep Metaphor.

From the vantage of Thought, the intrigue of Number theory has long presented itself as a truth preserving formal system. During the last century, this system was taken up by Russell and others as archetypal for all truth preserving formal systems. The laws governing the system were re-cast as logical rules. The formal basis of these truth-preserving rules was the law of the excluded middle, whereby any validly formed statement about Numbers must be either True or False. Number theory became a mechanistic process of deducing True theorems by following the rules. At the same time, Numbers *as numbers*, were emptied of any interior meaning. The rules could and were externalized and reproduced in mechanistic systems, such as computers. This program, however, was stopped short by three discoveries regarding its limitations. First, Russell's paradox brought into question the whole foundation of the program in its intention to create a closed system of "truth"—that is to say, the intention to limit, define or contain Truth.

As a result, the program's intention became meaningless, as Fregel recognized. Second, Turing and others showed that there are incomputable numbers. The embodiment of the system as real spatio-temporal processes demonstrated the incompleteness of the embodied system. Third, Godel showed that as the signs of Numbers were emptied of their interior meanings, they could be made to point back to the formal system in order to transcend the system. Numbers were revealed to refer to more than the finite understandings that came from the logical rules or laws of the formal system.

So, when laws of thought were taken as the highest category for understanding Numbers, the intention became meaningless, the embodiment was incomplete, and the formal system was transcended.

From the vantage of Nature, the reduction of Newtonian mechanics has ruled the land for generations. Physical systems are taken to be constructed from elemental parts or states. The parts or states exist eternally *in themselves*. Their relations are governed by deterministic Laws. Systems are nothing more than assemblages of parts and, as systems, they lack wholistic *identity*. All is laid bare to the human mind. Nature is merely a mechanistic unfolding of a pre-determined process. However, during the last century Nature has revealed herself to be quite Otherwise. At the core of the determinate processes in Nature there is a fundamental indeterminism, as manifested, for example, in the Heisenberg Principle of QM. Nature always eludes reduction to finite, discrete elements. Furthermore, relativity theory articulated that assembled parts, as spatial structures, are never synchronized in themselves because all relations are mediated by light. The whole and its constituent parts are categorically different. Finally, the stars above revealed that our world and all it contains was created from a mysterious Beginning. Nature is creative.

So when Nature was assumed to be determined, her body vanished into nothingness, her rules became contingent possibilities, and the great Beginning revealed itself through the mystery of birth.

As we look back in this way on the Deep Metaphor, we can see a parallel process whereby first Law is taken as the highest category, then finite individuals are isolated from relation and emptied of meaning, and finally the whole program folds back on itself in a transcending movement.

This reflective process is what we will mean in this paper by Logic.

Having completed the first harmonic progression, we can now trace a coarse outline of our first general form for that to which the term Logic refers. Namely, the form of emergence. Emergence is a process that begins within a rule-bound system. The process involves *kenosis* whereby one or more elements of the system are emptied of their significance for the system. Kenosis is followed by *return* which is a process of fulfillment. The emptied elements become the fulfillment of the meaning or significance of the system *as a whole*. Fulfillment reveals a

new dimension or *depth* as a gate or door to a realm that transcends the whole system. As a turning point, the gate or door is the *mysterion* which is the source and fulfilment of the unfolding of depth. Emergence is a lifting up out of the embedded system or *body* and into the *light*. Emergence is birth, the mysterious feminine element that appears to have eluded former men of science.

Second Harmonic Progression: Paradox

Through the first harmonic progression, we touched upon the limits of Rational Understanding by bringing the underlying principle of RU—Law—into relation with its other—Metaphor. Not only did this happen within the discourse, it was also the underlying theme of the first harmonic progression. For it was my intention to introduce a metaphorical relation between the rational understanding of natural numbers that reigned in the time of Pythagoras and the rational understanding of the world that dominates modern physics. And just as the Pythagoreans discovered that there was a mysterious interior limit to rational numbers, and that beyond this limit were irrational numbers such as pi. So too, might we not venture that there is a mysterious interior limit to the “rational” objects of classical physics and that beyond this limit are “irrational” objects. In this venture, “irrational⁵” is to be reclaimed as a positive term denoting something that is *real* but not containable within the formal logic of RU. Irrational does not mean unreasonable, for example. And my offer is that we might move from the rational to the real by expanding our understanding of the form of logic.

RU is based on the law of the excluded middle, which we shall take to be the principle of law itself. A either is or is not. And what is A if it is? A is A. And if A is not, then not-A. The primary relation is identity: A is A. Difference is negation: not-A. And the negation of negation is a return to identity. A is not not-A. The underlying movement which sustains the being of A actually involves a moment of return: not-not-A is A. The death of death is Life.

While RU begins in the Self-identity of the thing called “A”, metaphor begins in the Otherness of relationality. When we say through metaphor that A is B we are saying that A both is and is not B. Metaphor is the excluded initiative of the binary logic of RU. It is excluded because, as a proposition, it is a contradiction. Metaphor sublates the Self-identical form—A is A—that grounds binary logic. Metaphor sublates this Self-identical form by calling into question the

⁵ Another note on method. In the current context, the term “irrational” begins as pure negation. Irrational is that which is not rational. If the assumption is that only the rational is real, then the term “irrational” in itself is meaningless. It only has meaning in relation to “rational” as some kind of nothingness that exceeds the rational. But to point beyond the rational is to identify *something*, namely a limit. A limit is not nothing. If the rational is limited, can it still be claimed as the full measure of the real? Perhaps we can postulate a reality beyond rationality by negating the negation. This is the method of the Logic of Three. There is the rational, the irrational which is the Other to the rational, and the limit or boundary between the two which opens to the world.

finitude of A as the ground of itself. Through the movement of metaphor, A relates to something other than itself and so can enter into the plurality of relations that provide the formal basis for its own Selfhood.

RU takes its elements to be given moments of timeless stasis. Each stasis is a particular locus for meaning formation. The identity of stasis is *given*. Metaphor is the Self-emptying of stasis in order to point to or signify something Other. Otherness manifests through likeness or quality or essence that brings two particulars into unity. Metaphorical identity is *relational* and draws particulars into common or shared form.

Traditional binary logic works within formal systems that are themselves *given*. The givenness of the each elemental stasis as a whole within the system is reflected in the givenness of the formal system as a whole. The discrete iterability of a foundational stasis as Self-identical form grounds the system. For example, in the system of Natural numbers the foundational stasis is 1. Because 1 can be repeated, the particular instances of momentary stasis can be related to a common form, namely, the form of the finite unit. This foundational form is the creative source for other stases as forms, such as the numbers 2, 3 and so on. The foundational stasis, the other stases and the system all share the common quality of being “whole”. The movement of binary logic is the working out of the given particular forms while remaining contained within the formal system. Within binary logic the sublated relationality of metaphor might be said to assume the role of effective cause or implication. Whereas stases and systems are spatial, the sublated relationality of metaphor becomes temporal. It manifests the Otherness to spatiality which remains Other and refuses to be subsumed into spatiality. For example, in the system of Natural numbers we might say: *1 plus 1 causes 2*. This causal movement is the temporal form of equality, where equality relates particular stases by reference to common form. Equality is grounded in the Self-identity of the foundational stasis: 1 is 1.

Equality⁶ is the relation of two as stasis through balance or mutual symmetry. Yet it can also contain the movement of metaphor through a process of expansion or growth (in our case the expansive movement is addition). So we might say that, in traditional binary logic, metaphor empties itself of its pure dynamism in order to create stasis which then allows the formation of a static system or structure of meaning formation, that is to say it creates a formal logical system. The dynamism is given over to the interpreter as the subject who enters into the expansive system and explores its meanings. It is in this sense that one might speak of systemic binary logic as “spatial” and logical reasoning as “temporal”.

Is it possible to bring the dynamism of metaphor back into the explicated formalism of logic? At first blush, the answer appears to be no, because while we have been able to translate the “is” of metaphor into equality within formal logic, the “is not” of metaphor leads us into

⁶ Equality comes about from the sublation of the Otherness of relationality. As process, this sublation—a coming into equality—could also be called *Justice* [Levinas].

contradiction. Yet suppose we soften the tenor of the relationship. When we say that A is a metaphor for B we don't mean they are identical in every respect, rather we mean that there is *something about A* which is the same as B. A *implies* B. In doing this, A gives up, so to speak, its totalizing formal identity so that something can be shared with B. Let's represent this symbolically as $A \rightarrow B$. If A is true, then B is true. However, the relationship is asymmetrical in the sense that B does not necessarily imply A as would be the case for equality. B is "greater" than A, so to speak. In a movement away from equality, A is diminished as object or image so that B might be expanded as subject or essence.

Now, within a system of binary logic, $A \rightarrow B$ and $A \rightarrow \text{not-B}$ cannot both be true because then, by virtue of the identity of A with itself we would have the contradiction that B and not-B were both true. Consider a system where it is true that $A \rightarrow B$. Suppose someone comes along and claims $C \rightarrow A \rightarrow \text{not-B}$. Would we not have to say that C includes the impossible because if $A \rightarrow B$, then it is impossible that $A \rightarrow \text{not-B}$? Would we not have to say that the claim is meaningless or absurd? This is the "Lewis Carroll problem" analyzed by Florensky in *The Pillar and the Ground of Truth*.

However, Florensky argues for a different conclusion. To demonstrate his argument, let's take the example of A = rain and B = wet. The starting truth claim is: *rain* \rightarrow *wet*. While the second truth claim is that $C \rightarrow \text{rain} \rightarrow \text{not-wet}$. What happens if we take both claims to be true?

$$\text{rain [A]} \rightarrow \text{wet [B]} \quad \text{AND} \quad C \rightarrow \text{rain [A]} \rightarrow \text{not-wet [not-B]}$$

The first claim can be inverted by reversing signs: *not-wet* \rightarrow *not-rain*. In the second claim, we can replace the implication, *rain* \rightarrow *not-wet*, with the disjunction⁷: *not-rain or not-wet*.

$$\text{not-wet [not B]} \rightarrow \text{not-rain [not-A]} \quad \text{AND} \quad C \rightarrow \text{not-rain [not-A]} \text{ OR } \text{not-wet [not-B]}$$

Inverting the arguments gives:

$$C \rightarrow \text{not-rain [not-A]} \text{ OR } \text{not-wet [not-B]} \quad \text{AND} \quad \text{not-wet [not-B]} \rightarrow \text{not-rain [not-B]}$$

This can be reduced as follows:

$$C \rightarrow \text{not-rain [not-A]} \text{ OR } \text{not-rain [not-A]}$$

$$C \rightarrow \text{not-rain [not-A]}$$

⁷ Here is the lynch pin of the argument. The implication operator contains a forward moving identity and a backward moving disjunction.

The interpretation of this solution, according to Florensky, is that “the meaning of the truthfulness of [C] entrains the negation of [A], i.e., in other words, that it is impossible to affirm [A] insofar as, at the same time as, if [C] is also valid.” The nature of entrainment is that attention must be paid to the **context** in which A is spoken in order to confirm or deny truthful statements.

Suppose in our example we take C to be *winter*. Then, the first truth claim is that *rain is wet*, and the second truth claim is that *winter implies rain is not wet*. If the starting point was the context of summer, then both claims could be taken as true if it is recognized that the second truth claim is using the term “rain” in a new context of winter in which it falls as snow and therefore is not wet. What if the initial context was all that was known in the world? Perhaps, for example, the person making the second claim comes to the equator from a northern country that experiences winter. Not having experienced winter, suppose the person living at the equator has no word or concept for snow. “Rain” then becomes the most apt word to refer to snow, although it both is and is not snow. Rain is snow in the sense that it is water falling from the sky but it is not snow in the different sense that it is not frozen like snow is. Has the person who used the word “rain” in this context spoken meaninglessly? Florensky argues no:

This judge [symbolic logic] having examined the case, pronounces a fully determinate judgement: [winter implies not-rain], i.e., in other words, without injuring either of the disputing sides with reproach of meaningless testimony and even recognizing the rightness of both, the judge affirms that neither can speak of [rain] at those times and under those conditions when [winter] is under force. The first side, affirming the condition [rain implies wet] is right; but the second side, affirming the condition [winter implies rain implies not wet] is also right. But both sides should realize that the usual, everyday, ubiquitous [rain] stops being such under special circumstances, precisely under the condition [winter]. [Florensky, 357].

It is significant to note that this logical movement involves three stases [A, B, C] and not just two. Neither is it reducible to binary combinations⁸. Therefore, if we stay within the confines of traditional binary logic, the paradoxical claim involving C is merely a contradiction that must be excluded from the initial formal system. The logic of three, however, allows for the opening up of such a closed system to what, from the perspective of the closed logical system, must be called impossible.

This opening happens through paradox. First one of the stases, in our case *rain*, is emptied of its determinate content that comes from the original formal system. It is then able to transgress the limit of the original formal system by forming a “pivot”, as it were, that might enter into another formal system. During the pivoting movement, rain both is and is not rain. The two

⁸ The three stases are different in nature: the first is the same (a subject), the second is the other to the same (a quality) and the third is the systemic formal whole (context).

formal systems provide contexts, which give sense to the meaning or “content” of the stasis. In our case it was the pivot between summer and winter as “systems”. In this way, two formal systems can be related to one another as juxtapositions made possible by the implicit disjunction in the logical operator \rightarrow which has likewise been internalized into the pivoting stasis as paradox.

The opening is most dramatic when the original formal system is taken to be the measure of *all that is true*. In this case, paradox opens the system to *the impossible*. The opening happens by revealing an overarching context to the whole formal system that circumscribes or contains the system and its totality. The “world” is enlarged, so to speak, by the discovery that it is embedded in something beyond itself. Once the formal system is opened, what was formerly deemed “impossible” is seen to be capable of being brought within the realm of the possible, although this movement requires expanding the original system and its forms. What was form(er/al)ly both impossible and unspeakable enters into the realm of possibility and can be replicated or iterated to form a new stasis. This is the movement that captivated the Pythagoreans as they discovered that the *real* numbers are infinitely more expansive than the *rational* numbers. It is also the movement that Godel used to demonstrate the incompleteness theorems of number theory.

Third Harmonic Progression: Law

Through the second harmonic progression, we found an opening within the totalizing system of RU by way of metaphor. This opening disclosed a larger context in which RU is embedded, namely the *Real*. The opening occurs when the contradiction of Two is resolved through a Third. The disclosure or revelation requires the irreducible logic of three and is impossible within binary logic which is the underlying process defining RU. The logic of three entrains negation and introduces disjuncture into the processes of logical reasoning. It thereby also contains RU by explicitly embedding context into the formal processes.

In binary logic there is only one context, which is formed by the totalizing system of logic. This formal context is a structure. It has the form of spatiality. And the processes of logic—the temporal—occur within the formal system giving significance to its given stases or objects. With the logic of three, there can be more than one context. For example, our case above involved the contexts of summer and winter. The context is the stasis of the formal system as a system. The context possesses interiority and that interiority comes from the stases that form the system. The context, in turn, gives form to the stases such that they have meaning or signification. In other words, the context provides the foundation for the forms and the forms contain the stases as stases. These forms are exterior images and bring about objectivity.

However, just as there is a disjuncture between two contexts, so also there can be a disjuncture within a stasis. As with binary logic, the part reflects the whole. The simplest instance of disjuncture is the binary bit which can be either/or. This disjuncture allows a given stasis to

pivot between contexts as was the case with the stasis *rain* in our example above. The disjuncture gives the stasis interiority and is the means whereby it can pivot between formal systems⁹.

So, instead of dealing with the fully synchronized objects of RU, we are now dealing with stases which must come into synchronization to be real. The simplest instance of a stasis is the quantum bit.

A quantum bit is an interpreter.

There are three categories to the quantum. The quantum can be the locus for agency or process. This is called Firstness. The Firstness of a quantum is pure act and is *particular*. The quantum has form which contains it, although not fully. The form comes to the quantum from the formal system in which it is embedded as within a context. The form is general and is a property of the formal system. Therefore the quantum has form by virtue of its action within an *ensemble* of quanta that make up the formal system as context. This is called Thirdness. Finally, the quantum has *Otherness*. It does not rest in itself. For example, the either/or of the quantum bit is an irreducible contradiction of self-othering. Otherness comes from and allows the quantum to relate to other quanta. Otherness is relation. The Otherness of the quantum allows re-presentation such that the interiority of the quantum implies the exterior image of other quanta.

The three categories of the quantum imply that there is a difference between the quantum in its particularity (subjectivity or Firstness) and its generality (objectivity or Thirdness). The generality belongs to the formal system in which it is embedded and makes it inextricably entangled with other quanta in the ensemble forming the system. The particularity, as the locus of action, is disjointed from the generality inasmuch as the quantum can pivot into entanglement with another formal system. Such a pivot occurs through the other-ness of relationship.

Consider for example a quantum bit within the formal system of Euclidean geometry. It can enter into the system of relations with other quanta by sublating its Otherness. Such sublation is a symmetry breaking of the interiority such that the quantum has fixed orientation or handedness or “spin” and that orientation relates back the ensemble as a whole. No longer is the quantum in an indeterminate state of either/or. It is in a state of orientation or handedness that is synchronized with the whole system. Indeed it is only because all the quanta of the whole Euclidean system have sublated their otherness and entered into synchronicity, that the broken symmetry of orientation comes about which in turn stabilizes the system as a system. This broken symmetry, a habit of action among all the quanta in the ensemble, forms a

⁹ Through disjuncture, the stasis can be a *subject*.

geometrical law of the excluded middle creating “handedness” within the Euclidean system. Only quanta that reflect that law—whose “spin” has the mutually shared handedness—can be part of the system. From the context of the system, they constitute the *real*. However, the whole system is inert.

Yet the real is not inert because the broken symmetry of orientation is a general form belonging to the ensemble and the quantum maintains its ability to pivot by virtue of its interiority. It is as if the quantum’s interiority has been collapsed by the formal system into a fixed state. The quantum has *interpreted* the formal system. But this collapse or interpretation is neither final nor eternal because the quantum remains a locus of *potential* action. The potential action is the ability to pivot either/or between the given orientation and its opposing Other. Such pivoting would involve the quantum coming into a relation with another formal system, different from the first in its particularity although the same as the first in its generality. Through the disjointed relationship between these two formal systems the quantum can *communicate* orientation, its interpretation, as an external form.

The mediation of this process is light which obeys the logic of three.

We arrive at the consideration of light as a transcendental movement of entanglement which allows the creation of disjointed formal systems. The formal systems constrain quanta as processes by giving them structural form. Quanta have exteriority in the form of images or states. They also have interiority as indeterminate juxtaposition. The quanta can take on fixed images by following the laws or rules or habits of the ensemble forming the system or context. However, they also remain capable of potential action that changes their interior state and in so doing brings the interior into exterior representation. Through these processes quanta *interpret* the real.

Decrescendo

Law is not the highest category. It is purely formal and general. The real, by contrast, is particular. Law creates external form that applies to an ensemble of entangled quanta. It is a property of the ensemble that gives form to each constituent quantum. The ensemble of quanta work out these forms as relational processes of interpretation. The law of the excluded middle applies to formal systems and this law is what gives stability and structure. Formal systems create context but context can always be transcended and brought into relation with other contexts. This transcendental movement is called Light.

Coda: The Entrainment of Negation

The movement beyond RU has led us to the logic of inference by way of the entrainment of negation. Whereas the binary logic of RU involves a closed system of lawful determination, the

logic of inference involves the open and creative fulfilment of law. Inference is an interpretive *process*¹⁰.

The logic of inference is the logic of signs. When we say **A implies B** (that is to say: *if A is true, then B is true*), we are also asserting that **A** can be taken as a *sign* of **B**.

There are two ways we might represent inference within traditional formal logic.

<i>Not-A OR B</i>	(subjective representation)
<i>Not-(A AND Not-B)</i>	(objective representation)

These two ways are complementary in the following sense. The first representation is based on the relational operator *OR* and manifests the *subject* of succession which is metaphorically temporal. The second representation is based on the relational operator *AND* and manifests the *object* of co-presence which is metaphorically spatially¹¹.

Within these representations of inference, relation is prior to stasis. Inference takes us *from A to B* while allowing that both **A** and **B** are, in themselves, indeterminate. This has subtle implications for how we might understand the logic of inference. As discussed by Kauffman, the inferential operation that relates **A** and **B** is not a disjointed conjunction of two discrete elements or stases as would be the case in traditional binary logic. The inferential operator is, what Kauffman calls, a *Portmanteau* sign in which a single sign holds two meanings. “A Portmanteau word is a holder of two or more words, each justly truncated to fit the truncate of the other.” Specifically the Portmanteau sign of inference is the Sign of Illation as described by Peirce. It can be represented by fusing a horizontal overbar representing negation of the sign beneath it with a plus symbol representing the conjunction of two signs through OR.

Sign of Illation or inference



The Sign of Illation relates two signs by way of logical inference:

¹⁰ While traditional binary logic is the explicated logic of *Two*, inference is the explicated logic of *Three*. This moves us from thinking about numbers in terms of assemblages of discrete finite units within spatialized structures, to thinking about numbers in terms of formal principles of spatio-temporal processes. In *The Mathematics of Charles Sanders Peirce*, Kauffman explores the logic of inference and draws out several formal principles that are taken up in this section of the paper.

¹¹ For further exploration of the “metaphysics” of AND and OR, see *Otherwise than Being, or Beyond Essence* by Emmanuel Levinas.

Not-A OR B



This sign signifies the relation of an antecedent to a consequent: *from A follows B*. It is a directed relation in the sense that the positions of the two related signs cannot be interchanged as would be the case with equality. The Sign of Illation represents succession or progression as a mediated and directed relation between two stases without beginning or end and in this sense is similar to Derrida's notion of *différance*.

The Sign of Illation entrains the operator *Not* such that it is subsumed within systems of relations. Following Peirce's interpretation, "To say that A is false, is the same as to say that from an antecedent follows any consequent that we like. This is naturally shown by leaving a blank space for the consequent, which may be filled in at pleasure" [Peirce as quoted by Kauffman]. Thus, we can represent "A is false" as below.

A is false



This representation of falseness presents **A** as a sign of *nothing*. One way to think about this is to recognize that "nothing" is a word that refers to that which does not exist. But if something does not exist, it cannot be referred to—there is an explicit contraction involved in defining "nothing". In fact, when we speak about nothing, we are likely referring to something which is absent, something which has the potential to exist but does not actually exist. The recognition of absence comes from the relational system in which absence is contextualized. Absolute nothingness, without relation to something else, cannot be represented¹².

The representation of "A is false" also presents **A** as a final cause or end in itself with no further consequent. Within the logic of inference, a final cause cannot be represented. All

¹² It may seem confusing for me to signify "Absolute nothingness" after stating that it does not exist and that the signification is a logical contradiction. What is happening, I think, is that we are coming into contact with a transcending movement beyond the realm of representable existence. "Absolute nothingness" might then better be taken as referring to an internal state of receptivity to something beyond the world of representations, a creative potential on the threshold of actualization, a movement from darkness into light. A primal beginning.

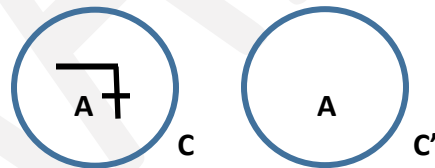
representable entities exist in some manner of causal relation to other entities and all are signs that signify something beyond themselves¹³.

The Sign of Illation allows for a *pivot duality* which can translate signs between different contexts. To see how a pivot works, suppose we have a closed system of inference such as Number theory. Let's call the system of inference **C**, where **C** establishes the context for interpreting the signs. Within the system **C** we might represent a false statement **A** as below.



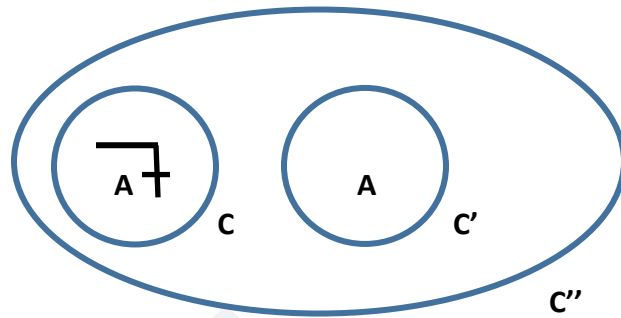
The system **C** constrains the negation of **A** such that it refers to an absence within a system of relations and it does not refer to an absolute state (which cannot be represented).

At the same time, the negation of **A** frees up the sign such that it now has the potential to refer outside of the context **C**. But in order to actualize this potential, it must become embedded in a second context **C'** which is other than **C**.



This pivoting movement involves indetermination, freedom, choice. It is a *creative* impulse. Yet the creative impulse does not overcome falseness until it is received or completed or fulfilled by bringing the two contexts into an overarching context **C''** in which both contexts are synchronously true.

¹³ No existent can be a sign of "nothing". Every thing is a sign of something else. The web of significations, the representable world, has its fulfillment in a unifying final cause that draws all things into itself. In the beginning was the Word.



Within this overarching context C'' , we would have the representation:



That is to say, A implies A which is true for any A .

But now A can be a pivot sign that can take on two mutually opposing values whose meaning is determined by the way in which the two contexts C and C' are united in the third C'' .

Suppose C'' is the context in which A cannot be false in both C and C' . Then C'' can be represented as below.

Not-(Not- A in C and Not- A in C')

This is the inference that

If Not- A in C , then A in C'

The contexts can be synchronized if A is a sign that can take on one of two opposing values and whatever value A takes on in context C it takes on the opposite value in context C' .

But now A has assumed a new dimension of depth. In traditional binary logic, the sign A would be taken to refer univocally to a single state— A would be fully explicated as an actual object. Within our more expansion logic of inference, A has *interiority* such that it could be in one of two possible states depending on the way in which two contexts are synchronized. A can be either *subject* or *object* according to potential agency and actual realization, respectively.

17. The entrainment of negation

Following Peirce, we can represent this graphically by taking a circle or simple closed curve drawn around a sign. The circle makes a distinction between its inside and its outside and thereby represents *distinction* [Kauffman].

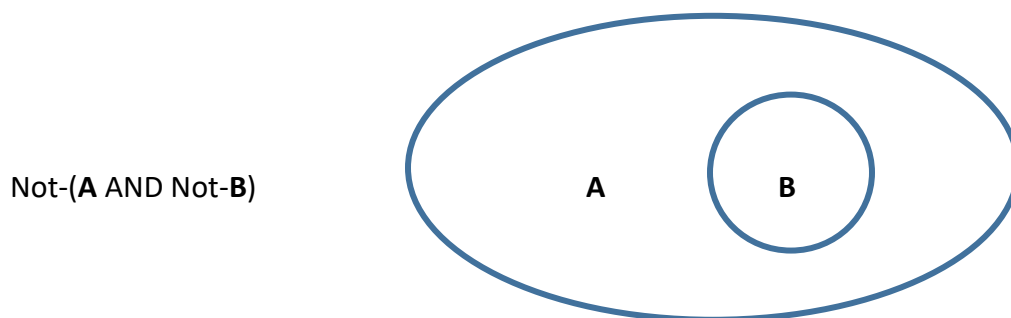
A circle drawn around a sign changes the enclosed assertion into a negative. So, for example, a circle drawn around **A** asserts the negation of **A**.



We can apply Peirce's "existential graphs" to our discussion by taking the circle to also represent context. Then the above graph tells us: *When A exists in isolation within a context where the context also exists in isolation, then not-A*. This is equivalent to the assertion "A is false" that we arrived at using the Sign of Illation involving an overbar fused with a cross.

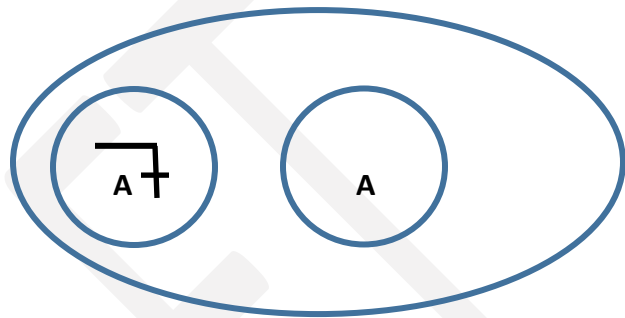


The existential graphs can also represent the Sign of Illation. Recall *A implies (is a sign of) B* is logically equivalent to *Not-(A AND Not-B)* in the objective representation.



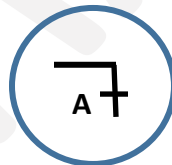
17. The entrainment of negation

Then, using the existential graphs, the two contexts **C** and **C'** contexts become synchronized when the circle representing any context is taken to mean that the enclosed assertion is negated.



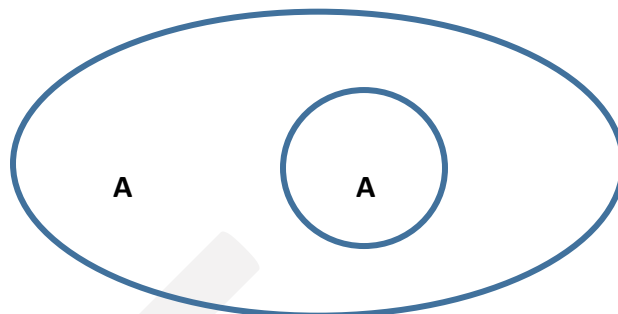
But for the simple case of opposition¹⁴, we have Not-Not-**A** is **A**.

Therefore we can substitute **A** for the graph below.



¹⁴ The case of opposition (duality) is also implicit in the use of two-dimensional planar circles as the formal basis for existential graphs.

This leaves us with the following simplified graph representing the synchronized contexts



This is the logic of identity. **A** implies **A**, where **A** is a pivot symbol that can take on one of two opposing values in a given context such that it takes on the opposite value in a second context that has been synchronized with the first context. Within this logic of identity, **A** is the same according to external form that comes from the context, yet it is distinguished according to internal value. It is a fully relational entity that only has form and manifestation within a context and which has agency to pivot by virtue of its relation to an opposing or complementary image of itself that is relationally united to itself by way of interiority.

This is also the representation of two coupled quantum bits. And quantum mechanics might therefore be interpreted as the embodiment of the logic of inference.

References

Florensky, Pavel. *The Pillar and Ground of the Truth: An essay in orthodox theodicy in twelve letters*. Transl by Boris Jakim. New Jersey: Princeton University Press, 1997.

Gallagher, Timothy M. *The Discernment of Spirits: An Ignatian guide for everyday living*. New York: Crossroad Publishing Company, 2005.

Habermas, Jurgen. *The Theory of Communicative Action*, 1981.
https://en.wikipedia.org/wiki/The_Theory_of_Communicative_Action

Kauffman, Louis H. The Mathematics of Charles Sanders Peirce. In *Cybernetics & Human Knowing*. 8(1-2), 79-110, 2001.

Kerruish, Valerie and Petersen, Uwe. *Philosophical Sanity, Mysteries of the Understanding, and Dialectical Logic*. [Available Aug 8 2018:
https://www.academia.edu/20791477/Philosophical_Sanity_Mysteries_of_the_Understanding_and_Dialectical_Logic]

17. The entrainment of negation

Kruse, Felicia. Is cosmic evolution semiosis? In *From Time and Chance to Consciousness: Studies in the metaphysics of Charles Peirce*, Eds. Moore, Edward and Robin, Richard, 1994. [Available Aug 8 2018: https://www.academia.edu/7104060/Is_Cosmic_Evolution_Semiosis]

Levinas, Emmanuel. *Otherwise than Being, or Beyond Essence*. Translated by Alphonso Lingis. Pittsburgh: Duquesne University Press, 1974.
https://en.wikipedia.org/wiki/Otherwise_than_Being

Marion, Jean-Luc. *Givenness and Revelation*. Transl by Stephen E Lewis. Oxford: Oxford University Press, 2016.

Unger, Roberto Mangabeira and Smolin, Lee. *The Singular Universe and the Reality of Time: A proposal in natural philosophy*, 2015.
https://en.wikipedia.org/wiki/The_Singular_Universe_and_the_Reality_of_Time

Whitehead, Alfred North and Russel, Bertrand. *Principia Mathematica*, 1910-13.
https://en.wikipedia.org/wiki/Principia_Mathematica

Wittgenstein, Ludwig. *Tractatus Logico-Philosophicus*, 1921
https://en.wikipedia.org/wiki/Tractatus_Logico-Philosophicus

18. What has Christianity to do with physics? An exploration of the metaphysic of modern physics in light of Maximus the Confessor and other patristic authors

With creation *ex nihilo*, light becomes the primal source of space, time, matter and form, such that the unity of the cosmos (and humanity) can longer be said to rest in itself.

DRAFT

18. What has Christianity to do with physics?

For the Astronomer¹



Then the Lord God called to the man and said to him: “*Where are you?*”
[Genesis 3.9]

¹ Luca Giordano (Italian 1634–1705), *Astronomy* c. 1653–54 or 1680–92?, oil on canvas, Collection Art Gallery of Ontario.

A Recapitulation of the Mystery

‘For this reason the Monad from *the beginning* moved toward a dyad and at the Trinity came to a halt.’

... if ... after hearing the word ‘movement’, you wonder how the Godhead, which is beyond infinity, is said to ‘move’, understand that movement is something that happens to us, and not to the Godhead.

[Ambiguum 1]

In what way can we enter into theology? For the *logos* of *theos* according to the Christian faith is the person of Jesus Christ and not an academic undertaking. Surely we cannot claim knowledge of God who is mystery beyond all understanding? Yet, perhaps we might reverse the relation and ask instead about the *theos* of *logos*—the assumption of understanding into the mystery.

Suppose we begin by taking *logos* to refer to an underlying order or unity to all of creation, an order or unity that is partially accessible to our understanding. We might call it wisdom. Yet even though it is accessible to our understanding, it is not the same as our understanding; it is not the same as reason or thought or theory or narrative or mathematical equation. It always points beyond, to something infinitely greater, like the way that a word points beyond itself to the interiority of the one who speaks or writes it, to its meaning. So while we might call it wisdom, we also realize through this naming that *logos* is beyond wisdom, beyond finitude, beyond human words.

Perhaps you find this beginning a bit strange. I’m not setting up an object of thought for you. I’m not saying that *logos* is a thing or an idea. Instead we are exploring a movement of thinking whereby something is affirmed, then negated, and perhaps affirmed again at a higher level. And in this paradoxical movement we are confronted with a deeper truth. What is the end or goal or resting place of our contemplation of *logos*? What is the *theos* of *logos*?

Let Saint Maximus the Confessor be our companion for entering this *way* of thinking theologically. A way in which *how* we are thinking—the form—matters as much as *what* we are thinking—the content.

There are two lights to guide us that have been passed down through tradition. These lights are said to be revelations from God about his nature or essence. The greater light of the Trinity and the lesser light of the Incarnation.

‘... you must attribute the more sublime expressions to the Godhead, to the nature that transcends the sufferings of the body, and you must attribute the lowlier ones to the

18. What has Christianity to do with physics?

compound, to Him who because of you was *emptied*, became incarnate, and (to use equally valid language), was made man.'

... the teacher is making a distinction between 'essence' according to which the Word remained simple, even though he became flesh, and 'hypostasis' according to which He became composite, by the assumption of the flesh....

[Ambiguum 2]

The Trinity subsists in the Father, the Son and the Holy Spirit. Three persons, one essence. The three persons are individuated according to their particularity or uniqueness which Maximus calls 'hypostasis'. What individuates the three persons is relationality. With Augustine, we might say: the Father is Father in relation to the Son, the Son is Son in relation to the Father, and the Holy Spirit subsists in the relationship. Yet the essence belongs communally to the three. The essence *is* unity or oneness. But not unity or oneness as created things are one, rather Oneness that remains mystery beyond all understanding. Oneness that can only be spoken about through relation because it transcends all attempts to determine or contain or circumscribe or define. Oneness that can only be approached through likenesses, even though it is infinitely different from any likeness and so any relation of likeness once made, immediately decreases so that participation in the One might increase.

The inapproachable essence of the One Godhead is central to monotheistic religions. In Judaism, the mystery is entered through the Name of God which is unspeakable and therefore beyond all categories of names and all categories of creation. In Islam, the mystery is articulated through negation: there is no God, but God. In Christianity, the Trinity allows us to speak obliquely about the Oneness of God. Yet it is only possible to speak of the Trinity because of the Incarnation.

'... He digned to take on your thick corporeality, consorting with the flesh through the medium of the intellect—and God on earth became man, for it (i.e. the flesh) was blended with God, and He became one, because the stronger predominated, so I might be made God to the same extent that He was made man.'

The teacher says ... that He became 'one' (i.e. a single subject), but not a single object, pointing to the fact that even in the identity of the one hypostasis, the natural difference of the unified natures remains unconfused, since the one (i.e. the single subject) is indicative of the hypostasis and the other (i.e. the single object) of nature.

[Ambiguum 3]

Through the Incarnation we encounter a reflected image of unity. One person or hypostasis with two natures. The absolute uniqueness of the Son is, as it were, the centre or origin of God's agency in creation. By becoming incarnate, Jesus fully assumes human nature while remaining fully divine. In this mystery, human nature and divine essence are brought into unity even while they remain individuated and unconfused. This creates for us a movement. But not

18. What has Christianity to do with physics?

a movement in space and time, nor in the created realm. Rather a transcendental movement as a drawing up of human nature into the Godhead. The Incarnation is said to be an emptying of God in order to assume humanity and draw us into our original image and likeness of God which is also our end. The emptying or *kenosis* is the origin of a movement of return that is embraced, guided and sustained through the Trinity.

When we speak of the Incarnation we are referring to the birth, human life, death, and resurrection of Jesus. Immanuel. God among us in the world. An impossibility for the Godhead who is infinitely beyond us and wholly transcendent. Yet with Christianity the impossible is said to obtain and is the creative origin of all possibilities and all actualities. This is the Mystery.

An interesting thing about mystery is the way in which it both reveals and conceals itself. In order for something to be mysterious, it must present itself to us as something we can grasp and enter into and participate in. But at the same time it must be beyond that entrance or door or opening. To be a mystery it must draw us deeper into its nature which is concealed in the beginning. A movement obtains. It is we who move deeper into the mystery seeking our final rest in its full revelation or unconcealment. The resting place is what Patristic authors like Maximus would call the *final cause* of the mystery.

The Incarnation is the beginning of such movement for which the final cause is God the Father who is also the fullness of the Trinity. The Lesser light draws us, so to speak, into the Greater light. This movement is guided by the Holy Spirit. Yet it is not a movement of “knowing” as might be the case for the mysteries we encounter in the world around us. It is a movement of being, of participation, of Life. The origin of this movement can be located in the incarnate Son by way of His two natures which, according to Maximus, are One yet remain distinct and unconfused. The incarnate Son is said to be fully human and fully divine. The human nature is what enters into the world and lives among us. Yet the humanity of the Son is also taken up into the divinity of the Godhead. The divinity remains concealed and inaccessible to us. The humanity of the incarnate Son, however, points to or makes known or opens us up to this concealment in a way that is like the way a word points to or makes known or opens us up to its intended meaning. The Son *is* the Word of God. And much like a word only has meaning if it is recognized to be a word and to have meaning, otherwise it remains an empty utterance or a random mark, so the Word of God has meaning if He is recognized as the Word of God and this recognition is the gift of the Holy Spirit.

‘... as the form of a slave He comes down to the same level as His fellow slaves and servants. And He receives an alien form, bearing the whole of me in Himself, along with all that is mine, so that He may consume within Himself the meaner element, as fire consumes wax or the sun earthly mist, and so that I may share in what is His through the intermingling.’

If, then, He emptied Himself and assumed ‘the form of a slave’ (that is, if He became man), and if in ‘coming down to our level He received an alien form’ (that is, if He

18. What has Christianity to do with physics?

became man, passible by nature), it follows that in His 'self-emptying' and 'condescension' He is revealed as one who is good and loves mankind, for His self-emptying indicates that He truly became man, and His condescension demonstrates that He truly became man passible by nature. This is why the teacher says: 'He bears the whole of me in Himself, along with all that is mine', that is, He bears the totality of human nature, including its natural, blameless passions, which He united to His own hypostasis.

[Ambiguum 4]

The Incarnation situates the present human condition in terms of salvation. This framing comes from a Patristic reading of Scripture. In the opening chapters of Genesis², the *one* man Adam is a type or figure or symbol for the human person whose end or fulfilment or referent is the *one* man Jesus. The narrative of the expulsion from the garden of Eden formally discloses the condition of humanity in the present world. The narrative has the following symbolic form:

- God creates a single man Adam from the earth and breathes into him the breath of life. However, God says (to us) that the singularity or *aloneness* of Adam in-himself is not good, so he creates a companion Eve, a likeness to Adam who is also another and bears within herself the rest of humanity as potential. The two—male and female—are created in the image of God. In this beginning, Adam is in a loving relationship to Eve, and through her to all of humanity, and both Adam and Eve are united with God. In the garden of Eden, Adam is a symbol of a relational 'self' and Eve is typologically the Other to Adam.
- The Serpent deceives Adam and Eve by promising that they could become 'like God' in themselves, despite the fact that they are already created in the image and likeness of God. When Adam and Eve eat from the tree of knowledge, they become aware of good and evil. But having no knowledge of righteous judgement, they become afraid of God when they cannot discern his Infinite goodness. Their former relationship to God and to one another, a relationship of implicit trust or faith, is ruptured. Adam's self-image is changed from a relational one (*being for another*) to one of aloneness (*being for itself*) and he becomes a type or symbol or figure for a false image of unity.
- Through transgression, the unity of male and female is turned into two parts in opposition to God. This rupture is a type or figure or symbol that describes the breakdown of all human relationships, provoking war among people, both against one another and against themselves. Sin and death enter the world and are propagated throughout. Figuratively, there is a fall from an eternal communion with God to a temporal existence in which false images of unity—idols whose end are in themselves—reflect the fallen state of humanity.

² This interpretation of Genesis, based on Chrysostom's writing, is excerpted from *Word, identity and the relational form of the individual in Paul's Letter to the Romans*.

18. What has Christianity to do with physics?

In the story of the garden of Eden, the relational open image of unity in which Adam and Eve were created is transformed into a closed and empty image of nothingness or death as a result of transgression and sin. Relation to and participation in the origin or centre or source of the ordering principle of creation, of the Logos, is ruptured for the original human person Adam and through him for all humanity.

In the fallen state, the condition of humanity appears to be centred or ordered or ruled by *nothingness*. Like time itself, this state is characterized by its transience and is likened, by some Patristic writers, to sleep and the things in it to dreams. Moreover, the fallen state involves a type of darkness in that individuals cannot see on their own how far their condition is from the goodness and glory of God and they lack the power of getting free.

The salvation work of the Son involves entering into the human condition and overcoming the darkness by re-orienting humanity away from nothingness and into the Light which is the Logos of God. It is because the Son is born *without sin* that He can accomplish this. The way in which He does this is by “dying to death”, the very death that was brought into the human condition through Adam’s transgression. This death is not just physical death of the body, it is also the severance of the bond of Faith with God³ that Jesus overcomes on the cross in the cry: *My God, my God, why have you forsaken me?* In His resurrection from the dead, the Son is said to *recapitulate* all of creation for humanity by bringing it back into Himself, and re-orienting us into His Logos.

Humanity was originally created in the image and likeness of God, which we might do well to call Love. Through transgression the image and likeness was darkened and distorted. The Incarnation of the Son restores to humanity the image and likeness, but in a new and expansive way because all things become recapitulated in Him and thereby He reveals Himself to be the Logos of creation.

Formal Considerations

Our brief recapitulation of the mystery hopefully allows us to draw out or abstract formal movements or figurations or types that might be helpful for understanding how Maximus relates the Logos to the cosmos. By “cosmos” I mean the subject of study in physics. What Giordano’s astronomer appears to be holding in his hands. The cosmos is what physicists might call *The Universe*, although the term “universe” is problematized in Maximus’s way of thinking because the unity of the uni-verse does not rest in itself. And this is the key metaphysical

³ Theodore of Mopsuestia, for example, calls this severance the death of the soul. “It was necessary that the Son should assume not only a body but also an immortal and rational soul. It was not only the death of the body that he had to abolish, but also the death of the soul, which is sin ...”

insight from Maximus that I want to bring forward as also being the key metaphysical insight of modern physics.

One

‘For this reason the Monad from the beginning moved toward a dyad and at the Trinity came to a halt.’

... in the Deity’s initial approach, it indivisibly teaches the intellect the principle of unity, lest division be attributed to the first cause ...

[Ambiguum 23]

The first figure to unpack is the *aloneness* of Adam, which God says in the beginning is not good. The figure of unity here is of a finite, created thing which rests in itself, namely the created human Adam. Since God *is* good, this figure of unity—Adam’s aloneness—is not *in itself* the image and likeness of God. Let’s call this figure of unity the Finite Unit. According to the narrative of Genesis, as we are interpreting it, the Finite Unit is not a true image and likeness of Oneness.

But what is this abstract figure? Is it not the idea of One that we carry around with us when we abstract the form of unity from the objects of creation? Taking each object to be one thing, is it not the abstract or general form of *thing*? The abstract or general form of a physical thing that we sense and encounter and interact with, that we seek to manipulate. The abstract or general form of the idea of a thing that we create for ourselves in our minds so that we might have knowledge and power over the object. This idea of One, the idea that the Finite Unit is the image and likeness of One, this idea we must consider to be false.

Indeed, in the narrative of Genesis, the oneness of Adam is inextricably connected to his relationship to Eve and to God. Why does Eve show up? Because Adam, in himself, cannot have direct communion with God who is wholly transcendent. He needs an Other to himself to create a relational bond of love through which God can manifest as that Love. Well, you might say, now you are talking about two and three. What happened to one? This is the mystery. One draws all things into Oneness. One draws all things into oneness *through their relations*.

Two

‘The natures are innovated, and God becomes man.’

...man ... is divided into male and female, manifestly possessing by nature the full potential to draw all the extremes into unity through their means, by virtue of his characteristic attribute of being related to the divided extremes through his own parts ... this is why man was introduced last among beings—like a kind of natural bond mediating between the universal extremes through his parts, and unifying through

himself all things that by nature are separated from each other by a great distance—so that, by making of his own division a beginning of the unity which gathers up all things to God the Author ... he might reach the limit of the sublime ascent that comes about through the union of all things in God, in whom there is no division, completely shaking off from nature .. the property of male and female ... so that he might be shown forth as, and become solely a human being according to the divine plan, not divided by the designation of male and female (according to the principle by which he formerly came into being), nor divided into the parts that now appear around him, thanks to the perfect union ... with his own principle, according to which he exists.

[Ambiguum 41]

The second figure to unpack is the *movement* of duality. This figure is manifested in Adam and Eve who *together* are created in the image and likeness of God. The figure of duality here is of two persons or individuals or hypostases who are united by their one nature or essence as a general or common form. It is an image of *being-in-relation* whose unity comes through participation in the likeness of the Third who is *Love*. This figure of duality is very different from the modern notion of two individual things or objects that are said to co-exist in juxtaposition while maintaining their independent formal natures, each *in-itself*.

Unlike the modern notion of an object which has the form of *aloneness*, duality involves individuals who have *being-for-another*. The open relationality to the Other is constitutive of the individual, it belongs to its principle of being. The individual “admits of synthesis with something else for the completion of a different form” [Ambiguum 42] . And so we have to think quite differently about the form of “selfhood” through which the individual maintains identity as an individual *by way of its relations*.

To unpack the figure of duality, we need to consider that individuals possess both interiority and exteriority. The exterior is what is present to the Other as an image or body; it manifests as extensional *object*. The exterior of an individual assumes general forms and presents as that which can be identified and acted upon or responded to by the Other. The interior is the locus for agency or responsiveness to the Other as *re/action*; it manifests as intentional *subject*. The interior of an individual is particular and remains concealed to the Other in its essence or nature while allowing for the communication of formal gestures and signals and signs that can be interpreted by the Other as signifying that interiority.

In the beginning God creates Adam in his aloneness who exists in relation to other creatures by way of his exteriority or body. The nature of this relationality is like coexistence in juxtaposition, a union with another that is independent and “completely unconditioned by nature”, as Maximus might say. This, in fact, is the nature of relationality that underwrites all of classical physics—*pure objectivity*. In Giordano’s painting, such relationality is represented by the way in which the Astronomer holds in his hands the universe as an *external* globe in disjointed juxtaposition to himself.

18. What has Christianity to do with physics?

However, in the genesis narrative we are told that this type of relationality will not overcome Adam's aloneness which is not good. So God creates for Adam a companion Eve. In Eve, Adam can see for the first time his own interiority, his own consciousness, his own soul, as a reflection. The nature of this relationality conditions both Adam and Eve. They are two individuals who are united by a common nature or essence but the nature of this unity is such that their relational bond is constitutive of the very identity of each. They are given the capacity for *good intention* towards one another and good intention in turn informs their nature. The nature of good intention is to give one-self for the Other. In his aloneness, Adam was unable to impart or share his nature with another creature. However, through his companion he assumes a nature "that will never cease from synthesizing itself with other elements to complete another form" [Ambiguum 42]. The kernel of this nature is the bond of love between Adam and Eve which brings them into unity with one another, and that unity into which they are both drawn is the image and likeness of God. Each particularly is drawn into a common union whose fulfilment is the true measure of the human essence or nature. This essence or nature manifests through *movement* and does not rest in-itself, although it might be said to rest in God who is Love.

So there are two forms of relationality at play in the story of Adam and Eve. On the one hand, there is the relationship of independent, unconditioned natures, each in itself, each *alone*—in the figure or form of Finite Units. On the other hand, there is the relationship of conditioned mutuality where individuals live out their image and likeness in and through one another as good intention. In the first form of relationship, the "between" of the individuals is, as it were, pure *nothingness*, since there is no overlap or constitutional union. In the second form of relationship, the "between" of the individuals is filled out by the Love of God and this Love is what draws them into oneness. But not only does it draw them into oneness, it also allows them to enter into relationships of unity with other creatures, creatures not like themselves, and through good intention bring these creatures into the Loving kernel of their image and likeness.

In the garden of Eden, the serpent represents the origin or source of the first form of relationality, the form of aloneness. This origin or source is properly called *Nihil*. Nothingness. It is severance from God. Non-being. Illusion. Death. It is the dark background represented in Giordano's painting. By choosing themselves as the end or final cause, Adam and Eve assume in themselves a tendency towards the form of Finite Units whose condition of being is ordered around nothingness. *But nothingness does not exist*. That which does not exist cannot be something, and therefore it cannot be an ordering principle. So when we speak about sin, we are speaking about a perversion or a deception or a lack. What is lost through sin is good intention which requires a bond of love through which God can be made manifest. Good intention is the *movement* towards God as the end or final cause. This way of speaking re-directs our gaze away from external things and inwardly towards our intention or orientation or will. The fallen state is not, nor can it ever be imagined as, a *place*. Rather it is a loss. What is lost, as Augustine laments, is the union of our *free will* with God's *Good will*, a union that we might call Grace. And to the extent that this union is broken, we are in sin and we lack the

18. What has Christianity to do with physics?

fullness of Being. Although there is a loss for Adam and Eve, Grace still obtains. Giordano has cleverly shown this to us through the way in which the Astronomer is illuminated by some form of light which lies beyond the darkness and, indeed, beyond the frame of the picture itself.

But moving naturally, as he was created to do, around the unmoved, as his own beginning (by which I mean God), was not what man did. Instead, contrary to nature, he willingly and foolishly moved around the things below him, which God had commanded him to have dominion over. In this way he misused his natural, God-given capacity to unite what is divided, and, to the contrary, divided what was united, and thus was in danger of lamentably returning to nonbeing. This was why 'the natures were innovated', so that, in a paradox beyond nature, the One who is completely immobile according to His nature moved immovably, so to speak, around that which by nature is moved, 'and God became man' in order to save lost man, and—after He had united through Himself the natural fissures running through the general nature of the universe, and had revealed the universal preexisting principles of the parts (through which the union of what is divided naturally comes about)—to fulfil the great purpose of God the Father, recapitulated all things, both in heaven and on the earth, in Himself, in whom they also had been created.

[Ambiguum 41]

Three

'For this reason the Monad from *the beginning* moved toward a dyad and at the Trinity came to a halt.'

This is not, however, a causal explanation of the cause of beings, which is itself beyond all being, but the demonstration of a pious opinion about it, since the Godhead is a Monad (but not a dyad), and a Trinity (but not a multitude), for it is without beginning, bodily form, or internal strife. For the Monad is truly a Monad: it is not the origin of the things that come after it, as if it had expanded after a state of contraction, like something naturally poured out and proliferating into a multitude, but is rather the inherently personal reality of the consubstantial Trinity. And the Trinity is truly a Trinity, not the sum of divisible number (for it is not an aggregation of monads, that it might suffer division), but the inherently essential subsistence of the three-personned Monad. The Trinity is truly a Monad, for such it is; and the Monad is truly a Trinity, for as such it subsists, since there is one Godhead that in essence is a Monad and in subsistence a Trinity.

[Ambiguum 1]

The third figure to unpack, for the purposes of discussing the metaphysic of modern physics, is the *synchronicity* of three. Synchronicity is related to perichoresis—the relationality of the three persons of the Trinity to one another—as a shadow form or figure in the likeness of mutual indwelling or entanglement.

18. What has Christianity to do with physics?

When we speak about Trinity, we are trying to speak circumspectly and carefully about One in full recognition that One is ineffable, unimagable and beyond all knowing and all mystery.

The Trinity is three persons or *hypostases* who commune as one nature or *essence*. However, when we use the term “person” we don’t mean person as a human is a person and when we use the term “nature” we don’t mean nature as a human has human nature. We must reverse our orientation. By way of the persons of the Trinity we have human personhood even though the personhood of the Trinity is infinitely beyond us. And by way of the essence of all essences, we have human essence or nature even though the essence of the Trinity is likewise infinitely beyond us. The Trinity is like a light that illuminates our being while always remaining infinitely beyond that Being.

The persons of the Trinity refer to unique and particular individuals who have agency. They are known to us through their modes of being in relation to creation which communicate to us *who* each person is. For example, the Father is said to be the source, the Son the redeemer, the Holy Spirit the sanctifier. The identity of each person is sustained through *relationship*, rather than essence, and marks *distinction* rather than division. Maximus uses the term “hypostasis” to refer to the individual and particular personhood of each person of the Trinity. This term is better suited to our purposes in discussing physics because it does not carry extraneous trappings of modernity that come with the word “person” by way of our associating that term with *human nature*. Hypostasis is that which is particular, distinct by way of relations, and has agency by way of its mode of being in creation.

The essence of the Trinity is revealed to us as unity in communion. This essence is what Jesus refers to when He says: “*I am the Way, the Truth, and the Life*” [John 14,26]. While hypostasis manifests exteriorly through relations, essence is interior and concealed. Essence is communicated through hypostasis as meaning is communicated through word. Essence is what is communally shared by hypostases who are relationally distinct but one in nature. We can understand the three persons of the Trinity sharing a common essence inasmuch as we can recognize that each as hypostasis acts in harmony or synchronicity or communion with the others according to their respective modes of being.

The narrative of the Garden of Eden sets up for us an image and likeness of the unity-in-relation of the Trinity. In the beginning of genesis, the essence of humanity—human nature—was shared communally by the two hypostatic individuals Adam and Eve. Each was for the other an outward communication of their inwardly shared humanity. This duality was created and sustained through the Third who was Immanuel—God among us—manifesting through the loving bond between them. In eating from the tree of knowledge of good and evil, this bond was symbolically corrupted and evil entered between them as the attempt to recreate themselves in the image of Nihil. But Nihil is not God, so this became an orientation towards death. In a manner of speaking we might say that Adam and Eve fell away from their own true nature and gave themselves up to that which does not exist.

Ex nihilo. The movement from darkness to light. God's act of creation. In the hypostasis of his Son, God became incarnate and made man in order restore to humans to their original image and likeness. This was an act of re-creation because the original innocence or nakedness of Adam and Eve had been lost. The Son accomplishes this redemption through the hypostatic union of two incommensurate natures. The incarnate Son is both fully human and fully divine such that His humanity and His divinity are united without division while remaining distinct and unconfused, just as the three persons of the Trinity are united without division while remaining distinct and unconfused. The Son incarnates unity-in-relatedness where the unity is manifested through his hypostasis or mode of being, through *the Way* of Jesus. The unity-in-relatedness of the incarnate Christ overcomes death—the aloneness of humanity—and thereby draws us out of the darkness and into the light. A renewed form of unity for humanity is born, which is made manifest through the body of Christ. The body of Christ bears the Word of God. It is the church in communion, the eucharist in form, grace inwardly digested. In the body of Christ, people as hypostatic individuals remain distinct while being fully united through their communion with God. They come to participate in a form of synchronicity or mutual indwelling or Love that unites humanity and divinity distinctly, without division and without confusion.

This is a mystery beyond all understanding.

Four

'He communicates a second communion, far more marvelous than the first.'

....

One is truth, the principle of principles, the essence of essences. Two is love, being-for-another, movement towards God. Three is Light, the creative, the beginning and the end.

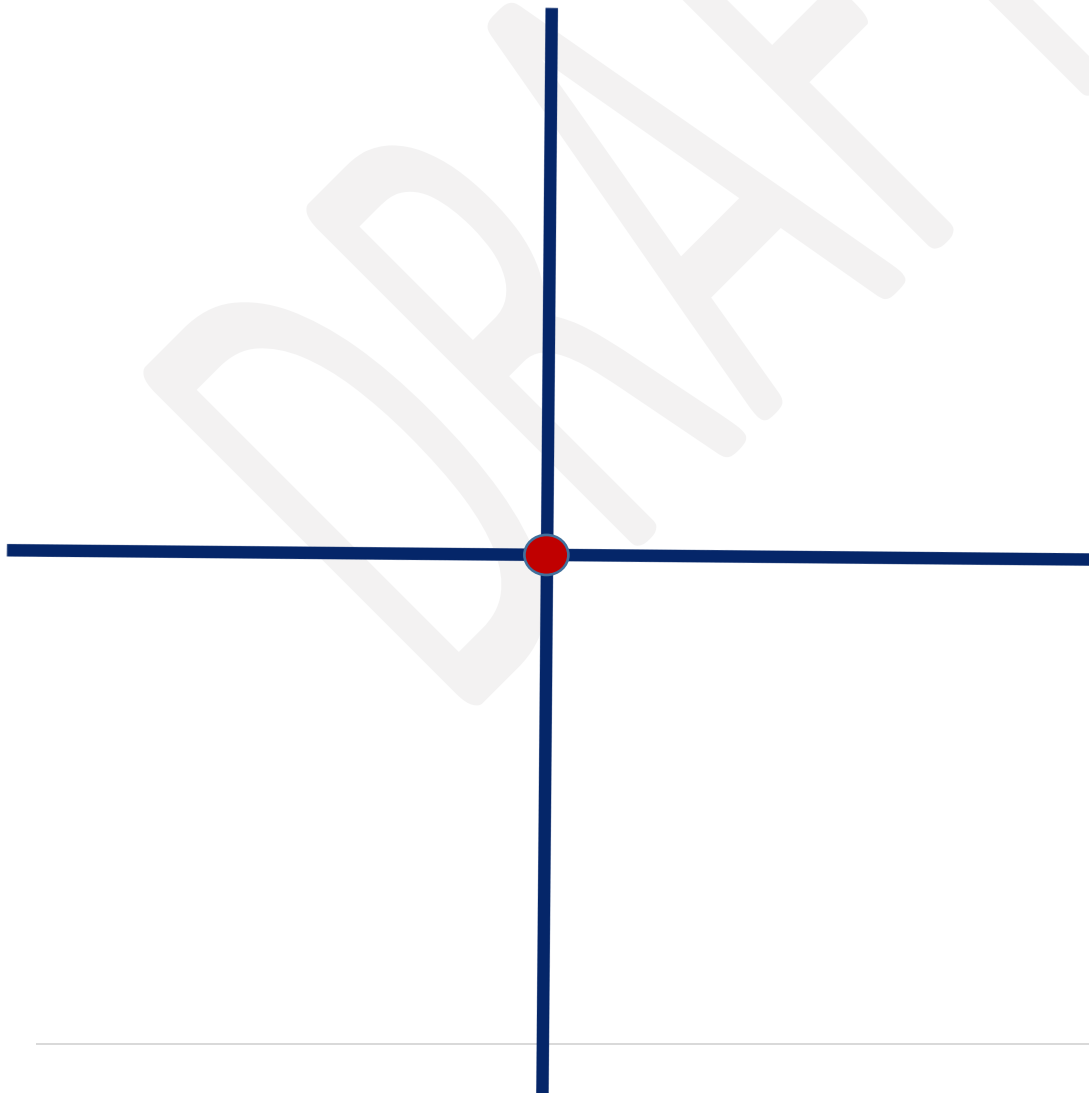
The form of numbers illuminates the form of forms. And Maximus shows us a very different way to think about numbers compared with *Principia Mathematica*. The latter is based upon the Finite Unit as the foundational form for all created beings, such that all other numbers are merely the aggregation of disjointed images of the Finite Unit and this is what passes for relationships of unity in the world.

Imagine Giordano's Astronomer, in his aloneness, projecting the corrupted image of himself onto the created things he encounters in the world. Each is isolated in its aloneness as a thing in itself, as the idea of a thing in itself, as an idea that exists only in the mind of the Astronomer. The principle of absolute difference rules and from the calculus of differences the cosmos is re-presented in the image of the Astronomer's aloneness. But the Astronomer remains frustrated by a simple truth. He cannot locate himself in his own creation. And he knows this when he looks up, out of the re-presentation of the painting. When he looks at you, my friend. He knows this because he knows that you are not an idea in his mind.

18. What has Christianity to do with physics?

Really, Tim, you might be saying to yourself right now, this imaginative digression is just too much. But please bear with me. The universe, as represented by *Principia Mathematica*, is a geometry of being which is depicted as a globe in Giordano's painting. The foundation of this geometry is the null point—an abstract form of the Finite Unit that has been reduced to its (almost) nothingness. And this point, as an original locus for the coordination of the whole universe, also becomes the projected vanishing point at infinity for that coordination. The beginning and the end are turned into images of nothingness—points that are taken to rest in themselves but in that rest they lose their being. Indeed, the original locus for coordination is not a geometrical point. The original locus for coordination is *the person of the Astronomer*.

So the Astronomer finds himself immobilized or crucified, as it were, in a re-presentation of creation that is static and unmoving. Empty space. What holds him captive and immobile is the law of geo-metry, a law of unconditioned relations that excludes the loving unity-in-relatedness of the Trinity. This is the law of Cartesian coordination that is based on the absolute difference between God and creation, a law that does not admit any form of transcending just as it does not admit any form of humanity.



18. What has Christianity to do with physics?

In attempting to transcend creation by imagining that he can bodily step beyond the universe *on his own* as he appears to be doing in the painting, the Astronomer re-forms that universe in his own fallen image and thereby finds himself fixed by his own false representations which are oriented towards darkness and death rather than towards transcendence and light which is the beginning and the end.

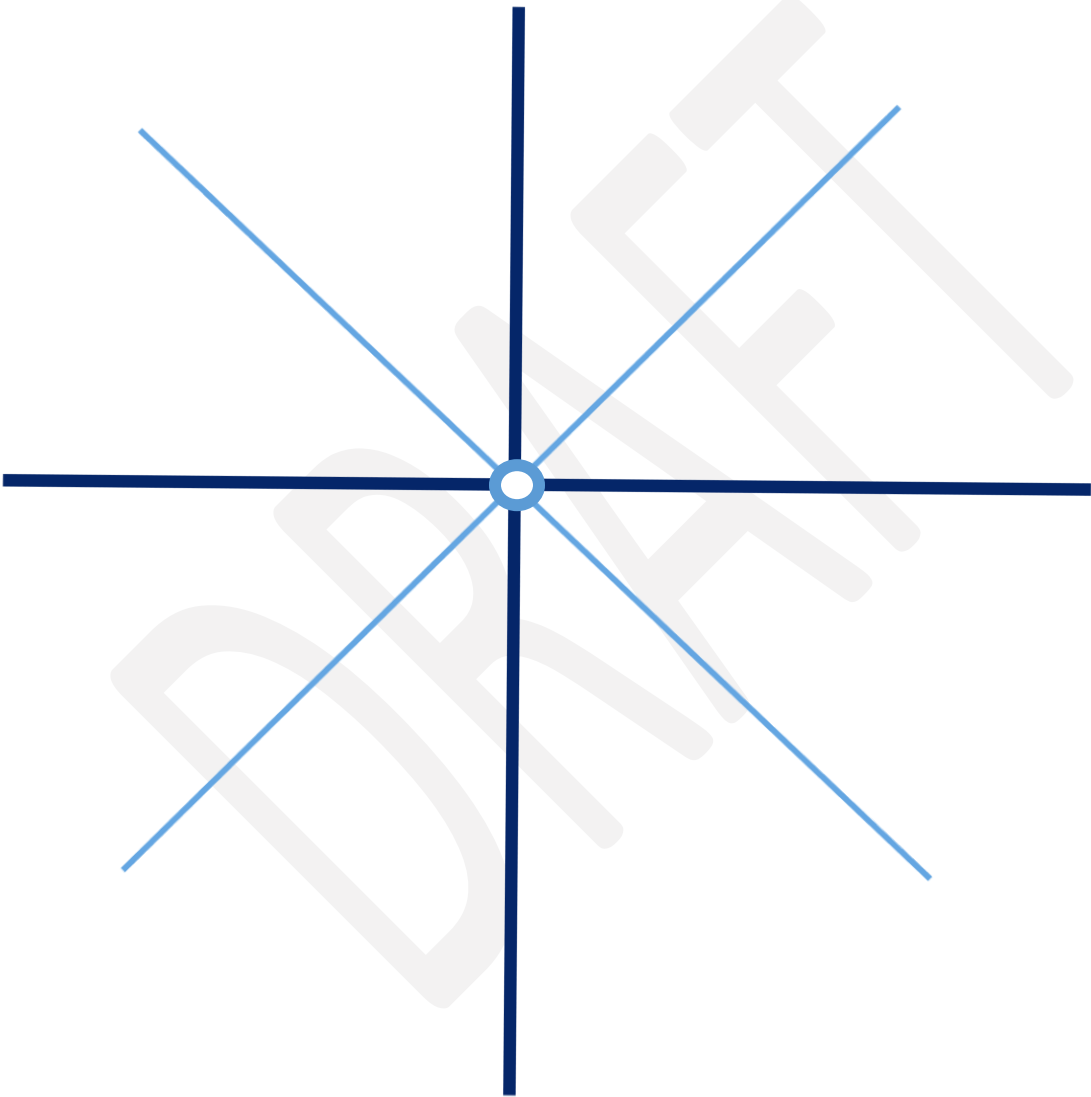
All becomes centred and enveloped by nothingness. Nothingness that exists for the Astronomer inasmuch as he has become a law unto himself. But this nothingness or death does not truly exist in the fullness of the Being of God. The Astronomer is captive of his own self-image, an idol which he lacks the power to overcome on his own. Yet the incarnate Son, by taking on the Astronomer's nature and emptying himself into its nothingness, overcomes that nothingness as creation *ex nihilo* overcomes the darkness with light. Through his death and resurrection, the incarnate Son reveals the fullness of Life to be something wholly different from the orientation towards darkness and death that defined the Astronomer's former (non)-existence. The light from infinity comes near and penetrates the centre, restoring the origin by opening it up to the light.

....

In the first instance, nature did not in any way whatsoever obtain unity with God according to mode or principle either of substance or hypostasis, according to which all beings universally are seen to exist. Now, however, through the ineffable union, nature has obtained unity with God according to hypostasis, preserving unaltered, on the level of its essence, its proper principle of difference in relation to the divine essence, with respect to which it has become one and not different, by virtue of having been united to it in a union according to hypostasis, so that with regards to the principle of its being (according to which it was created and exists), nature should continue to abide with its essence strictly intact and in every way undiminished, while with regards to the principle of how it does exist, it should receive its subsistence in a divine manner, so that it would neither know nor admit of absolutely any impulse of movement toward anything else. In this way, the Word entered into 'communion' with human nature in a way that was 'far more marvelous than the first', essentially uniting nature to Himself in a union according to hypostasis.

[Ambiguum 36]

18. What has Christianity to do with physics?



Creation *Ex Nihilo*

‘For Scripture acknowledges three births for us: from bodies, from baptism, and from the resurrection.’

It is through this first birth that we receive being. The second birth, which is from baptism, is how we lavishly receive well-being, while the third birth, from resurrection, is how we are transformed by grace into eternal well-being.

[Ambiguum 42]

To recapitulate is to restore the movement of all creation towards God, the final cause. The key to understanding recapitulation for the Astronomer is to recognize the primal role of light in his theories of the universe. To turn his attention away from the dark ground of space and towards the transcendent source, redeemer and sanctifier.

According to Maximus, the human condition and its movement towards God can be understood as three births. By ‘birth’ we mean a transcendent movement from darkness into light, from one level of ‘being’ to another. The first birth is creation *ex nihilo*, the movement from non-being into the light of existence. This first birth gives rise to our physical universe and the things within it, including us. We might call it a birth into *Being*, where being has an external objective form. This is the level of existence that currently consumes the Astronomer’s attention. The second birth is one of orientation. It involves differentiating light from darkness and orienting one’s interiority or intention towards the light. We might call it a birth into *Life*, where life involves freedom of movement to some degree. The third birth is a wholly transcendental rising up through which all things find their completion or fulfilment in the Light of God.

If we think only on the level of the first birth, as the Astronomer is wont to do, then creation presents as natural law and the things within it are governed by those laws without any suggestion of interiority or responsiveness or freedom. This is the realm of Finite Units that exist alone in-themselves, lacking any constitutional relationality to one another or to God. Creation appears at this level to be crafted from little bits of nothingness.

Once we become aware of the second birth, we can begin to see the false images that are formed when the first level is taken in isolation. Instead of taking the things in creation to be timelessly determined images or ideas in our minds, we can begin to appreciate that every created thing is an individual hypostasis with form or nature and movement or mode of being. The form is what is general or common to the class of things and the movement or mode of being is what distinguishes each particularly by way of its relations in the world⁴.

⁴ This characterization is related to Peirce’s notion of categories. The general form belongs to the category of thirdness, the mode of being belongs to secondness, the individuality of the hypostasis belongs to firstness.

18. What has Christianity to do with physics?

Each hypostasis has its proper degree of indetermination, according to its kind. The indetermination of an electron, for example, is its location and orientation in spacetime. Each hypostasis also has its proper degree of determination. The determination comes from the communion of hypostases through their collective habits or patterns or laws. The determination and the indetermination are interwoven. The general habits or patterns or laws establish a common *external* form or nature for each hypostasis but that form or nature has its proper *internal* degree of freedom that is commensurate with the external form. With electrons, for example, the external form is the spacetime metric which forms a geometry of formal relations. But, unlike the case of the Astronomer's geometry of complete determination, this geometry remains open because the hypostases of which it is formed possess an interior indetermination. For example, electrons are indeterminate according to the form of a "quantum bit", where a bit is that by which opposites can be differentiated as opposites.

What holds together the determination and indetermination is light. Light mediates actions and reactions between hypostases by way of synchronicity. In light we can see the trace of Trinity, the logic of three. Light enables hypostases to communicate with one another in order to sustain their common and general forms through which they are constituted. This communication is the communication of signs which relate interior indetermination to exterior determination. *The Logos of light is word.*

In this way of thinking, we arrive at an understanding of the universe as a creative process that is mediated by light. Hypostases or logoi, oriented to light, work communally to create and sustain general forms and these forms in turn allow new logoi to come into being. For example, simple quanta, like electrons, create and sustain spacetime which allows the emergence of the more complex physical things we find in our cosmos. The third birth reveals that this creative movement finds its eternal fulfillment and rest in God who is the Light.

Such is the mystery of the One.

Bibliography

Primary

Maximos the Confessor. *On the Difficulties in the Church Fathers: The Ambigua*. Vol 1 and 2. Edited and translated by Nicholas Constas. Cambridge: Harvard University Press, 2014.

Secondary

Saint Athanasius the Great of Alexandria. *On the Incarnation*. Translated by John Behr. Yonkers NY: St Vladimir's Seminary Press, 2011.

Augustine. *The Trinity*, second edition. Translated by Edmund Hill, edited by John E. Rotelle. New York: New City Press, 2012.

18. What has Christianity to do with physics?

The Early Christian Fathers: A selection from the writings of the Fathers from St. Clemens of Rome to St. Athanasius. Edited and translated by Henry Bettenson. Oxford: Oxford University Press, 2010.

The Later Christian Fathers: A selection from the writings of the Fathers from St. Cyril of Jerusalem to St. Leo the Great. Edited and translated by Henry Bettenson. Oxford: Oxford Press, 1970.

Chrysostom, John. *The Homilies of S. John Chrysostom Archbishop of Constantinople on the Epistle of Paul the Apostle to the Romans.* Translated by John Henry Parker. Oxford: Baxter, 1861.

Tertiary

Balthasar, Hans Urs. *Cosmic Liturgy: The universe according to Maximus the Confessor.* Translated by Brian E. Daley. San Francisco: Ignatius Press, 2003.

Loudovikos, Nikolas. *A Eucharistic Ontology: Maximus the Confessor's eschatological ontology of being as dialogical reciprocity.* Brookline MA: Holy Cross Orthodox Press, 2010.

Toronen, Melchisedec. *Union and Distinction in the Thought of St Maximus the Confessor.* Oxford: Oxford University Press, 2007.

Physical Formation

DRAFT

19. A thought experiment with light: how the ontological form of quantum mechanics is consequent to the principles of relativity theory

An imaginative exploration of space and time in which light mediates the relationship between finitude and the Infinite. Light becomes the creative source through which interiority and exteriority are manifested and brought into synchronicity as time, space and mass. The exploration probes the relational logic of relativity theory using the meta-physical insights of Augustine, Hegel, Levinas, and Peirce.

In the beginning

Imagine we are together in a spacecraft, far from earth or any other massive body. Suppose we take ourselves to be hurtling through space at a constant velocity. From what we see around us, how would we know we are travelling at a constant velocity? Perhaps the distant stars could serve as a guide. Like the stalling of waves into the horizon on the sea, the movement of the stars at ever increasing distance will be stilled into a spherical panorama. The “stalling” occurs because linear velocities are bounded by the speed of light while angular “distances” increase without bound. This enveloping, three-dimensional horizon will be like a fixed globe. Though it may revolve, the distant stars will maintain their relative positions or constellations to ever increasing accuracy the farther away they are. If we speed up or slow down, the globe *as a whole* will be altered because the Lorentz transformation will cause stellar aberration. The constellations will contort. So by careful attention to the horizon surrounding us, we can determine if we are accelerating linearly or travelling at fixed speed. Rotational motion will likewise manifest as rotation of the distant globe as a whole.

Now imagine that we are hurtling through space at twice the velocity as before. If our velocity is constant, how is this journey any different? Again the enveloping horizon will form a fixed globe, although the constellations may have a different contortion. The speed of light will be the same. Even if some nearby objects may move more or less quickly than before, these objects are random and particular, so what universal meaning would there be? Can it not be said that the two situations are identical? This is the principle of relativity. If we are only concerned with our spacecraft, it makes no sense to speak of “traveling at a constant velocity” or of “hurtling through space”. In both and indeed all instances of non-acceleration, we are just sitting there watching the show.

Velocity is a relative concept and before we can speak of velocity, we need to identify an index or *origin* with respect to which velocity can be defined. The distant stars can tell us about acceleration, but not about velocity. For the time being, we seem to be the only viable option

for an origin. We remain at the centre of our coordination system and there is only our coordination system to speak of. And it makes no sense to talk about us as moving *through space*.

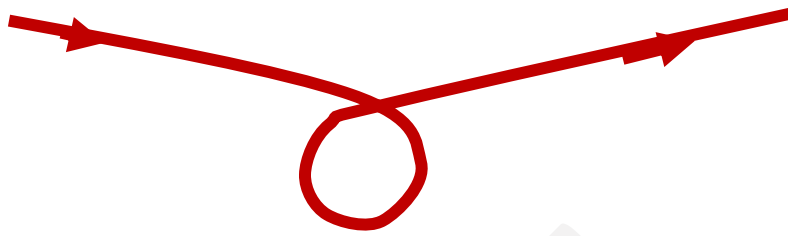
We need an origin before we can speak of time and space. And time and space will be specific to that origin. So what? Can't we just choose any old point in space and time to define an origin? Isn't that what we do when we create a frame-of-reference? But how are we to find such a point? Sure, when Newton's Absolute space and time ruled the day, there was an underlying framework such that any point could be an origin. But with relativity theory that framework is gone. Perhaps there aren't any "points" out there? After all, the point is really a Euclidean image and we know we are not exploring Euclidean space. If points are not out there, ready at hand as it were, for us to rest upon, what do we mean by an origin and how does relativity theory allow us to speak of such a thing?

Perhaps we should explore this a little further. What instantiates an origin as an origin for a frame-of-reference? With Newton's theory, was it not the earth itself which provided a stable reservoir of imaginative points at rest—a *geo-metry*? And wasn't his Absolute space an extended metaphor in which the vehicle was the fixed ground upon which we walk (inner space) and the tenor was so-called "outer space"? But here in our spacecraft the earth is far away and we are trying to explore the starry sky on its own terms, to the extent of our ability.

Let's return our attention to the distant horizon surrounding us in order to get our bearings. This globe does provide a reference for acceleration as we discussed earlier. But as for velocity, with respect to the horizon it is *undetermined*. Before, we might have taken that to mean that there was a whole set of possible frames-of-reference for an infinite set of possible constant velocities all of which were indistinguishable and one of which was selected. But now I am suggesting we only take this to mean that our velocity is not established by the horizon and perhaps it has no universal meaning. Nonetheless, there was a very interesting thing we noted about the horizon earlier. When *we* accelerated, *it* moved. This is a strange horizon indeed, because *it reflects back to us our own action*. Perhaps we ought to be careful, then, that we don't project ourselves onto the horizon and mistakenly assume something is happening *out there* when, in fact, it is happening *right here*.

Well, there we go again using Euclidean metaphors. The distant horizon is not "there" in a purely spatial sense, because as we look farther out into the horizon we are also looking further back in time. The horizon that envelopes us points *to the beginning*. The stars we see in our horizon are present to us as they were in the distant past when their light began its journey to us. And we are also present to other stars in the future as part of their distant horizon when our light reaches them. So there is a sweeping arc of light, as it were, from the beginning to our here-and-now and then back out to the ends of space and time. And all of this is present to us now—from the beginning to the end—although only partially and in reflection as we noted above. This is very different from the empty theatre of space which Newton invented to embed a universe. What should we call this arc if not the origin of our origin?

Figure 1: The arc of light



Horizon of “the beginning” → Here-and-now → Towards “the end”

Perhaps, then, there is a sense in which the dynamic of light sustains our presence here-and-now as an origin for a frame-of-reference. This dynamic brings us into relatedness with the horizon that surrounds us and that horizon points back to the beginning as original presence. The mediator of this relatedness is light.

Light as paradox

Light is what connects us to our horizon. Perhaps we might think of it as a sign of the absolute. For example, a second principle of relativity tells us that the speed of light is *invariant* in any frame-of-reference that is moving at constant velocity. Invariance or “without change” can be a signifier of universality, so light might also be a helpful guide to us in our journey. Notice, however, that we already seem to be muddled again in our metaphors because earlier we said that it may make no sense to talk about “moving at constant velocity” and, apparently, light is in agreement with this suggestion. Perhaps it is wiser to say that light, like the horizon, allows us to determine when we are accelerating and when we are not accelerating. Is it not as if light mediates for us inertia or “rest” as a *special* form of relationship with the Infinite?

We said earlier that light comes to us from distant stars and gives us information about how they were long ago. This way of speaking seems to make sense to us. But does it make sense to light? What I mean is that from the perspective of our spacecraft as an indexical reference, the statement has a particular meaning. But what might be said about the perspective of light itself? Undoubtedly we are entering into difficult territory here because the so-called “perspective of light” confronts us with an implicit infinity that is part of what we mean by saying that light is a sign of the absolute. To grapple with the theory of relativity is to grapple with the meaning of this encounter with “infinity”. And we need to be careful that we don’t assume this encounter will be formally the same as Euclidean geometry, since we know that the Euclidean formalism does not apply here. We also need to be careful that we don’t project

too much of ourselves onto “infinity” as we grapple with what is before us, although some projection is unavoidable.

So, please bear with me. Imagine, now, that we are travelling on a beam of light from a distant star to our spacecraft. How might we describe this? From our material existence, light is also a horizon that cannot be reached—it is a horizon for the relative motion of two material objects with respect to one another. In order to imagine the “perspective of light”, suppose we start by considering what happens as a second object moves towards us with a speed that approaches that of light. From our vantage, time will slow down for the other object and spatial intervals will contract in the direction of motion. In the limit that the speed of light is reached, there will be no passage of time and the spatial interval between the star and the spacecraft will become nil. So, what we might say from our vantage is that *for light* there is no space nor time interval in its journey from the star to the spacecraft. This comes from the principles of relativity theory. For light, the star and the spacecraft are in *immediate proximity*. But how can this be? How can it be that light brings the horizon of the stars—the beginning—into immediate proximity with us and yet we think of this horizon as far, far away? To continue with the thought experiment, suppose we reflect that light back out into space and it hits another star. Again there is no time nor space interval for the light. Let’s call the first star A, the second star B, and our spacecraft C. From the “perspective of light” there is a way in which $A=C$ – this we will call an identity because there is no time nor space interval for change. But from light’s perspective it is also true that $C=B$. And yet, it would seem that A is not equal to B because they are different stars (or perhaps the same star in a different state if we reflect the light directly back on itself.)

At first blush, it appears that we may have encountered a contradiction. If two things are equal to a third, aren’t they equal to one another? The contradiction may be partially resolved by recognizing that the third is actually not self-identical. In our thought experiment, an *action* occurred on the spacecraft in that the beam of light was reflected back. While this may allow us a temporary sigh of relief, the difficult problem of the proximity of light is not going to disappear. Here is why. If we return to our spacecraft, light is our only immediate guide to coordinate a frame-of-reference for our journey. But in trying to coordinate a frame-of-reference we must act and any action will mean that we are non-self-identical. There will be a gap, as it were, an indeterminacy surrounding our action that cannot be eliminated. *So we cannot use ourselves as a determinate origin.*

It may take some time to realize what a profound challenge this is. That’s because we are so accustomed to assuming identity (of things or of ideas) as a foundation or ground for systems of states or knowledge. If nothing is self-identical then won’t we be lost in an abyss of change? Isn’t this what the deconstructionists are on about? All is relative, arbitrary and meaningless. Yet, in the theory of relativity, this is not the case –light comes to us as a sign of the absolute. To understand this sign, however, we may have to struggle with the primordial aspects of identity and difference.

Self emptying

Perhaps we ought to vigorously object to this way of thinking because we haven't defined what it is that is identical when we say $A=C$. Indeed, we are playing a bit of a trick here by trying to define identity almost like a verb before we define what the noun-things of identity are. But can we really ignore that there is a deep problem here? For example, imagine that we try to reduce the material objects (spacecraft and stars) to featureless points: A, B, C. If they are featureless, then identity means identical and not just identical in some way. However, light, which is our sign of the absolute, does not appear to obey the laws of traditional binary logic. We appear to have the case that: A is identical to C and C is identical to B, but A is not identical to B. So perhaps we were right, there are no points out there and we would do well to dispense with this Euclidean image. But we also may be encountering a breakdown of the law of the excluded middle, because here C both *is and is not* C. In the discussion above, we introduced the concept of action to get as this "non-identical identity".

One approach open to us is to try to sort out this mess by careful attention to elements, definitions and the avoidance of contradiction. This is the approach usually taken in relativity theory. Here I propose we take a different approach. When we encounter contradiction, let's remain open to the possibility that this encounter is actually an encounter with the limits of our conceptual or logical framework. Such an encounter I will call a *paradox*. Whereas normal contradiction suggests we have made a logical error within our existing conceptual or logical framework, paradox suggests that our framework itself is inadequate and must be overcome. In other words, normal contradiction implies that we should correct or *fix* the way we are thinking, while paradox suggests that we should *unfix* the way we are thinking. Such "unfixing" involves identifying fixed *patterns of thinking* within the logical framework (that lead to paradox) and then relinquishing them. In this spirit, let's continue to explore how light might provide us with an identity operator in which non-identity is also implicit. What I mean by this is that we consider light to contain within itself the principles of both identity and non-identity (equality and in-equality). Also what I mean by this is that light obeys a threefold logic which transcends the binary logic that underwrites Euclidean geometry and differential calculus.

Another way to come at the impasse is to recognize that we are grappling here with the nature of "negation". Negation—including what we mean by "zero" or the "null operator"—is a tricky (non)concept because it lies between *finitude* and the absolute or *infinity*. The former is the domain of our world and our thoughts and is determinate. The latter is always beyond, transcendent and indeterminate. Negation, however, is between—partly determinate and partly indeterminate. It is "formless-form" or "formed-formlessness". Newton's Absolute space, and the calculus which underwrites it, is one approach to negation, the key to which lies in our experience of the earth as fixed space. Relativity theory brings forth a new approach to negation, the key to which lies in our interaction with light. And it is very important to bear in mind that negation carries with it—like traces or echoes—a priori categories or "prejudices" of the finitude from which it is derived. Negation is like "self emptying", which can bring into

awareness the “ground” of the system, the “world”, the “space” in which “self” is embedded (while at the same time pointing beyond the determinate limit of that space).

Relinquishing the Euclidean Point

Let’s return our attention to the distant horizon that surrounds our spacecraft. Now imagine the spacecraft is rotating uniformly. The rotation will be apparent because the horizon will be seen to rotate about us as a whole. Rotation *differentiates* our spacecraft and the horizon bringing each into relationship with the other. A complete revolution brings us back to the *same* configuration of fixed stars in relation to our inner spacecraft. In this manner the *interior* of the spacecraft can be brought into synchronicity with the *exterior* horizon. The period of a complete revolution marks a return to the same. This repeating cycle of Return creates a measure of temporality for our spacecraft as an origin. Because of the differentiation and return to the same that is inherent to circular motion, proper time might be said to be instantiated. Moreover, this proper time depends on, and in a sense belongs to, interiority. Let’s call this instantiated temporality “Duration”.

Rotation also creates two fixed points on the surrounding horizon which define the axis of rotation. As the spacecraft rotates, the distant stars trace circles. The closer a given star is to the fixed point, the smaller the diameter of the circle it traces. Conversely, stars found further from the fixed point trace larger circles. Following an angular arc from one fixed point (say above) to the opposite fixed point (say below) we can infer that there exists a plane perpendicular to the axis of rotation that acts as a divide, differentiating the upper hemisphere from the lower hemisphere. This plane *bifurcates* the horizon into two hemispherical domains each with its own fixed point.

What we are imagining here is a symmetry creating action—namely rotation—that differentiates interior and exterior and brings them into relatedness as temporality or Duration. This symmetry creating action further projects onto the horizon two fixed points and their domains of circular motion. The two fixed points can be joined by an imaginary axis of rotation which is *a line that cuts through the interior of our spacecraft as origin*. Transverse to the fixed points is a blurry plane of bifurcation that is not disambiguated.

Now imagine there is no spacecraft.

What I mean here is that we imagine removing the determinate aspects of the spacecraft in such a way that we are left only with the broken symmetry stripped of all extraneous trappings. The bare *re/action* which creates orientation about an origin. Let this origin become for us a new image that replaces the former image of a featureless point which dominates Euclidean geometry. Unlike a Euclidean point, the origin has interiority. It is *in*-formed. The determinate aspect of this *in*-formation is exactly reflected in the external horizon. Light, as it were, separates interior and exterior by bringing the distant horizon—the beginning of creation—to

the inner horizon of the origin. At the risk of getting ahead of ourselves, might we not say that the origin is like a gap which rests on the edge of spacetime?

Similarly we might imagine harmonic motion as another form of re/action. Going back to our spacecraft, imagine we are vibrating uniformly along an axis. Vibration involves acceleration and so will be apparent by the changes we can observe in the horizon—stellar aberrations, for example. However, since vibration returns to itself regularly—like rotation—the changes will be cyclical. From observation of the stars, we can identify an axis of vibration and a smeared out or blurred plane transverse to the axis. This gives to our origin a sense of *extension* along the axis of vibration. Might it also be called mass? It is important to note that extension comes about because of a relationship between interior and exterior. It does not exist *in-itself*, but rather is a consequence of the relationship of the interior of our origin with the distant horizon. But the distant horizon is also in relationship with other origins. So extension, and mass, might be seen to be a consequence of the inter-relatedness of the ensemble of origins *as a whole*. But again I fear we are getting ahead of ourselves.

Return as the formal bearer of identity/difference

Light is the connector which brings interiority into determination and relation with exteriority. Light is creative in the sense that it allows the formation of an origin whose interior is related to the exterior.

In our exploration of “origins” we identified two elementary processes or stationary modes. *Rotation*—which manifests duration and orientation—and *vibration*—which manifests extension (space). Now let’s explore how these two stationary modes might be unified in light. We seek unification in light because we are taking light as a sign of the absolute.

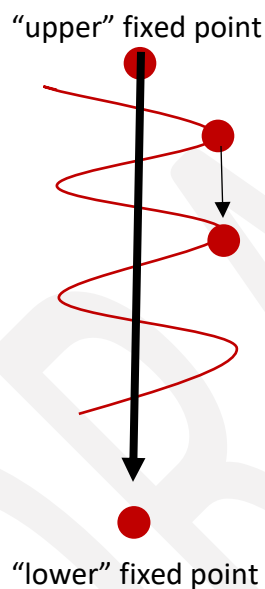
To the extent that it might be possible, imagine again that we are travelling with a beam of light. Strap yourself down because this is wild ride that will horribly mix Euclidean and non-Euclidean metaphors with the hope that we come out with something helpful at the end.

Recall that when we explored the distant horizon with our spacecraft we identified two fixed points that defined an axis for rotation or vibration which cut through the interior of our spacecraft. If we now imagine we are travelling at the speed of light along this axis, the two fixed points will be merged together because the Lorentz contraction annihilates the distance between them. Additionally, light will compress spacetime into a two-dimension plane. That is to say, the beam of light will manifest the pure, unified form of the “fixed point” and of the “blurred plane” which we discovered in our exploration of rotation and vibration. If we were to image a simple collapse we would be left with quite a mess because there would be no capacity for differentiation of the plane. If, however, the light beam rotates around the axis of motion as it collapses spacetime, then a form of differentiation becomes possible. Let’s call this “spin”. This differential operator is quite different from the one invented by Newton because it does

not pre-suppose identity. In other words it both differentiates and unifies at the same go. It is *creative*.

Bear with me here. Light is a proximity operator. From the perspective of light there is no passage of time nor separation of space. So light might be taken as an operator that brings origins into immediate contact. It gives them *sameness*. This is a global or universal operation. To get a handle on what we might mean by this, try to imagine the way light might compact or enfold the universe into a “blurred” plane. The transverse layers of the universe would be rolled up in a spiral along the axis of rotation for light as represented in Figure 2.

Figure 2: The Collapsing of Spacetime at the Speed of Light



As the spiral collapses, “origins” or domains parallel to the axis collapse onto each other. They are brought into immediate “proximity”. In this sense they are identical. However, they are also differentiated because of the rotation of the light. There is a phase transition between the two instantiations of “origin”.

If you are saying to yourself now that this is a crazy way to think about the situation I would be inclined to agree. How can there be any meaning to this construction where origins (and aren't we really talking about points anyway?) are said to be the same and yet different, collapsed and yet not collapsed? I would be inclined to agree, that is, if there were no precedent for this type of thinking. *But there is a precedent.* What I have drawn above is analogous to the plane of complex numbers.

And what I want to say is this: Whereas the ontological form of *discrete* objects is represented by natural numbers, and the ontological form of the space/time *continuum* is represented by real numbers, so light's *reflexive* ontological form is represented by complex numbers. In this way of thinking, we might see a problem with the Euclidean point as a metaphor. It accords with the ontology of natural numbers (that is, objects); whereas if we are to understand the role of light in relativity theory, we need to unpack the ontology represented by complex numbers, which unites and in a sense fulfills the discrete and continuous forms. And this will lead us to an understanding of the ontological form of quantum mechanics.

Synchronicity

Newtonian mechanics is contingent on a Euclidean form for space and time. A central metaphor in this framework is the "point", an ensemble of which becomes the featureless ground of objects and objectivity—the differential geometry of space and time. The differential operator, as an imaginary limiting form, becomes the passive, inert connector of points and, by extension, objects. This sets up for us a "self image" (point) and "world form" (spacetime geometry) against which we are trying to think in this exploration. In the Newtonian framework interiority, exteriority and their connector or mediation are all abstracted from a form of "nothingness". Yet this "nothingness" is a determinate, closed form—the empty vacuum. And, like the self image of the point, this totalizing form of nothingness is also assumed to be "given". Through our exploration of light we seem to have arrived at another possible metaphysical framework through which interiority, exteriority and their mediation are interwoven in an open and creative process. What is the nature of being or substance for this framework? What is the ontology of relativity theory?

Instead of starting with a self-same image, like the Euclidean point, we started our exploration by focusing on mediation—the connector between our horizon and our immediate presence. Light was identified as the bearer of this mediation or relation. Light creates symmetry by creating interiority and exteriority and bringing them into relation through an indexical origin. We identified "Return" as an original form. Through Return, identity and difference are brought into determination in and through their relatedness. The concept of phase, which is constitutional for complex numbers, provides a means to represent the form of Return.

In the previous section, we explored one stationary mode of return, namely spin (which is like rotation). As action, the "spin" of light is an original form of *in-formation* that brings into being time, identity, difference and orientation. The way it brings these into being is by allowing the formation of an *origin*. Unlike the Euclidean point, an origin has an indeterminate interior. In this simplest case, the indeterminate interior possess spin. This indeterminate interior exists in relation to its exterior which is both the bearer and the enabler of interiority.

Starting from the original form, the universe as it were, becomes populated with instantiated images of the original form. These images have extension (mass) which is a form of resonance

with the horizon and with one another. Such images can become material origins for spatial and temporal coordination. A material or instantiated origin is borne by the distant horizon and comes into determination by synchronization with other origins. Light mediates this synchronicity of elemental in-formation by mediating response and counter response between instantiated origins as re/action couplets. Spin determines orientation and duration, both of which are local degrees of freedom which are limited/defined by the whole ensemble of origins.

The interiority of each instantiated origin is in immediate proximity with other origins *and* with the distant horizon through the mediation of connectors of light. This relatedness is a triadic logic involving the Same (*identity* or Firstness), the Other (*difference* or Secondness) and the horizon that enables and sustains Return (*reflexivity* or Thirdness). Triadic logic involves the exchange of in-formation through sign-bearing processes. The simplest example of a sign-bearing process is spin. Sign-bearing processes bring the interior of each particular origin into an external and generalizing system of synchronization, such as a spatiotemporal system of coordination.

Reflection

Let's return to our spacecraft. Earlier we noted that there is a relationship between the action that occurs in the spacecraft and what we observe in the distant horizon. For example, when we rotate, the distant horizon rotates. When we vibrate, the distant horizon vibrates. The symmetry principle at work here is *reflection*. Our action is reflected in the distant horizon.

Reflection is the creative principle of extension.

Why do I say this? Let's again imagine ourselves travelling on a beam of light. As the light rotates and compresses spacetime, it brings "origins" (we are using this term in place of the loaded term "points") into proximity as schematically shown in Figure 2. Separation along the axis of rotation (which is also the axis of motion) is annihilated as we discussed earlier. Transverse to the axis of rotation we are left with a ring, or rather concentric rings, which fill the transverse, un-disambiguated plane.

But how does this play out for us in the spacecraft as the light overcomes us in moving from the upper hemispherical fixed point towards the lower hemispherical fixed point along the axis of motion that cuts through the centre of our spacecraft? While the vantage of light is a complex plane, from the vantage of the spacecraft light compresses space and time, moving from a distant past towards a distant future as represented in Figure 2. It is not just a spatial compression, it is a compression of space *and* time. Recall, the fixed point in the upper hemisphere belongs to the "horizon of the beginning", whereas once light overcomes us it moves into the future, towards "the end" as represented in Figure 1. For light, this slice of spacetime is all in immediate proximity. For us, in the spacecraft, the past is compressed into

the future. It is important to note that the fixed point we see in the lower hemisphere is not the fixed point towards which light is actually travelling; the fixed point we can see from the spacecraft actually belongs to the past, to the horizon of the beginning, to the Origin and not to the future, to the end, to the Terminus.

So it is a bit misleading to think of light as compressing into a “plane” in the Euclidean sense, because there is an inherent, unexpressed orientation to the plane of light, an orientation that marks movement from the past towards the future, from the Origin (the beginning) towards the Terminus (the end). Unlike Euclidean geometry in which the Origin and the Terminus are identical, with relativistic spacetime the Origin and the Terminus remain differentiated, even in the Infinite limit. The plane of light cuts the past from the future *for us* at the same time that it orients us to “above” and “below” as different directions.

How is this process unified? What holds together the differentiated Origin and Terminus? What is the principle of identity at work here?

From the vantage of our spacecraft, we considered light travelling from the upper hemisphere into the lower hemisphere. Yet, we might equally well have considered light travelling from the lower hemisphere to the upper hemisphere. These two possibilities reflect one another and create a binary dialectic of orientation along the axis of motion of light, an orientation that is either upwards or its reflected image of downwards depending on which of the two possibilities is at play.

Now try to image again that there is no spacecraft.

What are we left with? Are we not left with a pure dialectic of orientation along an axis of motion? The unification of the Origin and the Terminus—a unification in the Infinite “distant horizon”—enables and sustains the instantiation of a un-disambiguated binary dialectic (up or down) along a particular axis while at the same time blurring the transverse plane because that plane lacks orientation (it has no orientation operator). This *interior* dialectic is contained as an instantiated domain, an indexical origin for a coordination system. *And this indexical origin is an image of the Infinite horizon.* The likeness of image and prototype is found in the binary logic of opposition, a logic that is only potential until it becomes expressed in a particular instantiation, a particular image.

Resonance and extension

Let’s try to get a handle on how the image might become instantiated.

Recall that a beam of light coming from the upper hemisphere is compressed into a complex plane oriented in such a way as to differentiate upper and lower. As the light rotates and compresses spacetime, separation along the axis of rotation (which is also the axis of motion) is

annihilated as we discussed earlier and represented by Figure 2. Transverse to the axis of rotation we are left with a ring, or rather concentric rings, which fill the transverse, un-disambiguated plane.

Let's consider one such ring. The ring will form an enclosure about the axis of rotation which creates a separation between the interior and the exterior for the transverse plane. The "interior" is the circular domain containing the axis of rotation and the "exterior" is the open domain formed by the transverse plane with a "hole" cut out of its centre. (Perhaps we should say a "w/hole"?) The ring represents a single period of rotation for the light which we called the "spin".

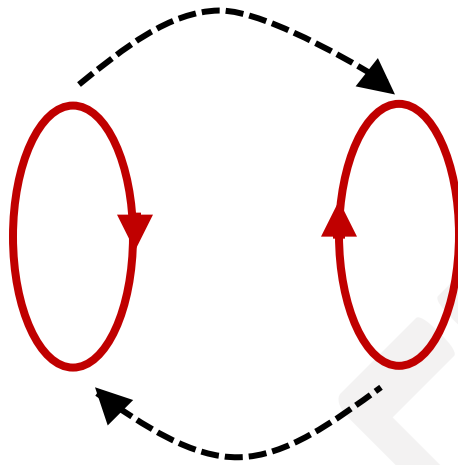
But the beam of light can rotate multiple, and indeed an infinite number of times about its axis. So the single ring also represents multiple rings (a consequence of the "collapsing" of spacetime into a two dimensional complex plane as represented in Figure 2.) Let's take this to mean that a single ring can be *in proximity with* any number of other rings of the same "diameter" and centred around the same axis of rotation. This relationship of proximity we will call an *identity*.

A similar compression would happen for a beam of light travelling in the opposite direction, from the lower hemisphere to the upper hemisphere.

These two complex planes can be synchronized *through reflection*.

Consider two rings of the same diameter in reflective proximity with one another, one from the upper plane and one from the lower plane. Each rotates with same period T which is the fundamental temporal operator and is determined by the spin of light. *The relationship of proximity will bring the two rings into synchronicity*. Might we not represent this in the following way? A single revolution around the first ring is followed by a jump to the second ring. Then there is one complete revolution around the second ring followed by a jump that returns to the first ring.

Figure 3: Creation of a Finite Domain by Light

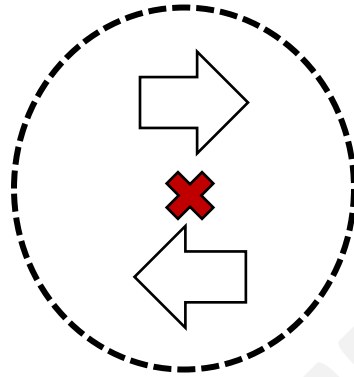


Rings—as boundaries for open domains—resonate between two reflected planes of light with opposite orientations.

Note that *three* processes of Return are involved here: the revolution about the first ring, the revolution about the second ring, and the jump return between the first ring and the second ring and back again. The last revolution is actually bifurcated into two symmetric jumps. If we were to synchronize this bifurcated process with the original beam of light, might we conclude that the period of this double movement is twice the period of the light beam, or that the double movement has spin $\frac{1}{2}$?

Might we also conclude that it has the topological form of a “spinor” in the sense that two rotations are required before there is a return to the “same”?

Figure 4: Reflection as the creative principle of extension

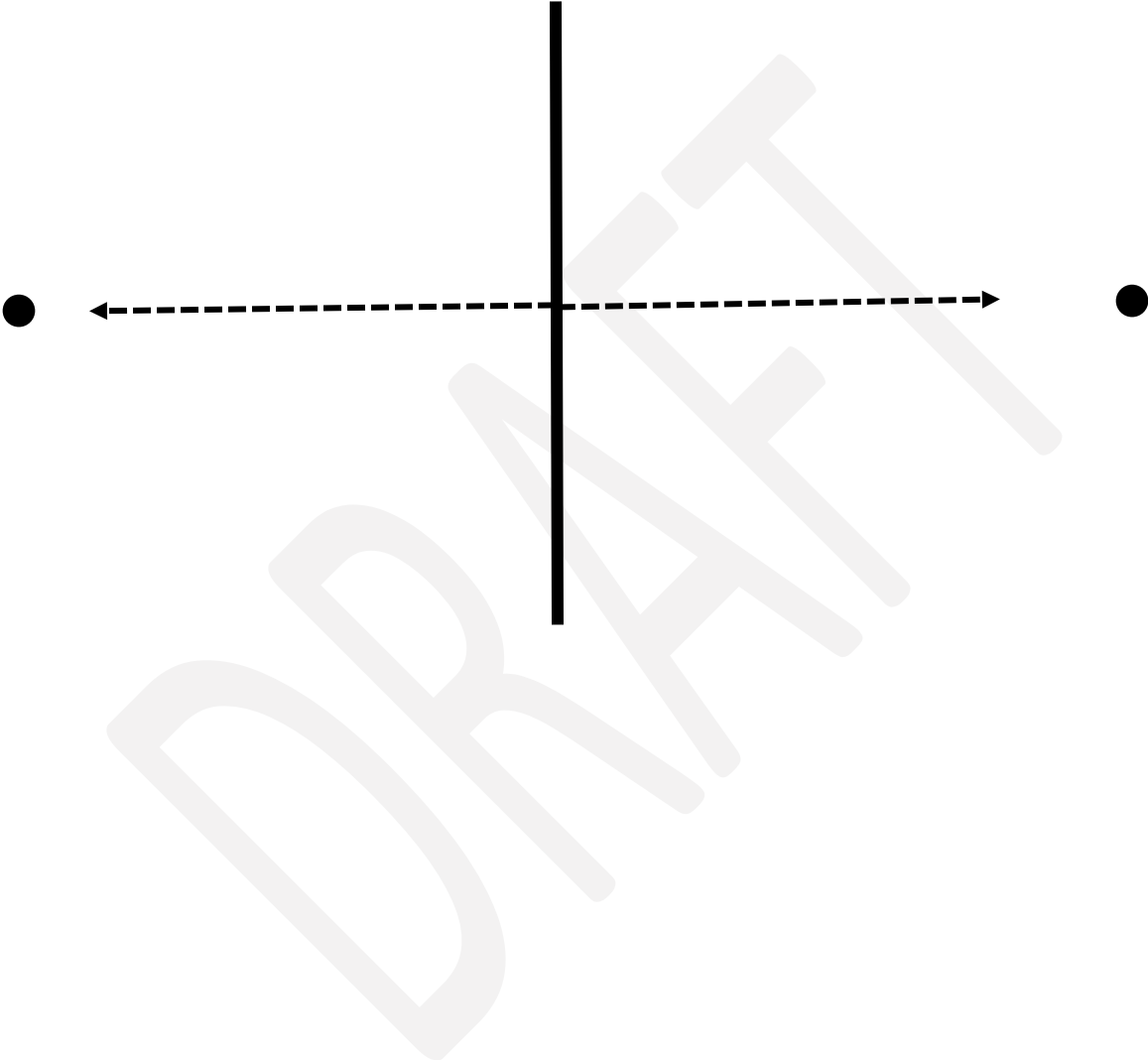


The process I am trying to describe here involves the “holding together” of an open domain by the Infinite horizon of light. It is a particular form of relationality by which an image of the Infinite is instantiated and endures as an origin of rest or inertia. However, unlike the featureless Euclidean point, this domain of rest, this indexical origin, has interiority in the form of un-disambiguated binary opposition or resonance.

Recap

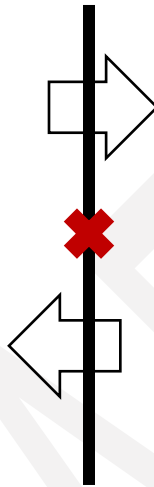
Let’s return to the vantage of our spacecraft, which I will now call the “outer world view”. In our exploration, first we considered rotation in the outer world view. We identified two fixed points on the horizon which were related to the axis of rotation. We identified concentric circles around each of these fixed points about which the stars revolved and a transverse plane that bifurcated the horizon into two domains, one for each fixed point, such that each side of the transverse plane “pointed” to a different fixed point. Before we thought of these fixed points as “upper” and “lower”, but now lets just represent them as “left” and “right” because in the course of our thought experiment we have brought them into an equality.

Figure 5: Outer World View



Second, we considered the mediating form of light through which the two fixed points were merged and spacetime collapsed into a two dimensional plane.

Figure 6: Mediating Plane of Light



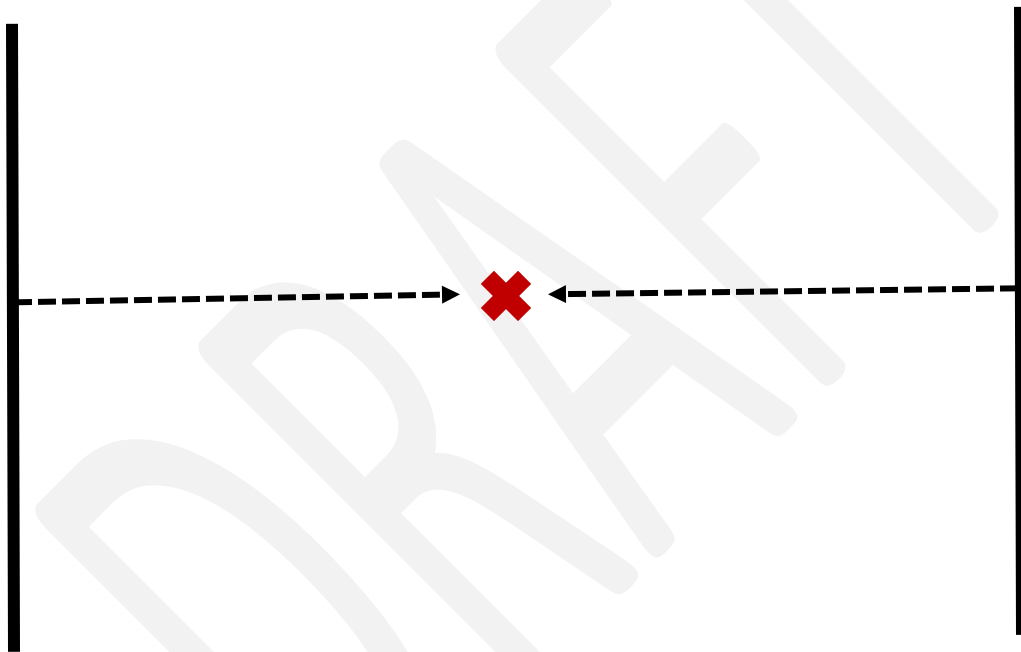
From the vantage of light, the collapse has the form of a complex plane as represented in Figure 2. The two external fixed points at infinity (the “beginning” and the “end” in Figure 1) are brought into proximity at the origin of the complex plane. *Yet they remain distinct.* The distinctness of the two fixed points is the genesis of asymmetric temporality (duration) which allows us to speak of the “motion” of light as motion from ... towards ...

From the vantage of our spaceship, there are two possible ways spacetime might collapse into a complex plane of light. Light might travel from the upper (now “left”) fixed point to the lower (now “right”) fixed point, collapsing the four dimensional spacetime into a complex plane oriented to the right. Or light might travel from the right fixed point to the left fixed point, collapsing spacetime into a complex plane oriented to the left. In this sense the complex plane is different from a normal Euclidean plane because it possesses the potential for disambiguation—the creative operation of orienting. The Origin of the complex plane is not a Euclidean point. It possesses within itself an inherent, unexpressed symmetry principle that only becomes expressed when the complex plane is disambiguated into a four dimensional spacetime manifold. This inherent, unexpressed symmetry is the *orientation* of the travelling beam of light. It is the orientation of the axis that connects the left fixed point with the right

fixed point. Orientation belongs to the interior perspective, the perspective of our spacecraft. Light has within itself the creative principle of orientational symmetry, but orientational symmetry must be disambiguated by the interior domain of our spacecraft in order to be *realized*.

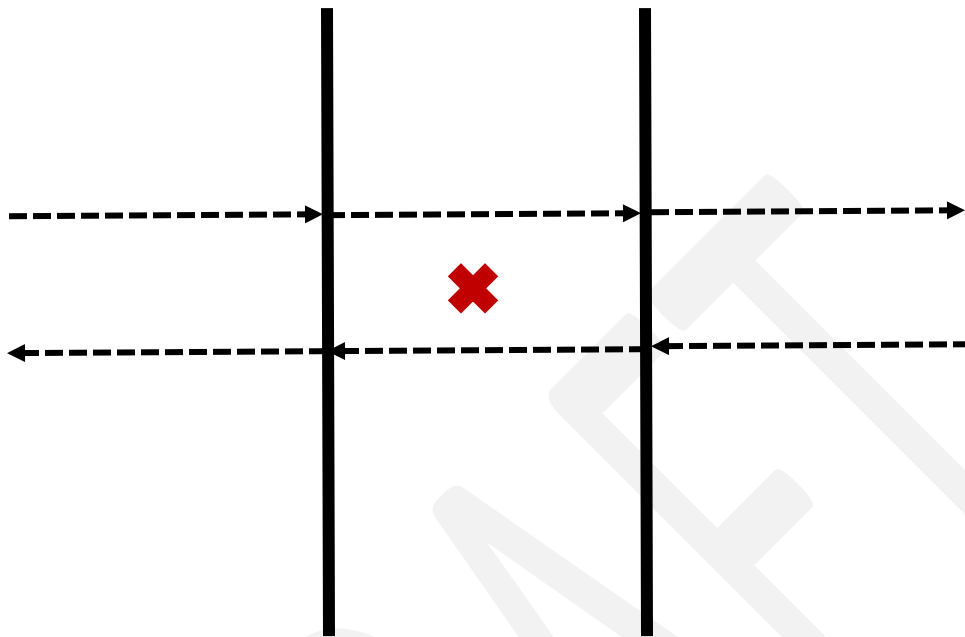
Third, through reflection, we arrived at an “inner world view”—the image of the Infinite—in which there is one fixed point at the origin (a reflection of the distant horizon) and two transverse planes pointing towards one another.

Figure 7: Inner World View (Image)

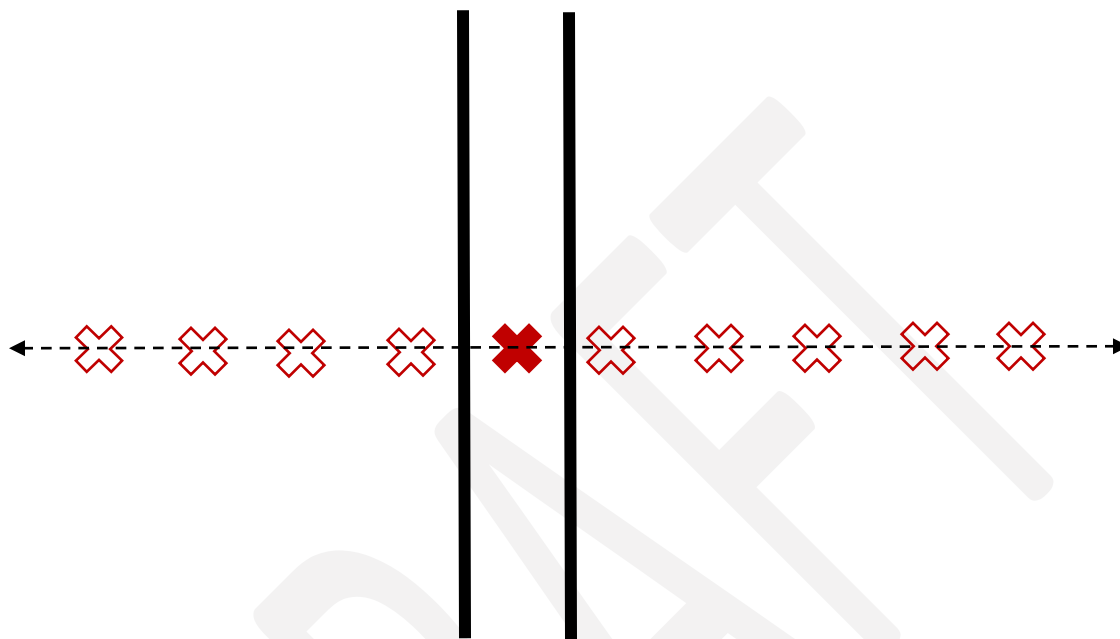


Finally, however, the Outer World View and the Inner World View can be synchronized by the Mediating Plane of Light. This will result in a “standing wave” in which two planes of light are oriented in opposite directions

Figure 9: Synchronized Reflection



However, the situation is quite different than the way we normally think about standing waves, because here *it is the origin that causes the wave to interfere with itself*. This “self-interference” comes about because of the doubling nature of reflection and it causes an outward radiation of fixed points. In this way might we say that extension is synchronized? Would not the separation of the fixed points be determined by the radius of the “rings” and might we not connect this with the notion of mass?

Figure 10: Instantiated origin for the coordination of space and time**Generality**

Our thought experiment seems to lead us to the following conclusion. Through a process of synchronization, reflection interiorizes the distant horizon as an origin. The origin is a spinor or fermion which is both a doubling and an inward enfolding of light. This origin is creative, resulting in the outward propagation of equidistant fixed points which represent images of the localized reflection process. In a sense, then, light results in the *creation of spatial extension*. This symmetry creating process involves spin about an axis of orientation that is synchronized with resonant linear reflection or vibration along this axis. The instantiated origin might be said to have a (rest) mass which is related to the period of vibration or resonance. This period of vibration might also be taken as indicative of the local or proper time. But it is also important to recognize that we are not speaking here of determinate rotation and vibration within some externally defined measure of space and time. We are speaking about the *limits of determination* that sustain any origin as an indexical origin for coordination of space and time. This limit of determination comes from the spin of light as mediator of synchronicity.

19. Thought experiment with light

Having imaginatively instantiated an origin, we are now poised to consider the coordination of space and time. Such a coordination process will involve the mutual interactions of two or more origins through the mediation of light. One way to think of this is to take each origin to have interior degrees of freedom (related to orientation and displacement) which only come into determination through the resonant relationship it has with other origins. So the degrees of freedom for a differentiated origin are determined by its relationship to other differentiated origins. Light mediates this inter-relatedness of action and re-action.

However, there is no such thing as an origin-in-itself. An origin, as a differentiated origin for the coordination of space and time, exists in relationship to other origins of differentiation. The individuality of a specific origin—to the extent that it can be individual at all—comes from the dyadic relatedness of this indexical origin with “others” of the same. This dyadic relatedness, in turn, depends on the mediation of light, not only among dyads, but also with the “origin of origins”—what we have been calling the “distant horizon”. This latter mediation establishes the interpretive framework or *world* in which origins are created. The mediation of light establishes *the ensemble of origins as an interpretive system*. A particular origin is embedded in a generalizing system through the triadic logic of relational meta-physics.

In our simple thought experiment, we have imagined the instantiation of an origin for the coordination of space and time. This origin only exists in relation to other origins and coordination only happens by virtue of the inter-relatedness of origins. Let’s consider the interaction between two such origins represented graphically below:

Figure 11: Coordination of multiple images of the origin



Each origin has a repeating resonant structure which is the manifestation of the symmetry of reflection. What is important to note is that there are two different ways in which these origins

might then synchronize the “distance” between them through the proximity of light. Each way might be called an “interpretative framework” for synchronization.

1. A standing wave might be established between them such that there remain a fixed number of nodes separating them. This is an external synchronization of the fixed space between them. It will result in a discrete measure of that space since there is no way to differentiate the in-between of the nodes. Such a measure is often called wavelength.
2. Their interior phases might be brought into synchronicity such that they continuously differentiate one from the other. This is an internal synchronization of time. It will result in a continuous measure of relative momentum.

By bringing a third origin into the description, it might then be possible to look at the way in which these two interpretative frameworks are inter-related. First, let’s consider the third origin to be another instantiated origin like the other two. Beginning with our indexical origin we can establish a standing wave pattern with the second origin which can serve as the calibration of spatial extension. Between the second and third origins there will be the creation/annihilation of spatial nodes which can be measured by using the calibration relationship. Alternatively the phases of the indexical and second origin can be synchronized such that the continuous differentiation of the third in relation to them can be measured. The first method will establish a measure of spatiality as exterior synchronization and the second method will establish a measure of momentum as interior synchronization. But can these two frameworks be united? How would we do this if not by considering one of the three origins to be the distant horizon? And if we try to do this, won’t we find that the commensurability of the two interpretative frameworks will remain perpetually frustrated because the distant horizon is open and creative, rather than closed and deterministic. In other words, the uncertainty that exists in trying to harmonize the two frameworks—namely the Heisenberg uncertainty—is indicative of the essence of light as creative and open. *Principia Mathematica* reveals for us the limits of our finitude.

Mass and gravity

In the final movement of this étude, let’s imagine a very massive body in the universe, say like the Sun. By massive we mean that the body consists of a large number of origins (open domains or images) that are highly synchronized with one another and with the distant horizon. There is such an overwhelming exchange of light between the open domains constituting the body and with the horizon that a spatio-temporal field of coordination is created for this body which we are taking as an index. *The body forms a system.*

Or, to flip this way of thinking around, let’s define “very massive” to mean that space and time are highly coordinated in the neighborhood of the body as an index. Because space and time are highly coordinated, we don’t have to concern ourselves as much with the fine details that are consequent from the “blurriness” of extension, neither in space nor in time. Additionally

19. Thought experiment with light

we are considering an index that synchronizes in three-dimensions, rather than the single dimension described above.

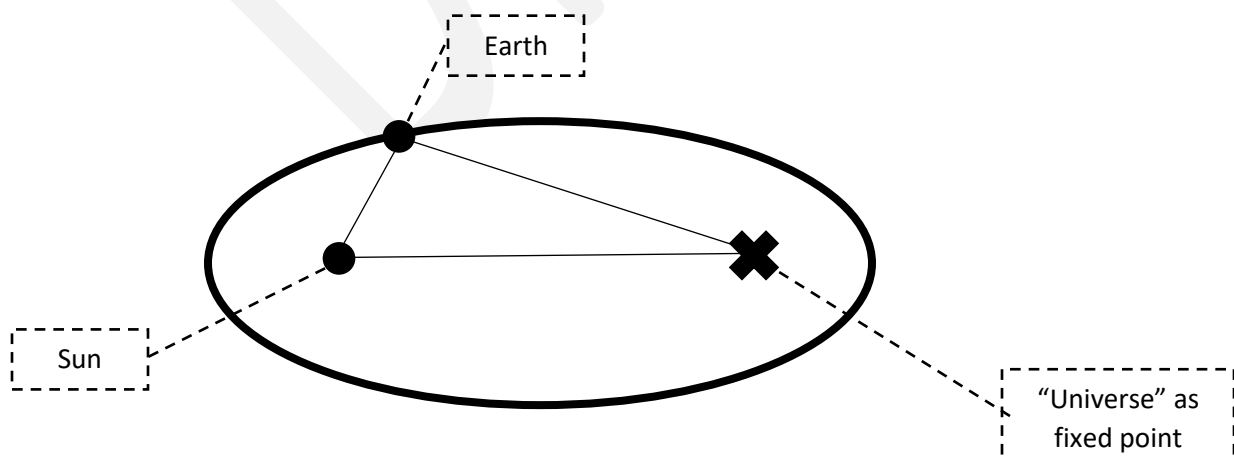
Let's also imagine a second very massive body with similar properties, say like the Earth. Now we ask the question: how do the two massive bodies become coordinated relative to one another? This question is concerned with a *three-fold* relationship involving the Sun, the Earth and the Distant Horizon.

Perhaps you feel this thought experiment is illegitimate because we are speaking about "highly correlated" as if we knew what that meant, when spatio-temporal coordination is really the core problematic of this exploration. Such skepticism is quite appropriate. I can only ask that you bear with me again as we park this concern for future consideration.

Suppose we take the Sun to be very massive, even in relationship to the Earth. Then, the Sun and the Distant Horizon will be coordinated through the exchange of light. Let's take this relationship as our indexical relation. The Earth will be brought into relationship by a double exchange of light, both with the Sun and with the Horizon. In this way we might begin to see that the core relationship in this model universe is the Sun as same, the Earth as Other and the Distant Horizon as Universal third party. The mediator of the relationship is light.

The synchronicity of light now manifests as a cycle of return from the Sun to the Earth to the Distant Horizon and back to the Sun. This cycle is an invariant. The situation we are describing might be represented by an ellipse where the Sun is one focal point and the Distant Horizon or "Universe" is the other focal point.

Figure 12: A mean field model of the solar system



The key property here of the ellipse is that the path of return from one focal point to a point on the ellipse to the second focal point and back is a constant. The fixed distance between the foci establishes the indexical relationship of spatial separation or *extension* and the return path of light establishes a corresponding measurable temporality or *duration*. The elliptical movement of the Earth becomes its determined degree of freedom.

And so we have arrived at Kepler's orbit. But perhaps with a new perspective. The orbit is not embedded in Newtonian's Absolute space and time. Rather it is the relationship between the Sun and the rest of the universe (the Distant Horizon), through the exchange of light, which establishes a spatio-temporal coordination system *for the motion of the Earth*. We have approximated this by representing the "Universe" as a ghost image of the Sun at the other focal point of the ellipse. This, of course, is an approximation. But what is interesting is that the orbit is actually a many body system involving an index (the same, Sun), an other (the Earth) and the whole (the universe of all stars). And the dynamics of this many body system is mediated by the proximity of light. And to the extent that we imagine the universal fixed point as "nothingness", we return to the closed, lifeless mechanical model of Newton.

Parting words

I hope you have enjoyed this imaginative journey through math and metaphor. I'd like to leave you with some parting words which might perhaps trace our exploration together:

*blue water stilled
in the precise horizon of another blue;
dance of broken light*

References

Augustine. *The Trinity*. Second Edition. Ed. John E Rotelle. Transl. Edmund Hill. New York: New York City Press, 2012.

Bohm, David. *The Special Theory of Relativity*. New York: Routledge, 1966.

Hegel, GWF. *Phenomenology of Spirit*. Trans. by AV Miller. Oxford: Oxford University Press, 1977.

Levinas, Emmanuel. *Otherwise than Being or Beyond Essence*. Trans. Alfonso Lingis. Pittsburgh: Duquesne University Press, 2002.

Peirce, Charles Saunders:

5. *Evolutionary Love*, Monist III(1), 1892. [Available January 8, 2015: <https://archive.org/stream/C.S.Peirces5FamousTheMonistPapers/5.EvolutionaryLove1893#page/n0/mode/2up>].
6. *Law of Mind*, Monist II, 1891. [Available January 8, 2015: <https://archive.org/stream/C.S.Peirces5FamousTheMonistPapers/3.TheLawOfMind1892#page/n0/mode/2up>].
7. *The Architecture of Theories*, Monist I(2), 1891. [Available January 8, 2015: <https://archive.org/stream/C.S.Peirces5FamousTheMonistPapers/1.TheArchitectureOfTheories1891#page/n0/mode/2up>].
8. *A Guess at the Riddle*, 1887-8. [Available January 10, 2015: <http://www.iupui.edu/~arisbe/menu/library/bycsp/guess/guess.htm>].

Zajonc, A. *Catching the Light: The entwined history of light and mind*. Oxford: Oxford University Press, 1993.

20. Is Dretske's theory of information naturalistically grounded? How emergent communications channels reference an abstracted ontic framework

By bringing together Dretske's theory of knowledge, Shannon's theory of information, and the conceptual framework of statistical physics, this paper explores some of the meta-physical challenges posed by a naturalistic notion of semantical information. It is argued that Dretske's theory cannot be said to be naturalistically grounded in the world described by classical physics and that Dretske information is not consistent with Shannon information. A possible route to reconciling Dretske's insights with Shannon's theory is proposed. Along the way, an attempt is made to clarify several points of possible confusion about the relationships between Dretske information, Shannon information and statistical physics.

“In the beginning there was information. The word came later.”
—Fred Dretske, Preface to *Knowledge and the Flow of Information*

Introduction

In his book *Knowledge and the Flow of Information*, Dretske claims to present a theory of meaning, belief and (true) knowledge that is naturalistically grounded in the sense that these interpretative processes develop out of “lower-order, purely physical” mechanisms. The keystone of his theory is a notion of objective information that bridges physical and semantic realms, so that information becomes the raw material from which “meaning, and the constellation of mental attitudes that exhibit it”, are manufactured [Dretske pvii]. Dretske describes his project as an exercise in material metaphysics and although he acknowledges the project is ambitious—“perhaps *too ambitious*”, he writes—the book is a tour-de-force that pieces together a theory of meaning from the law-like regularities of the material world.

But do the pieces really fit together? My claim is that, from the perspective of the physical sciences, Dretske's material metaphysics is too naive for such an ambitious project. In developing his theory, Dretske tacitly assumes a world of everyday objects and relations, which are physically well-defined, separable and enduring, and which obey exceptionless lawful regularities regardless of whether or not such regularities are known or articulated (i.e. the lawful regularities refer to the world-itself and not the world-as-it-is-understood). He works within the framework of a “classical” ontology in which objectivity, states of affairs, separability, analyticity and a host of other properties can be assumed from the outset. Dretske also imports a very restrictive notion of the lawful regularity of the material world. The problem is that our current understanding of the physics of the world will not support the demands that

Dretske places on material metaphysics in order for his theory to hang together. If the notion of “naturalistically grounded” is taken in the narrow sense of grounded in the physical sciences, Dretske’s program *doesn’t work*.

This paper explores some of the metaphysical challenges that a naturalistic notion of semantical information poses by bringing together Dretske’s theory of knowledge [Dretske], Shannon’s theory of information [Shannon], and the conceptual framework of statistical physics [Reichl]. Specifically, it addresses the question: To what extent, if any, is Dretske’s *instantiation* of an informational relationship consistent with Shannon’s *measure* of information and (classical) statistical physics’ *definition* of entropy? My hope is that the language of statistical physics can provide an overarching framework to clearly cross-reference the commitments and commensurability of these three programs. I argue that Dretske’s theory cannot be said to be naturalistically grounded in the world described by classical physics and that Dretske information is not consistent with Shannon information. I explore a possible route to reconciling Dretske’s insights with Shannon’s theory. Along the way, I try to clarify several points of possible confusion about the relationships between Dretske information, Shannon information and statistical physics.

Physical Laws and Tolerable Uncertainty

Dretske’s theory rests hard on a particular notion of lawful regularity underwriting the physical realm. The world, according to Dretske, is parsed into objects, events or states of affairs and information in the world is contingent on the existence of “lawful (exceptionless) dependence” between two or more such parsed out elements. This lawful regularity must be independent of any knowledge or articulation of the laws. It also must be error-free. Given a source of information s , and a signal r , Dretske defines informational content of the signal in the following way:

A signal r carries the information that s is F = The conditional probability of s ’s being F , given r (and k), is 1 (but given k alone, less than 1) [Dretske, p64].

Here k refers to what the receiver already knows about the possibilities at the source—an aspect that can be ignored in the present discussion, since my concern is with semantical information in the absence of knowers. Dretske further goes on to clarify his notion of conditional probability:

In saying that the conditional probability (given r) of s ’s being F is 1, I mean to be saying that there is a nomic (lawful) regularity between these event types, a regularity which nomically precludes r ’s occurrence when s is not F [Dretske, p245].

The world in which Dretske’s theory applies must possess laws to which there can be no exception *in principle*. And these laws cannot be contingent on any interpretive process—at

least not in any naïve way—inasmuch as contingent laws cannot be the basis for their own existence. It is such foundational laws that have the requisite modal qualities—they constrain absolutely what *would* happen under certain circumstances and what *could not* happen under *any* circumstances—and the requisite intentional qualities—they are not simple a set of de facto correlations. According to Dretske, the intentional qualities of the laws provide the foundation for the semantic nature of information. Information “inherits its intentional properties from the lawful regularities on which it depends” [Dretske p77] and because of information’s intentional properties it can support notions of belief and knowledge [Dretske, p171+]. The notion of error-free lawful regularity is essential to Dretske’s program. Dretske writes: “Information is what is capable of yielding knowledge, and since knowledge requires truth, information requires it also.” [Dretske p45]. The truth condition of information, for Dretske, is intimately connected to that fact that “If a signal carries the information that *s* is *F*, it must be the case that *s* if *F*.” [Dretske, p63-4]. And this, in turn, he connects with the conditional probability for law-like regularities being exactly unity [Dretske, p66].

How, then, can it be said of Dretske’s theory, that it is “naturalistically grounded”? In which naturalistically grounded programs are the two requirements for Dretske’s theory to be found—namely classical ontology and exceptionless laws? To better frame this question, it is helpful to differentiate two different categories of lawful behaviour that might obtain in a physical system, which I will somewhat arbitrarily call empirical and fundamental laws.

Empirical laws are laws that are *taken to be pragmatic*, approximate descriptions of the inhabited world. They are contingent on the framework in which they are articulated and make no claims of exceptionless regularity. Ohm’s Law is an example. In the first instance, this law expresses a linear relationship between electrical voltage and current, where the linear coefficient is the resistance. But more accurately, Ohm’s law is a linear approximation to a more accurate (and non-universal) description of how voltage and current vary in particular materials, a description that further ignores the effects of induction and capacitance. No material on earth is perfectly resistive. No material on earth obeys Ohm’s law. But under certain circumstances the higher order contributions can be ignored and the “law” is applicable to within a limit of *tolerable uncertainty*¹. The physical laws governing everyday objects and relations are almost universally empirical in this sense. (In the next section I will discuss why this is the case.) Empirical laws do not meet the necessary conditions for Dretske’s theory because they are not error free and they do not bear perfect counterfactual correlation. Therefore, Dretske’s theory cannot be said to be grounded in the world described by earth scientists or meteorologists or engineers or any other empirical scientists who work with laws that are taken to be pragmatic and approximate descriptions. This argument against empirical

¹ Some argue that Ohm’s law should not be considered a law at all, because it is not universal. Instead the equation describing the linear relationship between voltage and current should be considered a definition of resistance that applies to a certain class of materials, under a certain range of conditions, and to within a certain degree of accuracy.

laws as an adequate naturalistic grounding for Dretske's theory is based on the pragmatic way that laws are used. At the risk of crushing under the full weight of epistemology, I want to say the real issue here is the nature of truth conditions. For Dretske, the lawful regularity is the source of truth conditions, whereas with empirical science, truth conditions come from a relationship between the laws and the inhabited world.

In fact, the most likely candidate for naturalistically grounding Dretske's theory is the world described by "fundamental physics", where the fundamental laws are *taken to be exceptionless* or absolute in a sense roughly similar to Dretske. And, more specifically, the world described by *classical* physics, where a classical ontology is also assumed. Even though we no longer believe that classical physics describes the world we live in, it can be said to describe a "possible" world (or ontic framework) and we can say of that world, that it has fundamental laws. This leads to a central question of this paper—Can the world (ontic framework) described by classical physics ground Dretske's theory? If Dretske's theory is not adequately grounded in this ontic framework—which is both classical and absolutely lawful—then the claim that Dretske's theory is naturalistically grounded in any scientific program is significantly challenged.

The Phenomenology of Channels and States

By requiring exceptionless lawful regularity between states of affairs, Dretske places very severe demands on material metaphysics. The challenge, which I will explore in this section, is that the parsing of the world into states of affairs and the lawful regularities that are exhibited by such states of affairs are intimately interwoven. In the everyday world that Dretske is describing, both are approximate and neither meets Dretske's conditions for semantical information².

*Equilibrium Thermodynamics and the Parsing of States*³

Equilibrium thermodynamics describes *macroscopic* physical systems, which are systems that contain a large (enormously large) number of degrees of freedom. An example of a macroscopic system is a "box" (eg. a closed container) filled with "particles" (eg atoms) which interact through (potentially exceptionless) laws. The box itself may be completely closed and isolated (micro-canonical ensemble) or it may interact with an external, time-invariant environment through the exchange of energy (canonical ensemble) or through the exchange of particles (grand canonical ensemble). However, regardless of the boundary conditions of the

² I apologize for the length of this section, but I feel it is important to lay out this program carefully as there is a lot of confusion in the literature around the "physics" of information.

³ This discussion is based on a standard reading of statistical physics, such as L.E. Reichl, *A Modern Course in Statistical Physics*.

box, the system is assumed to be in equilibrium, which means that it is left alone for a (very long) period of time in an environment whose properties do not change.

The remarkable property of a macroscopic physical system in equilibrium is that it settles into a time-independent, *macro-state* that is characterized by only a few “state” (i.e. macro-state) variables—such as volume, pressure, temperature, entropy—despite the fact that the microscopic description of the system (at the level of individual particles) is dynamical and is characterized by an enormous number of microscopic variables. The macro-state variables that characterize the macro-state can be related to *averaged* properties of the particles or micro-states—averaged over time, for example, or over the different micro-states that are possible. Moreover, these macro-state variables are linked by an “equation of state”, like the ideal gas law, such that the macro-state variables can fully describe relations between equilibrium macro-states. (Of course, the microscopic dynamics determine these “empirical” relations between macro-state variables, such as the equation of state.) Pragmatically, thermodynamic macro-states can change too, but only over very long time-scales, such that, at each moment in time, the macroscopic system remains in equilibrium with its surroundings (the so-called quasi-equilibrium approximation).

The upshot is that, for macroscopic physical systems in equilibrium, the ontic framework is *parsed* into two levels of lawful regularity, characterized by two different spatio-temporal scales:

1. The *micro-state* is a complex description of the simultaneous position and momentum of each particle in the system that varies rapidly in space and time.
2. The *macro-state* is a simple description of the average behaviour of the system (over the dimensions of the “box) which does not vary over space or time. (Or varies uniformly over such a long time-scale that the system is always in equilibrium with its surroundings.)

The macro-states are characterized by *constraints*, which are typically connected to boundary conditions with a homogeneous time-independent environment. An example of a macroscopic constraint is a *closed and isolated* system, which does not interact with its environment either through the exchange of energy or the exchange of particles. For this case the total energy E is fixed. The micro-states are characterized by *probabilities* that they will be realized for a given macro-state. For the example of an isolated system, the total energy E is constrained so only micro-states with energy E can be realized and such states are all equally probable (by assumption).

The macro-state variables can be related to the micro-state variables through averaging, where the averaging can be over time or over different micro-states that are possible for a fixed macro-state (an “ensemble” average). These two averages are equivalent if the system is ergodic. The equivalence allows time averages (that can be measured in the lab but not calculated) to be replaced by ensemble averages over all accessible micro-states (that can be

calculated but not measured). One such average relationship, which is pivotal for Shannon's theory of information, is the entropy S , which can be defined as:

$$S = -\sum p_i \log(p_i) \quad \text{Equation (1)}$$

Where p_i is the probability of micro-state i and the sum is over the ensemble of all possible micro-states. For a closed and isolated system, the micro-states have equal probability $p_i=1/w$, where w is the total number of accessible micro-states and the entropy reduces to $S = \log w$. In this situation amount of entropy S associated with the macro-state is related to the number of "accessible" micro-states.

The replacement of time averages by ensemble averages is a central trope of statistical physics. This equivalence is only well-defined when the macro-system constraints are independent of time (i.e. equilibrium systems). As discussed below, for a time varying macro-system, the whole program of replacing temporal averages with ensemble averages may not be well grounded. Consequently, the interpretation of "entropy" can be problematic, since the appropriate ensemble, with respect to which entropy is defined, can be ambiguous. Likewise, if, along with Dretske, a specific micro-state is said to be an *instantiation* of the system, then it is necessary to differentiate whether the instantiation is in time, or within an ensemble, and, if the latter, the constraints defining the ensemble must also be specified. These different notions of instantiation should not be assumed equivalent.

*Microscopic Laws and Macroscopic Laws*⁴

Because the macro-variables are related to the micro-variables in a statistical manner we can distinguish two types of lawful behaviour appropriate to the two levels of description—a distinction that is crucial to Dretske's theory of information.

The lawful regularities that describe the evolution of micro-states (in classical physics) can be taken as *fundamental* and *exceptionless* in Dretske's sense. That is, there can be a lawful regularity between two micro-states m_1 and m_2 , such that the conditional probability of m_1 given m_2 is 1. However, such exceptionless lawful behaviour only obtains in a "micro-canonical ensemble" where the macro-state is *completely closed and isolated* from the environment (world)⁵. For such a system, the lawful regularity is the lawful classical dynamics that describe the evolution of a system of particles from one initial state to another. These laws are deterministic in the sense that, once the micro-state is specified (as an initial condition, say), all

⁴ This discussion is limited to laws of interaction. It is beyond the scope of this paper to address laws of symmetry, such as relativistic invariance.

⁵ For a classical world, probably the only example of a true micro-canonical ensemble is the "universe" for that world. Parsing the universe into sub-systems will bring forth some amount of uncertainty however small.

other micro-states are known by virtue of the classical laws. Therefore, the specification of any one micro-state includes *all* possible information about the system for *all* time. The laws are exceptionless but there is no longer the concept of a “possible” state, because all states are fixed once one state is fixed. There is no “valency” or degeneracy to the micro-states⁶. The notion of information, which is based on the reduction of uncertainty among possible states (i.e. reduction of “multi-valency”), becomes a vacuous concept:

In the limiting case, when the probability of a condition or state of affairs is unity [$p(s_i) = 1$], *no information* is associated with, or generated by, the occurrence of s_i [that condition or state of affairs]. This is merely another way of saying that no information is generated by the occurrence of events for which there are no possible alternatives (the probability of all possible alternatives = 0). [Dretske, p12].

Once the constraint of isolation is removed from the system, there is an interaction with the environment which introduces uncertainty into the evolution of the micro-states. (For example, the system may be in contact with a heat bath that exchanges energy with the system.) For such *non-isolated* systems, the conditional probability of m_1 given m_2 can never be exactly 1. There will be an element of uncertainty in the interaction with the environment, which cannot be eliminated from the description. If the system is not completely isolated, Dretske’s exceptionless lawful behaviour no longer obtains between micro-states⁷.

On the other hand, the lawful regularities that describe the macro-states are derivative and based on statistical properties of the micro-states. They are obtained in the idealized “thermodynamic limit” of infinite size, infinite time, ergodicity and no changes in the macro-state or in the environment. This idealized limit is never expected to manifest physically—it is taken to be *an approximation*. For example, in the micro-canonical ensemble discussed above, the macro-state is completely isolated from the environment (world). Therefore it *cannot change*. One might trivially say that, for such an isolated system, the conditional probability of macro-state M_1 at time t_1 , given the state M_2 at time t_2 is 1 because they are the same state by definition. But in such equilibrium, nothing can be said to “flow” from one state to another. In order to get macroscopic dynamics, the constraints must be lifted so the system is “slightly” out

⁶ This discussion is restricted to classical dynamics and I am sweeping under the rug some significant issues that can be associated with the notion of determinism in chaotic systems. Interestingly, quantum mechanics does admit exceptionless lawful behaviour and multi-valency, although it does not readily admit isolated states of affairs.

⁷ Even in the case of an isolated system, the macroscopic behaviour is derived by “coarse-graining” or partitioning the microscopic system to a finite level of resolution. Such coarse-graining “smears” the micro-states, introducing uncertainty and irreversibility. The exceptionless lawful behaviour of the micro-states requires us to observe all the microscopic degrees of freedom. It also requires that there be no chaotic dynamics. But “as soon as we violate these conditions and observe the world at a finite level of resolution (no matter how accurate), chaotic dynamics ensures that we will lose information and entropy will increase” [Bais, p27]. The nature of subjectivity itself may be the culprit here.

of equilibrium. An amount of uncertainty is introduced, from the environment for example, which can be made arbitrarily small, although it *can never be zero*⁸. This introduction of a small amount of noise, equivocation, or uncertainty is not a problem for statistical physics because it can be managed—the impact on the macro-state can be kept within a limit of tolerable uncertainty. However, “tolerable uncertainty” in lawful regularities is a problem for Dretske’s theory of information because Dretske requires laws with *absolutely no uncertainty* so that he can corral all uncertainty into higher order mental attitudes such as meaning and belief. If uncertainty is part of the laws—such that conditional probabilities relating states of affairs are less than unity—then the truth-value of the semantic content of any informational relationship that derives from those laws is uncertain and there is no Dretske information.

From the point of view of equilibrium theory, only completely closed and isolated systems can possibly exhibit the exceptionless lawful regularity that Dretske invokes as the origin of intentionality in informational relationships. But completely closed and isolated systems do not admit multi-valent micro-states at the level where this regularity is found and therefore information cannot be said to flow between different micro-states. And at the macroscopic level, closed and isolated systems do not exhibit any change in the state of affairs over time, once again eliminating such systems as potential carriers of information.

Non-Equilibrium Systems

What I have roughly sketched out above is a rigorous formalism for understanding how “approximate” macroscopic laws can emerge from “fundamental” microscopic laws (in a classical system). The formalism shows how and when uncertainties are manageable—why, for example, uncertainties (at the microscopic level) don’t cumulatively build errors into the description until all lawful behaviour is erased (at the macroscopic level). This rigorous formalism is very specific in its application, which is to systems in equilibrium. However, the general program—namely that macroscopic laws can be seen as approximate and averaged consequences of more fundamental microscopic laws—is a powerful way to understand how the approximate (empirical) law-like behaviour in our everyday world of objects and relations might be based on fundamental (microscopic) laws. Even in non-equilibrium, this program is expected to have teeth, although considerably more challenges emerge that further frustrate the certainty in law-like behaviour.

There are a few key points to this program to bear in mind:

- The macro-state is isolated from its environment in some way. This isolation can happen as a result of constraints imposed on the overall system or through emergent collective properties or through global conservation laws or ...

⁸ This is called the quasi-static or quasi-equilibrium approximation.

- The macro-state is not isolated from its environment in some way. This allows the environment to impinge on the macro-state to bring about macro-dynamics. It also introduces some level of uncertainty in the lawful regularity of the micro-states.
- The macro-states parse the system so that there is an exterior (the environment) and an interior (the micro-states defining the macro-states).
- There is a (sometimes diffuse) boundary that, in some systems, can potentially differentiate and identify a set of macro-states as a macro-object (such as a chair, a puppy or a rock).
- The laws describing macro-states and macro-objects have some degree of uncertainty which, although it may be arbitrarily small in some circumstances, cannot be zero.

Non-equilibrium systems can manifest more robust relations at the macroscopic level than equilibrium systems. For example, we can imagine a system in which two spatially separated macro-states, each with its own set of micro-states, interact through an environment which contains “everything else” as shown in Figure 1.

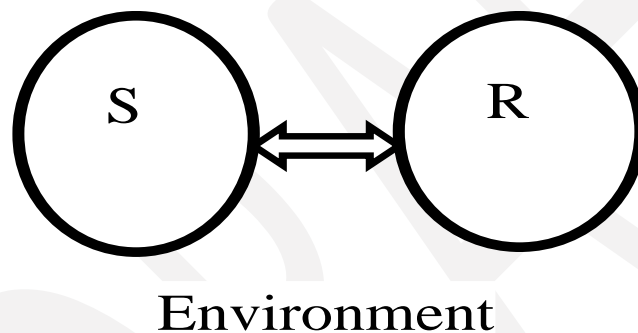


Figure 1: Non-equilibrium system parsed into two macro-systems plus their environment

In this situation, there are fully two levels of dynamical description, with distinct spatio-temporal scales. At the “macro” level, there are two (partially isolated) dynamical sub-systems S and R that can interact with each other through a pathway or “channel” that involves the macro-states of each system as well as the environment. Because of this interaction, the variables defining the macro-state can change (which was not the case in equilibrium). Therefore, at any instant we can speak of a macroscopic State of Affairs that specifies the value of the macroscopic variables for each of the two macro-systems. Depending on the overall system, there may be a lawful regularity between the States of Affairs of the two sub-systems, although for the reasons discussed above, such a lawful regularity would not be fundamental or exceptionless. The “channel” would then be the mediator of the regularity. On a much faster timescale, each “fixed” macroscopic State of Affairs involves a highly dynamical set of micro-states. So each *specific* macroscopic State of Affairs involves an *ensemble* of microscopic states

of affairs (eg. quasi-equilibrium approximation.)⁹. It is important to conceptually differentiate the “States of Affairs” at the macroscopic level from the “states of affairs” at the microscopic level. According to the classical ontology in which we are working, only the latter can be said to exhibit exceptionless lawful regularity.

Grounding Dretske’s theoretical framework

I have been trying to present a coherent story of how “laws” observed in an everyday (macroscopic) world might be naturalistically grounded in a classical system of fundamental, exceptionless, lawful behaviour at the microscopic level. By naturalistically grounded, I mean, among other things, that there is no artifice of observer interaction, cognition, subjectivity, mental states, calibrations, etc. I have been working from the framework of a ruptureless, externalized objectivity, much the same as Dretske claims to do. The macroscopic lawful behaviour can therefore be taken as an emergent phenomenology that can be derived (more or less) mathematically from the statistical behaviour of classical particles given some basic assumptions about their interactions.

Well, this is almost true, anyway. If nothing else, this story shows that naturalistically grounding a theory with exceptionless laws does not come easily. And, where there has been some success, it has been at the expense of admitting a tolerable level of uncertainty. If Dretske’s theory cannot tolerate uncertainty (however small) in the lawful relations defining information, statistical physics suggests that it is unlikely his theory can be naturalistically grounded. The central problem is that Dretske’s theory requires laws with “certainty” (exceptionless laws) acting on states with “uncertainty” (multivalent states). However, classical physics can only provide laws with certainty acting on states with certainty and/or laws with uncertainty acting on states with uncertainty. That is to say, uncertainty enters into the states and the laws at the same level of description. The conceit of fundamental physics is that all other natural sciences (which only involve physical mechanism as per Dretske) are derivative, so, from the perspective of physics, Dretske’s program is not grounded in any classical, naturalistic framework.

The Physics of Information Flow

Entropy is the link between statistical physics and Shannon’s notion of information. Recall that in the case of the micro-canonical ensemble above, the entropy was related to the number of

⁹ Here the notion of entropy gets tricky because the system constraints are no longer fixed. What constitutes the time independent ensemble if the constraints vary in time? Pragmatically, the evolution of the macrosystems must be “slow enough” compared to the dynamics of the micro-states that the system is continually sampling the whole ensemble of accessible states at each “macro-instant” in time—but please don’t ask me to define what is meant by “macro-instant”.

accessible micro-states [equation (1)]. In this system, for a fixed set of macro-variables (i.e. fixed macro-state) there are a range of possible micro-states that the system could realize (i.e. an ensemble). Entropy can be thought of as a particular measure of the size, or “valency”, of this ensemble. Equivalently, if all that is specified is the macro-state, there is an uncertainty or unpredictability about which micro-state is realized at any given time, since it *could* be any one of the micro-states from the ensemble. We can only speak of the *probability* that a specific micro-state will be realized, given the macro-scopic constraints of the ensemble. (In the case of the micro-canonical ensemble, all micro-states are equally probable, but this is not always the case.) As I explore in this section, the definition of entropy is connected to such measures of uncertainty and unpredictability.

Shannon Information

The leap to a notion of information comes from the following observation: if the system is *actually* in a specific micro-state then the uncertainty of the system has been reduced because it cannot be in any of the other micro-states. Knowing the actual micro-state provides *information* about the system in the sense that it reduces uncertainty. The amount of Shannon information depends on the number of accessible micro-states out of which the actual micro-state was selected. Entropy can be used as a measure of this “amount” of information. “The important innovation that Shannon made was to show that the relevance of the concept of entropy considered as a measure of information, was not restricted to thermodynamics, but could be used in any context where probabilities can be defined” [Bais p19].

Shannon information, like entropy in statistical physics, concerns a constrained macrosystem that has a range of possible states (s_1, s_2, \dots, s_n) whose probabilities of occurrence are ($p(s_1), p(s_2), \dots, p(s_n)$) – i.e. an ensemble. For such an ensemble S , the average amount of information generated is defined as:

$$I(S) = -\sum_i p(s_i) \log(p(s_i)) \quad \text{Equation (2)}$$

The Shannon ensemble is a much more general concept than the equilibrium ensemble of thermodynamics. It can involve any physically constrained system in which the dynamics are limited to a range of possible states with fixed probabilities. Unlike with statistical physics, where the ensemble is an emergent property of more fundamental, physically-determined micro-dynamics and related boundary constraints, with Shannon communication systems, the ensemble and its dynamics are given by construction—an *ansatz* or *a priori* set of conditions—which may or may not involve the action of conscious agents.

Shannon information is a property of a dynamical process. Although, along with Dretske, it is possible to associate an amount of information generated by the occurrence of a specific event s_i , as $I(s_i) = -\log(p(s_i))$, Shannon’s theory is not concerned with the occurrence of specific events.

It is concerned with the communication of a message as a temporal sequence of events. For Shannon, an information generating system is a constrained ensemble of events or accessible states that is ergodically sampled over a sufficiently long time that the trope of replacing temporal averages with ensemble averages is valid. Shannon is concerned with the communication process as a whole in which individual events have significance *only in relationship to the whole temporal sequence of which they are a part*. The constrained dynamical process establishes the ensemble, the individual events s_i and the related probabilities for each event.

Shannon information is relative—it measures the reduction in the range of possibilities relative to a physical system that is already constrained. The measure of what *could* have happened must be independently defined, for example, by the physical context. Thus we cannot say that a given micro-state has a value for Shannon information until we specify the macroscopic constraints that define the ensemble to which it belongs. Shannon information depends on a relationship between two levels of description: a macro-level that is physically constrained in some way and a micro-level that reduces uncertainty or valency associated with the macro-level. This means that the Shannon information depends on how the physical system is modeled [Bais, p22].

Any sequence of events may be taken as a generator of Shannon information if it can be framed as a sampling of an ensemble in such a way that each event which does happen reduces the range of possibilities of what could have happened in a measurable way. However, Shannon information is a term that only describes the measure of this reduction in the range of possibilities—it does not say anything about the *meaning* of the information. Shannon information is “just a function that reduces a set of probabilities to a number, reflecting how many nonzero possibilities there are as well as the extent to which the set of nonzero probabilities is uniform or concentrated” [Bais, p21]. Of course, the precarious relationship between Shannon’s theory and the semantic nature of information is the primary interest in Dretske’s theory.

Shannon Communication Systems and Information Flow

The physical set-up, or communication system, in which Shannon information is defined involves the following elements [Shannon p2]:

- the *information source* produces a message or sequence of messages to be communicated to the receiving terminal;
- the *transmitter* operates on the message in some way to produce a *signal* suitable for transmission over the channel;
- the *channel* is merely the medium used to transmit the signal from transmitter to receiver;
- the *receiver* ordinarily performs the inverse operation of that done by the transmitter, reconstructing the message from the signal;
- the *destination* is the person (or thing) for whom the message is intended.

The information source is constrained to a range of possible states which establish the ensemble of possible messages. Together the transmitter and channel provide rules or laws that predict the state of the receiver given the state of the source. These laws, which can be pragmatic or empirical laws, depend on the physical setup and they may be either deterministic or probabilistic. Shannon information is said to “flow” in the system in the following sense: each time a state of the source is “selected”, it restricts the possible states of the receiver by virtue of the laws governing the transmitter and channel. As uncertainty is reduced at the source (through selection of a possible state), uncertainty is also reduced at the receiver and Shannon information is said to “flow” from source to receiver. The flow of information is temporal—the object of interest is the *sequence* of selections at the source.

Typically, the physical set-up defining Shannon information is established specifically to transmit signals. The mechanism for selection at the source is external to the system. This can make the system qualitatively different from the physical systems of statistical physics described above. For example, the selection mechanism may involve (and usually does involve) the artifice of a conscious agent. Part of Dretske’s approach to semantical information is to ground the physical set-up which defines Shannon information as the outcome of a prior physical system in which only natural laws operate (i.e. no consciousness or intentional agents are invoked). That is to say, whereas Shannon takes the physical communication system as a given construction within which the flow of information is theorized, Dretske’s more fundamental program is to deduce the emergence of communication systems and their related informational properties from purely physical processes.

The communication system above results in information flow from source S to receiver R . Following Dretske, the information might be said to flow through a channel CH connecting S and R . However, the Dretske channel, CH , includes *both* the encoding processes that may occur at the transmitter as well as the signal transmission that flows through the Shannon channel. By mapping information flow between two sub-systems S and R in this way, the Shannon communication process can also be related to the interaction between two (non-equilibrium) macrosystems as described in section 3. In this mapping, the channel CH is related to the mutual interaction of the two macrosystems as mediated by the environment.

Both the source S and receiver R can be considered as constrained ensembles with possible states (s_1, s_2, \dots, s_n) and (r_1, r_2, \dots, r_n) respectively. Each state of S and R has a corresponding probability, so that the average amount of information for the source $I(S)$ and the receiver $I(R)$ can be defined using equation (2). The quantity of interest for measuring the flow of information from S to R is the transinformation $I(S,R)$ which is the average amount of information generated at S and received by R [see, for example, Lombardi, p25]. The transinformation is given by:

$$I(S, R) = I(S) - E = I(R) - N \quad \text{Equation (3)}$$

where the equivocation, E , is the average amount of information generated at S but not received at R and the noise, N , is the average amount of information received at R but not generated at S . Transinformation is a measure of the average amount of dependency between S and R . If S and R are completely independent the transinformation is 0 and no information flows between S and R . If S and R are completely dependent, the noise and equivocation are zero and all information generated at S flows to R — $I(S, R) = I(S) = I(R)$ ¹⁰.

Grounding the theoretical framework of Shannon information

Shannon information is consistent with statistical thermodynamics, in the sense that his definition of information reduces to the definition of entropy under the appropriate conditions. Shannon information is also consistent with fundamental laws and admits tolerable uncertainties (such as noisy channels). However it is not *reliant* upon the existence of fundamental laws, so it is also consistent with a world in which there are no exceptionless laws—the pragmatic world of engineering, for example. Compared to Dretske, Shannon information does not make much of a commitment to any particular ontic framework, as long as the system is ergodic and the necessary probabilities can be defined. The trade-off is that Shannon information is merely a quantitative measure which may, or may not, have any connection to our everyday notions of information, apart from the specific connection mentioned above, namely reduction of uncertainty in an ensemble of possible states.

The theoretical framework behind Shannon information makes no claim—and needs to make no claim—that the system in question is “naturalistically grounded”, in the sense of Drestke. This may seem like a strange statement, given that his is a theory of the physical measure of information. What I mean, however, is that Shannon information allows for the introduction of conscious agents in the physical set-up and conscious agents can manipulate the constraints such that the signal will carry meaning. This is different from Dretske’s program, in which the claim is that all properties of information (including semantics and meaning) are emergent properties of lower-order physical mechanisms.

In Shannon’s theory, the fact that a signal is a temporal sequence is a crucial point, one that doesn’t appear to be addressed in Dretske’s theory [Lombardi]. The temporality of the signal is the linchpin that enables information to be transmitted without error over channels whose law-like regularities admit tolerable levels of uncertainty or “noise”. A sufficiently long temporal signal can be transmitted over a noisy channel by introducing redundant information into the signal such that the global pattern of the signal is constrained—this is how Shannon’s theory is

¹⁰ For a more complete discussion of transinformation, noise and equivocation see Lombardi.

applied to the transmission of signals over a noisy channel. The noise may alter the signal unpredictably, but, under certain circumstances, the alteration can be “tracked” by the global constraint and subsequently “undone” at the receiver. The procedure has an effect similar to the averaging procedure for statistical ensembles—it is a way of managing uncertainty.

In Shannon’s program, the semantic content of the message is said to be outside of the ken of the theory—the meanings of messages are established by selection mechanisms at the source and coding mechanisms at the transmitter, both of which are physical and cognitive mechanisms that are external parameters of the theory¹¹. Many take this to indicate that Shannon information has no bearing on the semantic aspects of information. However, Shannon’s program may provide an important insight into the origin of intentionality through signal transmission. This insight comes from Shannon’s observation that global coherence properties of the signal can be used to overcome noise in the channel. When a signal is transmitted from a source through a noisy channel, the receiver can learn to “undo” noise by locking onto global, conserved patterns in the signal. These global patterns are related to redundancy or property overlap in the individual components of Shannon information that constitute the signal. In Shannon’s communication system, these patterns are externally imposed by the coding mechanism.

However, “naturalistically grounded” mechanisms might also lock onto coherence patterns in a system generating a signal. The redundancy in the signal would then be related to patterns which are properties of a *set* or *sequence* of instantiations. In this way, the signal can **re-present** an emergent property of the information source—a property that is averaged or “abstracted”¹². The signal can represent emergent patterns because, unlike Dretske information which refers to *a priori* states of affairs at the source, Shannon information refers to that which can pass reliably through a noisy channel and which may therefore manifest at a higher level of coarse-graining. Consequently, from emergent semiotic patterns of signal generation, pre-symbolic elements might manifest that reference a meta-level of instantiation. The key property of these pre-symbolic elements is that they are **in-formed**—that is to say there is a structure of interiority which allows for abstraction (through re-presentation or referencing) of a specific element from the ontic totality. Could these pre-symbolic elements be intentional? Taking this one step further, perhaps what naturalistically grounds the parsing of the ontic totality into objects with properties is the spontaneous manifestation of sub-systems where the sub-systems’ coherence exceeds the channel noise connecting them, such that **in-formation** (literally forms manifested interiorly) in this coherence remains intact, roughly in the same way signals are passed through noisy channels in communications engineering. The informational

¹¹ By external, I mean that these mechanisms are not emergent properties of Shannon’s theory, unlike the case with Dretske where meaning is an emergent property of the theory.

¹² This notion of abstraction is closely related to Dretske’s notion of digitalization.

content is some “average” (overlapping) property or pattern of the set of states from which it is constituted¹³. Which brings us to semantics.

The Physics of Representation

As discussed in the previous section, Shannon’s theory of information exploits the statistical properties of ensembles to overcome noise or error in the (empirical or fundamental) law-like regularities that connect the state of affairs at the source with the state of affairs at the receiver such that information can be transmitted without error through noisy channels. This is the key insight of communication theory. What it tells us is that the perfect counterfactual correlation required for Dretske information is not required for Shannon information. At the same time, Shannon information, as applied to emergent phenomenology, is not about *a priori* States of Affairs in the sense of Dretske, but rather is about collective, or coarse-grained properties or patterns of the source, properties that are essentially dependent on the degree of noise in the channel. With Shannon’s theory, the noise establishes the level of graininess in the communication and this, in turn, establishes what can pass for a state of affairs at the source and at the receiver. Referring back to the figure on page 14, the channel conditions connecting *S* and *R* determine the level or graininess of description appropriate to *S* and *R* by establishing the level of error-free information that can be transmitted between them. In this section I will attempt to unpack this crucial metaphysical difference between Dretske’s approach and that of Shannon.

The Physics of Dretske Information

Dretske’s theory is concerned with the semantic sense of information. For Dretske, a signal carries information whose semantic content is “what the signal is capable of ‘telling’ us, telling us *truly*, about another state of affairs” [Dretske, p44]. This semantic sense is to be distinguished from the “meaning” of a signal which, for Dretske, has only an incidental relation, if any, to the information carried by the signal. Dretske’s nuclear sense of information is related to knowledge and learning: “A state of affairs contains information about X to just that extent to which a suitably placed observer could learn something about X by consulting it ... Information is what is capable of yielding knowledge, and since knowledge requires truth, information requires it also.” [Dretske, p45]

Dretske locates the semantic aspect of a signal or message in the particular instantiation that links an informational source and receiver. He writes, “... if information theory is to tell us anything about the information content of signals, it must forsake its concern with averages

¹³ This approach is closely related to Brian’s book *On the Origin of Objects*.

and tell us something about the information contained in particular messages and signals. For it is only particular messages and signals that have content.” [Dretske, p48].

Dretske seems quite ambivalent about what he means by this particularity, which he variously refers to as a state, a state of affairs, an event and a signal. However, blurring these notions of particularity is problematic because it glosses over the key insight of Shannon theory and of statistical mechanics, namely that a “spatial”, or state-based ensemble can replace a “temporal” or sequential dynamics, and while the two systems are interchangeable, the particular instantiations are system dependent and not interchangeable. For example, “signal” is fundamentally temporal while that of “state” is fundamentally spatial and, as I have discussed earlier, this difference is crucial for relating dynamical processes to statistical ensembles. Along with Lombardi, I will commit Dretske to mean “state” (i.e. that which can be extemporaneously totalized) as this is the meaning consistent with his mathematical formalism and much of his discussion. Statehood is a property of classical ontology, in which space and time are orthogonal and parts can be isolated from the whole as autonomous totalities¹⁴.

Dretske goes on to apply Shannon’s formulas for information, transinformation and equivocation to individual instances, where a specific state at S (say s_i) results in a specific state at R (say r_i). Unfortunately, as Hockema and Lombardi have pointed out, he mishandles the formalism of Shannon. Dretske defines the transinformation between the states s_i and r_i as:

$$I(s_i, r_i) = I(s_i) - E(r_i) \quad \text{Equation (4)}$$

where

$$E(r_i) = -\sum_j p(s_j / r_i) \log(p(s_j / r_i))$$

In this formula, Dretske uses “the same index ‘ i ’ to denote the state of the source and the state of the receiver, as if there were some special relationship between the elements of certain pairs (s, r)” [Lombardi, p28]. Consequently, he makes the erroneous assumption¹⁵ that the individual contribution to the equivocation is only a function of the state r_i (i.e. $E = E(r_i)$). As Lombardi points out, the completely generalized application of Shannon’s formulas to the particular pair of states s_i and r_j is:

$$I(s_i, r_j) = I(s_i) - E(s_i, r_j) \quad \text{Equation (5)}$$

¹⁴ My own predilection is that information can be imported into a more fundamental ontic framework in which space-time and whole-part are emergent categories, such as the ontic frameworks underwriting quantum mechanics and relativity theory. So I can sympathize with Dretske’s ambivalence, but his mathematical treatment and related discussion is not adequate, in my opinion, for this deeper penetration of the notion of information

¹⁵ Erroneous from the point of view of Shannon’s theoretical framework.

where

$$E(s_i, r_j) = -\log(p(s_i/r_j))$$

The averaging procedure Dretske uses to define the equivocation as a property only of r_j (i.e. the summation over all states in equation 4) is invalid in most cases where Shannon's theory is applied.

There are two ways of looking at the consequences of this mishandling. On one hand, Lombardi rejects Dretske's approach outright. "This means we cannot accept Dretske's response to those who accuse him of misunderstanding Shannon's theory: his 'interpretation' of the formulas by means of the new quantities is not compatible with the formal structure of the theory. It might be argued that this is a minor formal detail. However, this point has deep conceptual consequences" [Lombardi, p29]. One such consequence is that the equivocation depends essentially on the communication channel and not only on the receiver. Lombardi writes: "... we can get completely reliable information about the source even through a very low probability state of the receiver, provided that the channel is appropriately designed." [Lombardi, p29].

On the other hand, along with Hockema, we could say that, if Dretske's theory is to be ransomed at all, it only applies to the specific case where each state at the source is perfectly paired with a specific state at the receiver as in Figure 2 below.

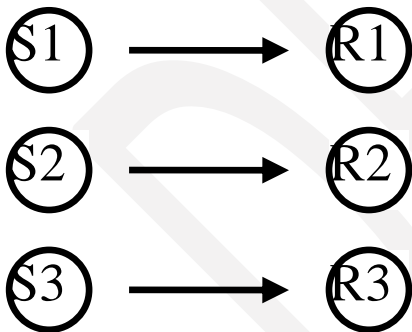


Figure 2: Pairing of States between Source and Receiver in Dretske's Theory

This is quite different from Shannon's theory, where the set of states at the source is correlated with the set of states at the receiver, such that there may be cross-correlations between them as shown in Figure 3 below.

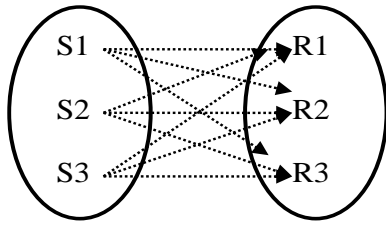


Figure 3: Cross-Correlation of States between Source and Receiver in Shannon's Theory

And there is the rub. In naturalistically grounded systems, the decoupling of the cross-correlation implies that whatever mechanism establishes the state of the source also establishes the state of the receiver. If such decoupling underwrites all relatedness between sources and receivers, something is missing from the story, namely, an understanding of how new information is generated¹⁶. As discussed in section 3, emergent macro-systems, which would ultimately ground the notion of information in Dretske's program, are coherent entities with interiority and complex interactions with one another. Cross-correlations between states would be the norm. Unlike Dretske's restricted interactions, the more generalized Shannon system allows *entanglement* which can manifest physically as uncertainty, entropy and heat flow. Because of cross-correlations, the ontic framework of Shannon's theory is not merely the linear superposition of Dretske's instantiated states—the robustness offered by Shannon's framework is commensurate with the program of statistical physics, whereas Dretske's decoupling is not. Furthermore, the Shannon program allows for macro-systems to exhibit interiority, which is not possible in the Dretske scenario.

The issue of transinformation notwithstanding, Dretske's attempt to locate semantics in the instantiation of particular events or states of affairs at the source moves his theory away from the essence of Shannon information in an even more profound way and this is related to a second misreading of communication theory. One of the fundamental properties Dretske requires of information is that it obey the so-called Xerox principle: If A carries the information that B, and B carries the information that C, then A carries the information that C [Dretske, p57-8]. From this he concludes that information preserving channels cannot allow any equivocation since this would involve information loss that would cumulatively build error into the transmission of information. [Dretske p58 and p245]. Dretske invokes communication theory to back up his claim:

¹⁶ As discussed in section 2, we need to get uncertainty into the naturalistically grounded system to speak of information flow. If there is an external conscious agent, choosing the states s_i , then we can say information flows between S and R, because of the uncertainty in the conscious agent's choices. But this is an imposed uncertainty, not an emergent uncertainty.

Communication theory tells us that the distant links of this communication chain [from A to B to C] will carry progressively smaller amounts of information about C (since the small equivocations that exist between the adjacent links accumulate to make a large amount of equivocation between the end points). [Dretske p59].

If information is localized in the instantiation of a particular state of affairs then the errors build as Dretske says. But this is not how information works in communication theory. The whole strength of communication theory is that the information can pass intact from A to C *despite* equivocation because of the way it is collectively encoded to overcome the losses in the channel. Unlike Dretske's theory, communication theory provides the means to negotiate tolerable error and does not require error-free lawful regularities. I think Dretske really misses the boat here and he wrongly draws support from communication theory for his claims.

Dretske's Semantic Relationship

Dretske doesn't need Shannon's framework for his nuclear concept of informational content. He only requires perfect counterfactual correlation that is established by nomic, or law-like regularities in the system. The nomic dependence is required to exclude *de facto* correlations that may be spurious, without informational content and therefore irrelevant [Dretske, p75-7]. And from this definition it is clear why he requires exceptionless, law-like regularity in the system—a property that I have already argued is unlikely to obtain.

Dretske's overall program is a grand scheme for locating information, knowledge and truth in objective physical mechanisms, such that higher-order cognitive processes are derivative. Although I have argued that this grand scheme is untenable, at least in classical physics, I believe there are some significant kernels of insight in Dretske's theory.

Suppose, for example, we relinquish the notion of fundamental, exceptionless laws and refer to the physical relationship in which Dretske's nuclear concept of information is embedded as an "information-preserving physical channel". This channel is based on nomic regularities (i.e. "laws of physics") and, as Lombardi points out, this setup imparts a physical nature to information and the dynamics of its flow. "Information may be conceived as a *physical entity*, whose essential feature is its capacity to be *generated* at one point of the physical space and transmitted to another point."

[Lombardi, p35]. The information-preserving physical channel, as Dretske conceives it, preserves information on a state by state basis. This is an idealization that can never occur in any physical system for the reasons already discussed. Channels are always noisy as Dretske acknowledges [Dretske, p107-124]. However, the notion of an information-preserving physical channel may have traction in the absence of exceptionless laws if the full statistical power of Shannon's theory is brought to bear. That is to say, noisy channels, in which perfect

counterfactual correlation on a state-by-state basis is not achieved, may still have information-preserving capacity and in this way, Dretske’s nuclear concept of informational content might be resuscitated. The trick is to find a way to manage tolerable uncertainty. An interesting aspect of this approach is that the information transmitted is not about a state, per se, but rather about an *abstracted property* of a coherent macrosystem—the information references a smeared, or “digitalized”, level of the ontic framework.

The key insight of Dretske that leads to a genuine semantic sense of information is not to be found in his nuclear definition which invokes information-preserving physical channels. Rather the insight comes from his articulation of an irreducible three-fold relatedness that establishes a *non-physical* information-preserving relation between two ensembles. Specifically, imagine an information source A that is connected to two different receivers B and C through two separate information-preserving physical channels as in the Figure 4 below.

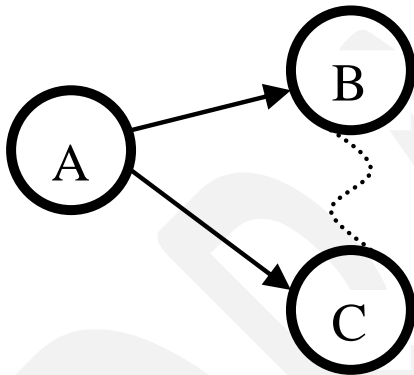


Figure 4: Semantic Information Preserving Channel

In this case, B and C contain information about A by virtue of the physical channel. But there is also an informational relationship between B and C which is not mediated by a physical channel. Neither is it a “spurious” correlation. This informational relationship has genuine semantic import—B “says something” about C even though there is no direct physical flow of information between them. Through this irreducible threefold relatedness, a semantic realm can obtain:

A is transmitting to both B and C via some physical channel (indicated by solid lines). B and C are isolated from one another in the sense that there is no physical signal passing directly between them. Though B and C are physically isolated from one another, there is nonetheless an informational link between them (indicated by the broken line). According to information theory, there is a channel between B and C. “Because of the common dependence of B and C on A, it will be possible to learn something about C by

looking at B, and vice versa. In the sense of information theory, it is correct to say that a channel exists between B and C" [Quastler as quoted by Dretske, in Dretske, p38]

As a concrete example, consider a person [A], as generator of information, repeatedly pointing to a rock [B] and saying the word "rock" [C] at the same time. Two information-preserving physical channels are established: 1) between the source [A] and the physical rock [B], and 2) between the source [A] and the word "rock" [C.] But, through this process, a third, non-physical correlation is also established between the word "rock"[C] and the physical rock [B]. This non-physical, information-preserving channel has a semantic aspect.

Another, more provocative example. Suppose the two states B and C are different states in the same observer (eg mental states), caused by an information carrying signal from A (eg. a tree). A non-causal informational link connects B and C. In the simplest case, this connection is an identity, establishing A as a temporally enduring object. But, drawing from our discussion of Shannon information and the notion of abstraction in section 3, we could also imagine that the informational link between B and C is not an identity but rather a pattern of coherence that points to, or refers to, an abstracted property of the object. What the three-fold relatedness provides is a mechanism of synchronicity that can stabilize the semantic description at a particular level of graininess.

There is much more to say about this, but that is beyond the scope of this paper.

References

Bais, F. Alexander and Farmer, J. Dooyne. *The physics of information: information theory in the light of thermodynamics, statistical mechanics and nonlinear dynamics*. Sante Fe Institute, 2005 [draft] Available: http://www.ilc.uva.nl/HPI/Draft_Physics_and_Information.pdf

Dretske, Fred J. *Knowledge and the Flow of Information*. Cambridge: MIT Press, 1981.

Hockema Steve. Private communication.

Lombardi, O. Dretske, Shannon's theory and the interpretation for information. *Synthese* 144:23-39, 2005.

Reichl, LE. *A Modern Course in Statistical Physics*. Austin: University of Texas Press, 1980.

Shannon CE. A Mathematical Theory of Communication. *The Bell System Technical Journal* 27:379-423, 623-56, 1948.

21. Spacetime as a formal semiotic process

1. Light (the Creative)

Space

The formative principle of space is *identity in difference*, or *Sameness*. Space *equalizes* difference by uniting given particulars through general forms. Space is *exteriority*.

Space, and more abstractly geometry, determines the structural foundation of *co-presence*. Space mediates the co-presence of individual bodies as discrete and separate individuals and brings them into relationships of sameness.

- Space is the ground of abstraction.
- Space is purely formal.
- Space underwrites embodiment.

Spatial mediation imparts *form* to individual bodies. Form is general; it equalizes individual bodies by constraining them within common patterns or structures and thereby sustains individual bodies in relationships of co-presence and sameness with one another.

- The spatialized patterns or structures are synchronous states or “*wholes*” that manifest as gestalts that are present “all at once”.
- A whole pattern or structure—a generalized form—never manifests as an abstracted body *in-itself*. Individual bodies—as whole forms—always exist through mutual relationships of embodiment within a system.
- There is no such thing as a body in-itself.

Natural law sustains the forms of bodies as *enduring* forms. Natural law determines the generalized patterns or structures and their relationships of co-presence and sameness.

- The foundation of natural law is the logic of the excluded middle. Geometry is an archetype for natural law.
- Natural law is necessary for bodies to have enduring form.
- Without enduring form a body cannot exist.

Natural law determines *form* but it cannot determine *existence*.

- Natural law determines the formal *nature* of a body but not its particular *mode* of existence or action.
- Form is general; action is particular.
- The determination of natural law is never complete.

Natural law *creates* formal symmetry or sameness. Formal symmetry is *broken* through embodied action.

- Form is general; embodiment is particular.
- A particular body breaks the symmetry of the general or common form by way of its particularity.
- Broken symmetry is relationship with Otherness.

General form is *exterior*.

- General form is the foundation of objectivity (and justice).
- Objectivity is a category of the collective or system of individual bodies. This category is called *Thirdness* by Peirce and others.
- General form is the *text*.

Space shapes the text of the cosmos.

Time

The formative principle of time is *difference in identity* or *Otherness*. Time is the *duration* of particular identity within systems of differentiation. Time is *interiority*.

Time *manifests* existence by way of action. Through time, a particular body is related to the Other which remains different.

- Time is particular.
- Time is repetition.
- Time is broken symmetry.

Time mediates *effective causation* through the mode of action/reaction.

- Effective causation is different from formal causation. (Space mediates formal causation).
- Through effective causation one particular body affects another particular body.
- Effective causation is asymmetrical: one body is the source of action and the other body is the receiver of action. (In contrast, formal causation is symmetrical)

The mode of action/reaction is *successive* and without end in itself.

- One body acts upon another body as source upon receiver. The second body then becomes the source for action on a third, and so on, and so on.
- The mode of action/reaction is movement.
- Movement never rests in itself.

Time is *intentional*. Time connects the interior of a particular body with the exterior of other bodies.

- Time relates interiority to exteriority through iteration.
- The interior of a body selects modes of action by way of which it comes into relationships of effective causation with other bodies external to it.
- The exterior of a body determines the possible modes of action as general forms of the system in which the body is embedded.

Time is the *measure of synchronization*.

- Bodies come into synchronization by way of their embodiment within a system which is itself a body of a higher order.
- The system establishes the temporal measure to which the constituent bodies are synchronized as parts within a whole.
- Synchronizing systems are hierarchically ordered as bodies within bodies within bodies of increasingly greater inclusion. For example, cells within organisms within communities or planets within solar systems within galaxies.

Time sustains *rhythm* and *harmony*

- Rhythm is a property of the interior of a particular body.
- Harmony comes from the processual inter-relatedness of bodies of the same order by way of their external, general forms.
- Rhythm and harmony manifest form within existence.

Time voices the music of the spheres.

Light

The formative principle of light is *return*. Light *presents*. Light is *transcendence*.

Light is *creative*.

- Light is immediate proximity, without spacetime interval.
- Light is presence.
- Light allows the cosmos.

Light *mediates* space and time, form and action.

- Mediation brings the particularity of interiority into dialogue with systemic, general forms.
- Mediation is processual.
- Mediation is formal.

Light is *return*.

21. Spacetime as a formal semiotic framework

- Through return, repeated cycles of action create systemic formal structures that have duration.
- Through return, systemic formal structures create enduring bodies that can act.
- Return is small, yet different from external things.

Light follows the *logic of three*.

- Light is word.
- Light is synchronicity.
- Light is whole.

Light is *word*.

- Through intentional actions, bodies manifest formal structures that can be interpreted by other bodies within a system.
- The interpretation of an action is a response. When a body responds to the action of another body, it generates a new action (a reaction) that can be interpreted by other bodies.
- All material action is reaction. The cosmos is in a continual state of responsivity to light.

Light is *synchronicity*.

- The temporal unfolding of action and reaction is constrained, determined and harmonized by formal structures.
- Light synchronizes action and form such that form references action, and action indicates form.
- General form draws out the particular intentionality of action as its final cause. The final cause belongs to the synchronicity of the system and is deferred in the present moment.

Light is *whole*.

- Light brings particular bodies into unity through their mutual inter-actions within a formal system.
- Wholeness or unity is the synchronicity of interiority, exteriority and return.
- The wholeness of a body reflects the wholeness of the system in which it is embodied, as interior reflecting exterior. Return is the breath whereby interior and exterior are brought into synchronicity.

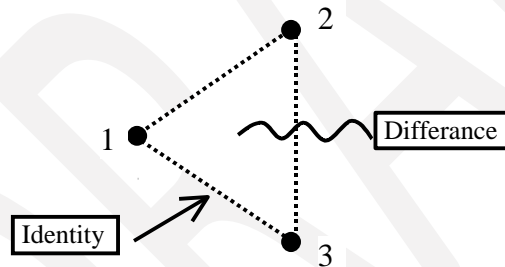
Light breathes life.

2. Form and Representation

Form

That which is exterior is formal. Exterior form is *represented* interiorly. The representation of form is interpretation. Interpretation is communal and lawful. Law stabilizes form as enduring presence; yet law remains open to the possibility of transcendence. Transcendence is the possibility of the impossible (according to law). Transcendence is light.

The logic of light is the logic of three: the Same, the Other and the Third Party, each of which is another to the others and none of which is the same to another. Each of the three is in immediate proximity with its neighbor—one-for-another in a continual process of substitution. Proximity is more near than neighbours. Substitution is kenosis—the giving up of self for the other. Proximity and substitution is the formative principle of *intensionality*. Each of the three is *in-itself-for-another*. Consider the diagram below:



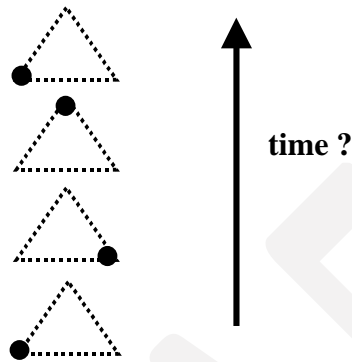
This diagram is a trope that represents three in proximity. There are three distinct indices, or origins, labeled “1”, “2” and “3” in the diagram. These three indices correspond to three distinct instantiations.

To see the working of this trope, suppose we establish “1” as the instantiated index, the *origin*. Then “1” is in a relation of proximity with the two others (here called “2” and “3”). This relation of proximity we call *identity*. “1” is identical to “2” and “3”, substituting itself for each. However, between “2” and “3”, there is a proximity that is inaccessible to “1” and we can call this *differance*. In the distinct instantiation of the three, there is both identity and difference.

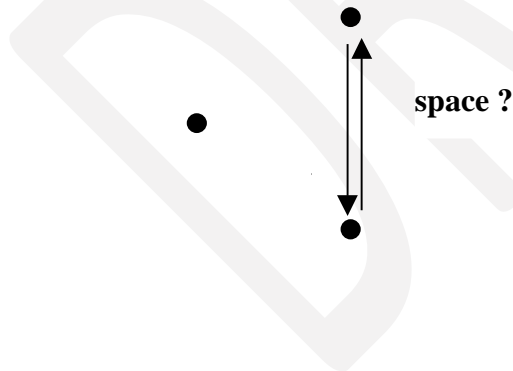
This trope frames interiority through a process of *return*. In return, “1” substitutes for “2” which in turn substitutes for “3” which finally substitutes for “1”. In return there is a traversing of the inaccessible difference that is the proximity of “2” and “3” according to “1”. This gap becomes the gap or clearing in which creation manifests—the *synchronicity* of light and word. Moreover,

because “2” and “3” can substitute one-for-the-other in the inaccessible gap, there is an indeterminateness at the core of this threefold relatedness.

Time is *iteration*. Iteration is the circular movement around the three, which returns through difference to a different same. Iteration is particular. There is change in the loss and return of proximity, which we postulate as temporal.

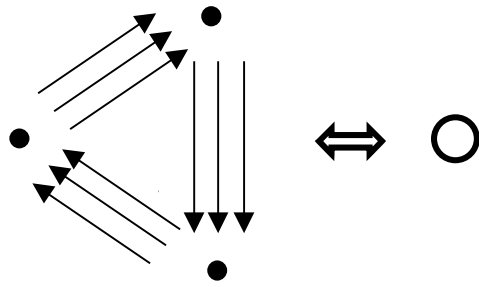


Resonance is equalizing, the identity in difference through back-and-forth. Unlike the particularity of iteration, resonance is "whole" or "at-once", the same difference, which we postulate as spatial.

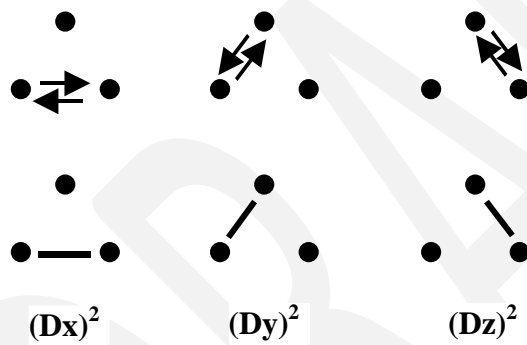


From the infinite iterability of return we might define a temporal element $(Dt)^2$, which we represent as an open circle

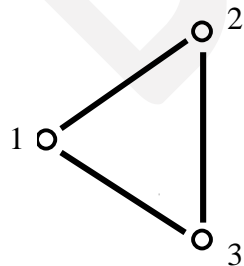
21. Spacetime as a formal semiotic framework



Likewise, the infinite back-and-forth of resonance brings a connector between two places, which we might call $(Dx)^2$ and represent by a solid line. Resonance is the formative principle of *extensionality*. There are three different resonances corresponding to proximity between the Same, the Other and the Third Party, which we might label as $(Dx)^2$, $(Dy)^2$ and $(Dz)^2$.



Together these connectors form a 3-space. By postulating an equivalence between the resonance of 3-space and the iteration of temporality, we arrive at the figuration of a lightcone.



Consider the following two ways to complete a loop, which we might postulate as the same difference. In the first way we pause at circle 1 (infinite iterability), then jump (in a finite number of back-and-forth motions) to circle 2 where we pause, then we jump to circle 3 where we pause, and finally back to circle 1. Another way is to infinitely resonate between 1 and 2, then, without pausing, infinitely resonate between 2 and 3 and finally, without pausing, infinitely resonate between 3 and 1. This is a method of combining connectors (resonances, space?) with pauses (return, time?). We might represent this equivalence as the fundamental equation of the light cone:

$$(Dx)^2 + (Dy)^2 + (Dz)^2 = (Dt)^2$$

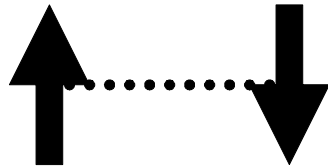
Of course we have been anticipating the solution from the beginning so this is not a derivation as much as a heuristic argument.

Yet something quite interesting has happened. We have postulated 3-space as a system of connectors (or line elements) but these connectors do not have directionality. So we have extension but we have no orientation. This is captured by representing the finite element as a squared quantity. What is missing is the spontaneous symmetry breaking that might establish direction (and therefore orientation). If we are to arrive at a model spacetime we need to *disambiguate* the temporal and spatial elements. Notice, however, that this disambiguation is prefigured within an overarching threefold relatedness. And the form of that relatedness is each-for-the-other and *not* each-for-itself.

Representation

The disclosure of orientation requires surfacing a richer understanding of difference—specifically symmetry creation—as the basis of spatiality along with identity—specifically the indexing of broken symmetry—as the basis of temporality. Orientation *discloses* broken symmetry.

Orientation comes from the disambiguation of pair symmetry. Pair symmetry is prefigured in the circularity of the temporal element which has two-fold equivalence – clockwise and counterclockwise traversal (1-2-3-1 or 1-3-2-1). Let's represent the breaking or disambiguation of pair symmetry by two oppositely pointing arrows as shown in the diagram below.



This diagram represents a fundamental connector that *mediates* an emergent twofold relatedness *through broken symmetry*. The connector involves reflection. By way of extension or space, the two are similar in their general form (same type) but different according to particular instances (different tokens or objects). By way of intension or time, the two are different in their embeddedness in general form (different instances of past and future) but identical in their particularity (same index or subject). The extensive general form through its (pair) symmetry allows for *abstraction* of the Other by the Same through *likeness*, where the Other refers to brokenness or particularity of common symmetry or form. The intensive particularity allows the enduring identity of the Same to index or mark a particular Other as distinct by way of opposition in synchronicity.

The Same and the Other share *likeness* of individual form and *distinctness* of particular embeddedness within the common formal system. The likeness of individual form *foregrounds* them to be of the same type *resonantly* co-existing within a spatial embedding. The distinctness of particular embeddedness synchronizes their action as oppositional to one another. Therefore, the connector can be taken as an *indexical relation* that points from one to the other such that one can be taken as a *sign* of the other. The connector between the Same and the Other within the formal system can mediate external form by representing it internally in time such that *the Same is an indexical sign of the coupled Other*. In this way broken symmetry indexes exterior forms to interior forms as relational *re-presentations*.

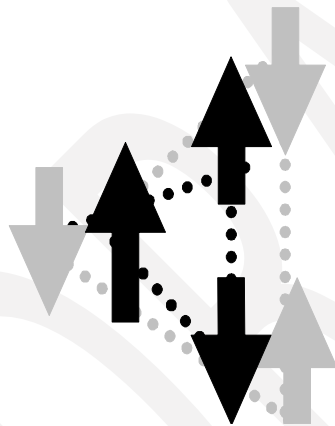
As a concrete example, we might consider orientation of binary quantum spin (spin $\frac{1}{2}$). As exterior form, spin involves an object that takes on one of two possible orientations in relation to another different object (of the same type) that has the opposite orientation. Interiorly, spin oscillates back-and-forth in time within a subject that remains identical. The interior form (which is temporal) represents or interprets the exterior form (which is spatial) when two spins are synchronously coupled. Whatever indeterminate spin one has, the other has the opposite. Therefore the interior of one spin, taken as the Same, *represents* the exterior of the Other spin by way of synchronicity. This representation will manifest when the Same is embedded in a formal system that can measure or *interpret* the spin. For the formal system that interprets the spin of the Same, it is the case that the spin of the coupled Other (which is a limit for the

interpreting formal (general) system by way of its particularity) is the opposite. For closed systems that are instantaneously synchronized this may not seem extraordinary¹. However, for open systems that are in the process of coming into synchronization with one another, such as found in quantum theory, *measurement is interpretation*.

Grammar

While we have postulated 3-space as a system of connectors and we have identified broken symmetry of the connectors as the basis for representation, our formal system lacks an *origin* that can place processes in space and time. The notion of origin is correlated with the sign of self.

The *self*-synchronization of spin comes about through return. However, with the emergence of pair symmetry, return is now frustrated such that two cycles are needed to recapture identity.



The structure of return now has the form of a *spinor* or knot. The figure folds in on itself, as it were, to disclose a deeper interior structure to origin. The inward folding generates the fundamental unit of action – a single rotation or cycle of return – which we have called spin. *Spin is an emergent property of spacetime that comes from the disambiguation of light.*

Suppose, now, that we synchronize an origin within a frame of reference with a specific spin orientation. This will simultaneously index one of the three axes; let's call the indexed axis the

¹ Actually it is extraordinary because in order for a classical system to be fully synchronized *in toto*, the symmetry must already have been broken globally and one orientation arbitrarily chosen for the whole system. The broken symmetry of handedness in Euclidean geometry is an example. Quantum theory does not allow for formal systems *in toto*.

z-axis. There is a two-fold symmetry which is also broken in choosing a specific spin orientation and this enables us to label the *direction* of spin along the z-axis. For example, we might call it spin up and label it as

$$|\uparrow\rangle_z$$

It is important to recognize that the broken symmetry, namely orientation, comes from a three-body process of synchronization. We—the observers as it were—are imagined to be in phase with the specific spin orientation that has been indexed. Of course, instead of we-as-observers, it may be some other interpretative system which is brought into phase with the indexed spin orientation – this process is one of interaction not cognition. What is interesting now is that, for the other two axes, *the spin is mixed*.

$$|\uparrow\rangle_x \quad \text{and} \quad |\downarrow\rangle_y$$

$$|\downarrow\rangle_x \quad \text{and} \quad |\uparrow\rangle_y$$

Synchronizing spin-up along the z-axis at the same time causes mixing of spin along the remaining two axes (let's call them x and y). Synchronization of spin along another index axis (eg. x or y) would at the same time de-synchronize the spin along the z axis. The apparent collapse of spin along the x-axis might rather be seen as re-phasing of three-body interactions. Because of its threefold essence, the disambiguation of light automatically generates the quantum properties of spin and this can be seen to come from the ontology of relativistic spacetime rather than a property of an individual or isolated particle. Spin is an emergent interiorization of light from which the fundamental unit of *in-formation* is created.

Yet a spin cannot exist *in-itself* as an isolated abstract object. Quantum spins exist through formal **grammars** of relatedness such that the “self” of the spin is formed, manifested and sustained by the way in which the spin is coupled to other spins in an interpretative system that reflects back upon the spin through return.

Quantum spin exists *in-itself-for-another* as a relational image or sign. The spin as the Same is coupled to the Other through indexed relations that are indeterminate in them-selves. Both the Same and the Other are entangled with an ensemble of spins such that the whole ensemble provides the formal grammatical basis for the same-other relationality. The Same is Firstness. The Other is Secondness. And the formal (general) grammar is Thirdness.

The Same becomes an origin for a system of formal representation and meaning formation that is internally synchronized with and indexed to the Same. The Other is the origin of a different system for formal representation and meaning formation that is internally synchronized with and indexed to the Other. The common grammar of the ensemble of entangled spins brings the Same and the Other into communal processes of interpretative action and response that limits

and determines by way of structure and rules yet remains indeterminate and random by way of particularity and agency. Each of the two systems of representation is a **context**. Only one context can be presently operative as the active frame of reference for which the Same is an original index (a subject). The Other becomes, for that context, an objective image for the Same that possesses particular indeterminacy (an object). The Other has particular indeterminacy for the Same because it is an agentic origin for a different context of interpretation. The processes whereby these two contexts might be brought into synchronization through determination or measurement is the subject of quantum theory.

For example, the archetypal process through which orientation (an interior structure) is externalized and represents rotational symmetry is the mediation of correlated photon pairs. Correlated photons provide a connector between two origins in spacetime which brings their orientations into synchronous relationship. When the correlated photons (which are a unified entity) interact with the external “world”, symmetry is *created*. This symmetry brings two origins (potential centres for formal processes of action and interpretation) in spacetime into a particular, synchronous relatedness of space-like resonance and time-like iteration such that they can enter into a common or general grammar of interpretation for the “world”. These relational processes manifest measurement, collapse, determination through randomness (indetermination) and (delimited) agentic freedom by way of a common interpretative grammar of the whole.

3. Matter (the Receptive)

Matter is embodied.

That which is embodied has both exteriority and interiority, form and action. Bodies are both extensional and intensional, spatial and temporal.

Bodies only exist in relation to one another as multiplicity; they dynamically participate in unity through their formal interactions such that interior forms or patterns represent exterior forms or patterns. Bodily relations are mediated by Light.

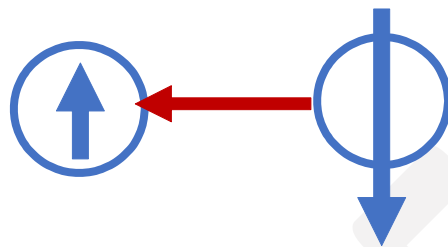
Bodies are receptive. That which is receptive is capable of responding to the action of another as source. Receptivity is interpretative.

Bodies interpret one another. Interpretation is communal and formal. The basis for interpretation comes from the system in which bodies are embedded. Such a system is itself a body of a higher order.

Matter is hierarchical.

Signs

Representation is mediation. Mediation is word. Word holds together in unity the interior representation of exterior form. The fundamental connector presented above discloses the mediation of the sign.



Two in opposition, such as coupled photons, manifest a semiotic relation as their principle of unity. One is the *interpretant* of the Other, where an interpretant represents the Other inasmuch as it refers to the Other as a potential sign. The spin of one of the coupled photons is an interpretant of the spin of the other-of-the-same by way of the rule that if one spin is “down” then the Other must be its opposite or “up”. Therefore, each spin can represent the Other even though the coupled spins remain *indeterminate in themselves*. For example, if the interpretant’s spin is “down”, then it represents the “up” spin of the Other.

If the interpretant enters into a semiotic system of interpretation, such as happens through measurement, then its spin will become a *sign* of the spin of its coupled Other for that semiotic system. If measurement determines that the interpretant has spin “down”, then this spin acts within the semiotic system of interpretation as a sign of the spin of the coupled Other. The entrance of an interpretant into a semiotic system of interpretation is the quantum mechanical process of “collapse”. Collapse is the action whereby a potential semiotic relation becomes actualized within a system of interpretation.

Collapse brings two distinct contexts into immediate proximity. The spacetime location of one of the photons is immediately proximate to the spacetime location of the other coupled photon (because for light there is no spacetime interval). This immediate proximity of contexts also involves substitution such that the spin of one photon substitutes for the spin of its Other by way of opposition. Proximity and substitution allows orientation to be abstracted from the spacetime continuum. Orientation is both an interior representation of spin and its exterior expression or sign within a formal semiotic system of interpretation.

Contexts

Suppose one photon of the coupled pair collapses into a semiotic system of interpretation by way of measurement. Let's say this photon has spin "down" as measured in that semiotic system. That spin becomes, for the semiotic system, a sign of orientation that represents the spin of the Other photon of the coupled pair. Now suppose the Other-of-the-same enters into a second semiotic system of interpretation by way of a different measurement. The result would be two disjointed contexts:

- Context A: the semiotic system in which the first photon (the same) has spin "down".
- Context C: the semiotic system in which the second photon (the Other) has spin "up".

However, since the two photons are coupled, their unity yields a semiotic connection between Context A and Context C. Namely, that which is oriented "up" in Context A is oriented "down" in Context C. This semiotic relationship allows Context A and Context C to become synchronized by way of a Third. The Third is an overarching CONTEXT that unites (sub)-context A and (sub)-context C by way of synchronization such that what is "up" in sub-context A is "down" in sub-context C and vice versa. Such synchronization comes about because all signs in sub-context A and sub-context C are connected by semiotic relationships. Both sub-context A and sub-context C were created in the past through prior collapses, that is to say, prior determinations of semiotic connections. The Third is the formal system of generalization that consistently interprets all photons in both sub-contexts. By way of the Third, all photons obey formal rules that ensure consistent synchronization of all orientations.

If the speed of light were infinite, this formal system would be a Euclidean *geometry*. An infinite speed of light means that synchronization has always already happened. It means that everything is always already determined. It is only possible if the primal symmetry of orientation has somehow been broken by a formative action in the past.

The logic of three, however, allows for another, much more interesting possibility. Namely, the possibility that contexts or semiotic systems of interpretation are *currently in the process of coming into synchronization with each other*.

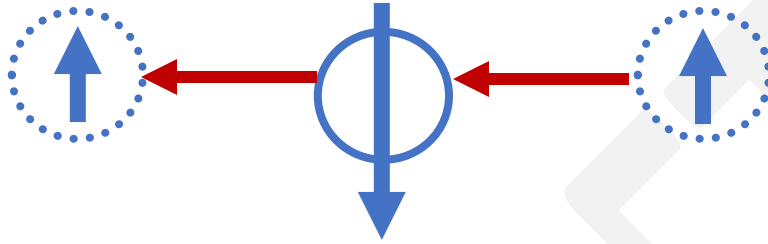
Synchronicity

The synchronization of contexts presents an infinite regress. This infinite regress *is* the excluded initiative of the geometry of space, namely time. Another way to say this is that determinate space lacks origin. But without origin, space cannot be *actualized*; it cannot be real. At best it can only be an epiphenomenon that determines some sub-context within a larger indeterminate context. And it only determines that sub-context outside of or exterior to the limit of some sub-sub-context—an inner limit that reflects the outer limit.

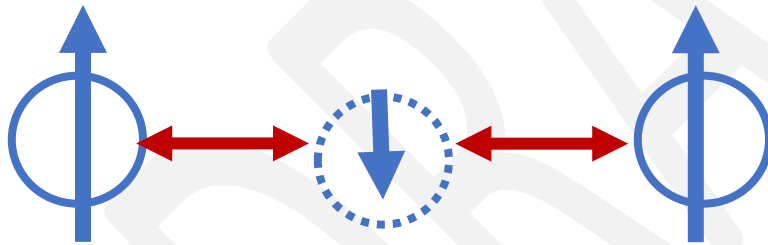
21. Spacetime as a formal semiotic framework

In formal semiotic systems, an origin comes about by the inward enfolding of the semiotic relation of two through synchronicity with a third. An origin creates a context that is limited and formally indeterminate at its core.

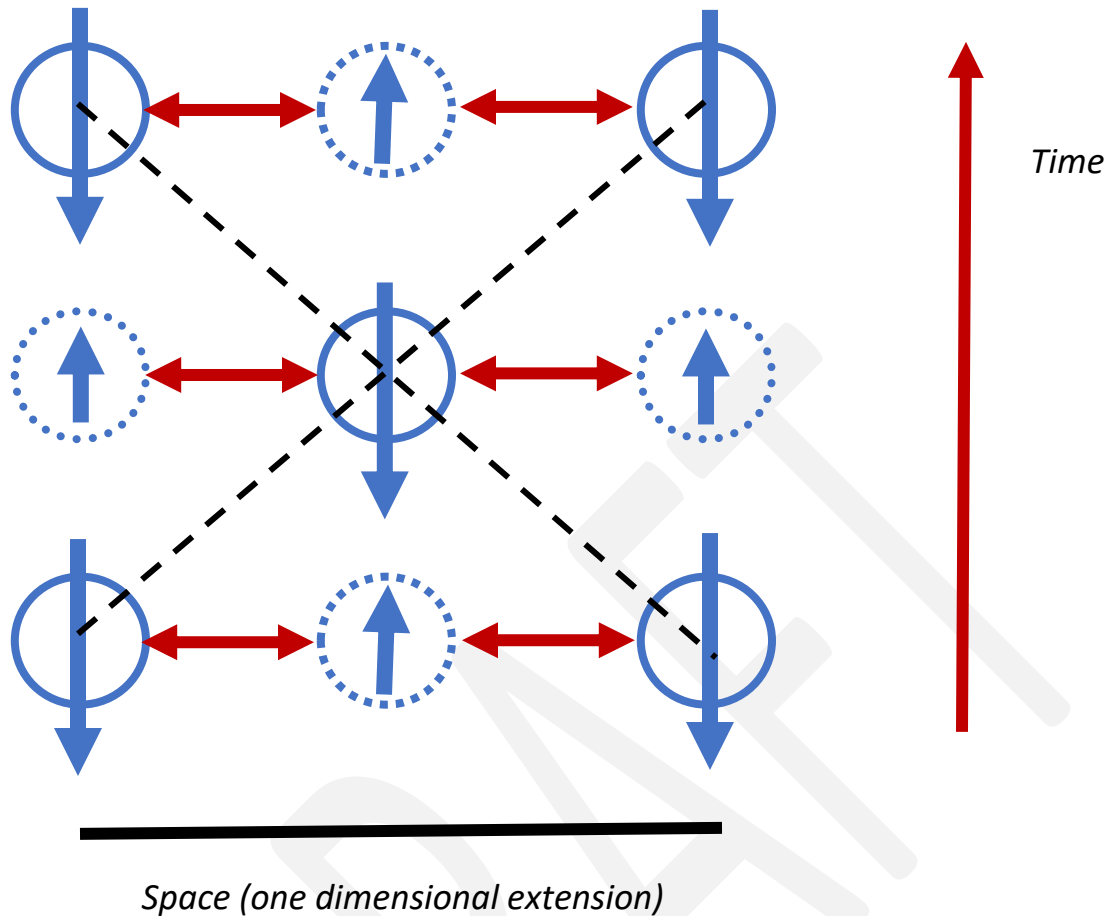
The temporal aspect is the successive iteration of substitution around the cycle of three as shown in the figure below:



The spatial aspect is the resonant structure of return:



The synchronization of temporal and spatial aspects results in a "breathing" manifold in which interior and exterior exchange according to the rhythm of the whole. The rhythm of the whole is determined by the invariant speed of light c , such that the temporal frequency of iterative succession f is proportional to the spatial "frequency" or inverse wavelength λ^{-1} of spatially extended resonance: $c = f \cdot \lambda$.



In the process of coming into synchronization, the semiotic system *formulates* spacetime as a communal interpretive framework for spin. However, this structural framework is generic and lacks the particularity of embeddedness required for actualization. It is a framework for the process of *signification* through which embedded spins might become synchronized as a collective whole. In order for a spin to exist it must follow the habit or rules of the formal system of the manifold: the manifold provides the structural foundation for an enduring “self” entangled within the whole. The enduring “self” determines or delimits the self-identical form an actualized spin. This is a bootstrap process. Through the threefold nature of *Return*, a sign or image of spin is formulated by its relations to other signs or images of like spin within a wholistic formal grammar (manifold) in which each spin is mutually interpreting all the others. The entanglement relates interior to exterior self-consistently such that individual signs or images are distinct but not disjoint or separable.

The process of interpretation involves action and re-action. For example, a given spin would be receptive to the actions of the other spins within a whole ensemble of spins. This reception involves a formal relation to the external image or *face* of the other spins. The given spin is *indexed* to the other spins as signs by way of the manifold. In turn, the spin *reacts* interiorly to the received image(s). This reaction formulates the exterior image of the spin which is its face according to the other spins. Light is the mediator of the relational indexing.

Embodiment

The breathing manifold opens up a grammar of signification. However, this grammar is general and lacks the particularity of real, actually embodied entities.

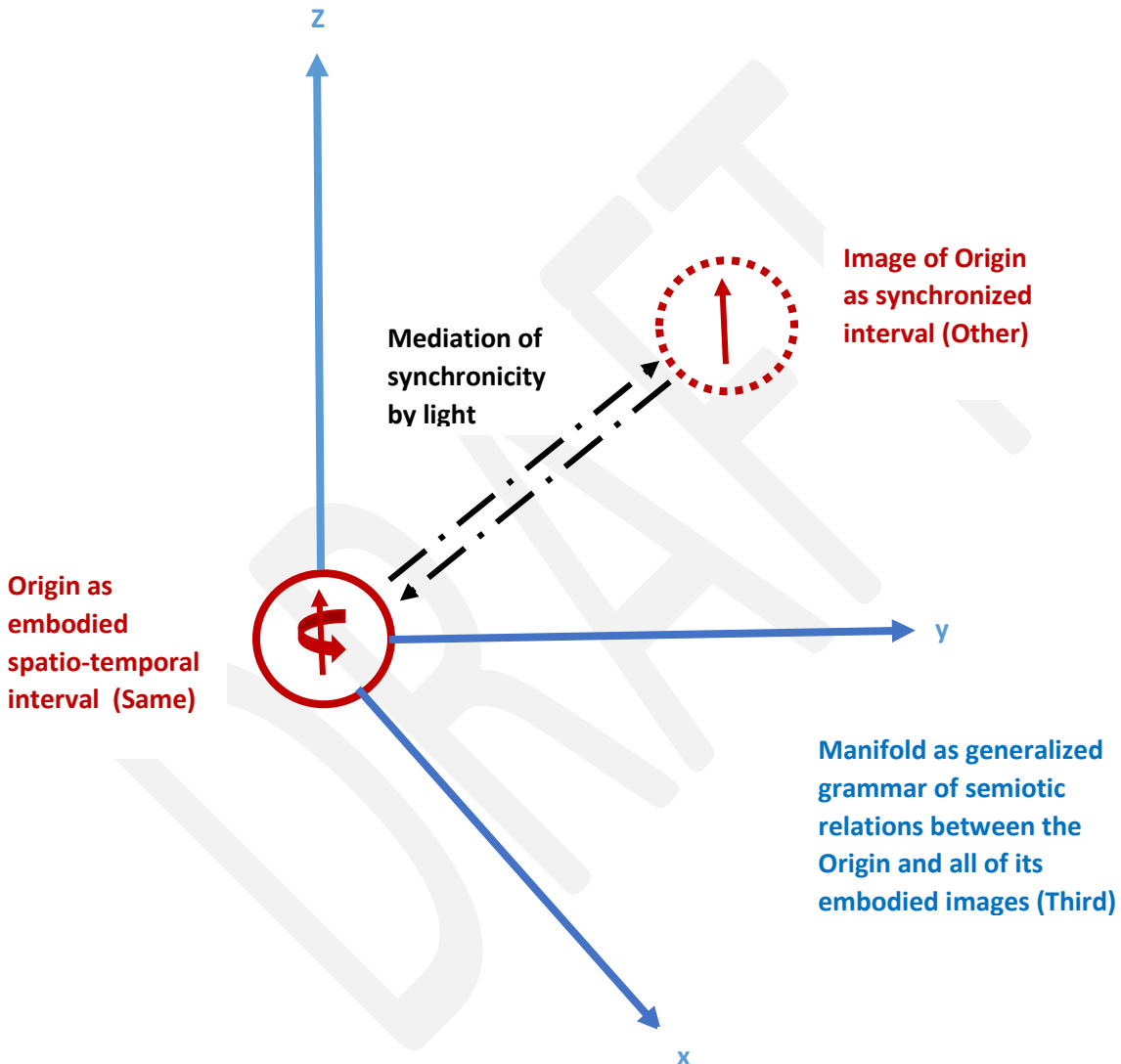
The embodiment of spin involves an inward folding of the breathing manifold to create a “knotted” spinor as described in section 2. The knotted spinor becomes an interior *re-presentation* of the external breathing manifold. The knotted spinor moves interiorly in synchronicity with the breathing manifold which is the general grammar of an exterior process for the knotted spinor. That exterior, general process is the entangled relational synchronicity of all the spins in the ensemble forming the system, each of which is an image of the original spin.

Embodiment is a symmetry breaking process. Only one embodied spin can be marked as the indexical origin for the entangled ensemble. This embodied spin undergoes a temporally iterative and open “breathing” process through which it is entangled with the collective ensemble by way of the generalized grammar of the manifold. It is because the embodied spin has an interiority that can represent the external breathing process of the manifold that it can be taken as an origin for an entangled ensemble of like bodies which are interpreted by the original embodied spin as signs.

From this origin we can mark out a three dimensional space of synchronicity. But this synchronicity is not instantaneous simultaneity. It is a spatiotemporal process that relates the other spins, as images, to the indexed original spin. The embodied original spin cannot be conceived of as or represented by a Euclidean point. It is a spatiotemporal *interval* of repetition. Likewise all the other spins in the embodied ensemble are images of that spatiotemporal interval. The magnitude of the interval is the body’s *rest mass*, such that body’s rest mass is equivalent to the energy of a photon whose frequency is synchronized to both the external procession (breathing) of the manifold and the internal procession (breathing) of the original spin². The interval involves a fuzzy upper cut-off to spatial and temporal frequencies

² The rest mass m_0 is related to the Compton wavelength λ_c of the embodied spin at rest :
 $m_0 = h / (c * \lambda_c)$.

such that the *particular embodied instantiation* of the manifold cannot be considered as a totalized continuum in itself, although it might be considered as a stochastic, relational continuum for mediating the processual synchronization of intervals.



The particular instantiated Origin can be taken as a subject to which all other spins are indexed by way of the relational manifold. The mediated relation between the subject (the Same) and an image (the Other) involves an inherent gap. The subject and the image-as-object are in immediate proximity by way of light for which there is no spatiotemporal interval. However,

the processual motion of the spins forms a “pause” as each spin completes its cycle. A complete cycle of the subject creates, for the Other, an object-image to which the Other can respond. A complete cycle of the Other creates, for the subject, an object-image to which the subject can respond. The complete cycle of an object-image is a *sign*. The two object-images are different because they have different contexts even though they both present the same formal, exterior object-image to one another. The subject is one indexical locus for coordination of the manifold. The image, *when considered as a subject*, is a second indexical locus for coordination of the manifold. These two contexts are mediated by the immediate proximity of light. What is transmitted through this mediation is the sign of spin, namely orientation. Each spin becomes synchronously oriented with the other inasmuch as they mutually exchange the same sign by way of *Return*. This sign represents what is happening interiorly for each spin; it communicates in-formation. Unlike the case with Euclidean geometry, however, the exchange of in-formation about spin is a spatiotemporal process whose frequency depends on the rest mass of the spins.

The differentiation of interior and exterior is crucial to the process of synchronization. Because each embodied spin can represent the mediating manifold interiorly and that interior representation can be communicated to another spin as an exterior image, an ensemble of spins can enter into a formal semiotic grammar of synchronization. However, unlike the case with Euclidean geometry, in the formal grammar mediating action and re-action is never fully externalized. Each embodied spin by way of its particularity breaks the symmetry of the manifold to form its own particular Origin. But an Origin, by way of its particular mode of broken symmetry, has some degree of indetermination which manifests to other “origins” as inherent randomness whose external signs can be “interpreted” through the formal grammar mediating relations. In the simple case we are considering, “interpretation” means the synchronization in space and time of particular actions and reactions according the grammar of the manifold.

What holds this process of synchronization of same-Other together is the manifold. The manifold (the Third) is the generalized grammar of the whole ensemble of spins of which the subject and each of its Others are parts. The manifold exists by way of a higher order process whereby the ensemble as a whole is synchronized by light. The synchronization of the manifold (Thirdness), the origin (Firstness) and the action/reaction of object-images (Secondness) involves the *Logic of Three* as described by Peirce and others.

More generally, any actualized manifold consists of spatiotemporal intervals that must be brought into synchronization. These intervals possess interiority that represents the exteriority of the manifold. The interiority gives to the embodied entities a degree of randomness, freedom or choice that cannot be subsumed into the manifold but remains external to it.

Semiotic processes do not manifest fully externalized objectivity. Through wholistic interpretative grammars, they synchronize images to an interpretative grammar or formal system which requires context to be actualized. The context has its origin in an embodied subject for which embodied Others are images or signs that possess some degree of interior

21. Spacetime as a formal semiotic framework

randomness, freedom, or agency that reflects the randomness, freedom, or agency of the subject. The formal grammar is sustained through representational relations that connect interiority to exteriority and this formal grammar is actualized when the collective whole becomes embodied in the world as a whole system.

DRAFT