Energy Transformation and Semiosis

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Abstract:

This paper examines the processes of codification or measurement of energy by means of which energy is able to operate as mass. The architecture of this transformation rests on a series of increasing asymmetrical ontological and epistemological cuts in measurement which are then mediated by increasingly complex semiotic codal actions. The ontological cut establishes an external and internal zone of measurement and the epistemological cut establishes a mental/formal and material/informal zone of measurement. The external zone is mediated by a semiotics operating within the rules of classical mechanics; the internal zone operates within the rules of quantum mechanics. The conclusion is that our cosmos requires both modes of measurement.

Keywords: Semiosis

The nature of energy and information

The analysis in this paper uses a basic definition that energy only exists as codified or *organized mass.* A basic postulate is that energy cannot exist in a pure state but exists as the ‘force to do work’ only within the restrictions and boundary establishing constraints of codification. Energy, to exist, must be organized or measured within patterns of cohesive relations which effectively transform energy into a mass with restricted properties of behaviour. Furthermore, energy that is codified should be understood in this constrained state not simply as matter which by itself is a meaningless term but more accurately as *information*. In this state, we can consider that energy acts to *inform*, which means it acts to establish sets of associative constraints and orderly connections between its own mass and other mass. This ability to set up orderly relations is what we can consider as energy operating as the ‘force to do work’. The process of measurement, of establishing patterned relations, in no way involves a deliberative and conscious interaction. Mind, the logical and communal action of measurement, operates to transform energy to mass or information but Mind is not necessarily human or conscious for “all nature abounds in proofs of other influences than merely mechanical action, even in the physical world” (CP 5.65) and one cannot “escape the conclusion that general principles are really operative in nature” (CP 5.101). Again, “there is something in nature to which the human reason is analogous” (CP 1. 315). Therefore, Mind “is not consciousness” (CP 7.365) for “consciousness is a special, and not a universal, accompaniment of mind” (CP 7.366). The ‘laws of nature’,

which is a 'tendency toward generalization' are 'primordial' (CP 7.518-521). Mind is the 'process of taking habits' such that "the existence of things consists in their regular behavior" (CP 1.411) and therefore, "the universe is a vast representamen" (CP 5.119). Therefore, we take as a basic axiom of our analysis of energy/mass that there is a need "for mentality to be as 'ontologically fundamental'" (Penrose, 1997, p. 176) as matter and "it is true that the whole universe and every feature of it must be regarded as rational" (CP 6.217). The process of the codification of energy to informed mass is known as semiosis. "The entire universe- not merely the universe of existents, but all that wider universe, embracing the universe of existents as a part, the universe which we are all accustomed to refer to as 'the truth' - … all this universe is perfused with signs, if it is not composed exclusively of signs" (CP 5.449). Again, 'thought is not necessarily connected with a brain. It appears in the work of bees, of crystals, and throughout the purely physical world… Not only is thought in the organic world, but it develops there" (CP 4.551). Information is not confined within language or human or biological consciousness but begins at the primal level of energy.

The architecture of this transformation of energy into informed mass is semiosis or codification, which operates within a series of ontological and epistemological differential cuts. These cuts increase the asymmetry of measurement of energy, and in so doing they establish different rates of mediation of this asymmetry. This leads to an energy flow operating at different temporal and spatial levels of organization. This thereby establishes different forms of energy-as-codified mass. These discrete masses are then mediated by different semiosic codal relations. The first cut sets up an *ontological* reality of internal and external zones of mass, establishing a discrete mass with a boundary line between its 'inside' and 'outside'. Each zone operates within different modes of codification. Then, within both these internal and external zones of codification, there will also be an *epistemological* codal cut that sets up formal laws which provide a stable memory of the normative codification that established that mass in the first place and as well, permits short term informal versions to emerge. Furthermore, these codifications of internal and external, formal and informal, will also evolve in hierarchical complexity by virtue of increasing the asymmetry of codal relations within the three basic ontological realms, from the physico-chemical to the biological to the socioconceptual.

The Ontological Cut

The most basic cut is ontological. This cut measures mass into zones of the external and

the internal and has been defined as 'the Heisenberg cut' (Matsuno, 1999; Primas, 1993; Atmanspacher, 1994, 1999; see also Prigogine's 'phase separation', 1980). This cut, with its distinction between an object and its environment, sets up a dualism that sees both the internal and the external as separate domains of codification and thus permits diversity of relations. The famous statement by Peirce, that "we live in two worlds, a world of fact and a world of fancy.…We call the world of fancy the internal world, the world of fact the external world" (CP 1.321) points out that one realm is subjective, the other realm is objective. It is obviously an important cut, breaking the homogeneity of the symmetry of Firstness, of that 'quality of feeling' that has 'no parts' (CP 1.318).

Codification in the external zone ignores what is going on inside an entity and considers that entity only from the ontological separation of an observer or other's stance. Measurements and interactions of mass in this zone refer only to externally measured units that are modular and impenetrable except by division into discrete parts. This is the familiar mechanical exoperspective of Secondness, operating within the constraints imposed by boundaries. The internal codification, on the other hand, operates within a holistic or near-symmetrical endoperspective, a state of Firstness, a feeling "in its entirety in every moment of time as long as it endures" (CP 1.307). This holistic state is obviously "prior to object-subject bifurcation, in which the so-called external world becomes totally deprived of its ontological solidity" (Atmanspacher & Dalenoort, 1994, p. 1). Measurement and interactions of mass on this subjective level include a basic uncertainty and amorphousness because they lack reference to a comparative 'other' reality with the result that discrete descriptions are impossible (See Matsuno & Paton, 2000; Matsuno, 2001; Atmanspacher, 1999). Measurements within the external zone lose that holism of Firstness "and objects and disentangled observers can be distinguished" (Atmanspacher, 1999, p. 129), for "the nature of fact is in some way connected with the number two" (CP 1.430); that is, with a dyadic relation. Measurements within the external zone are made within classical mechanics and measurements within the internal zone are made within quantum mechanics irrespective of the size of the system. My point is that classical and quantum mechanics are not ideological perspectives but are real processes of measurable experience and that both measurements are required within the ontological nature of energy/mass codifications.

The Epistemological Cut

A second cut, the epistemological, divides both external/internal or classical/quantum measurements into "both *facts* and *models*" (Atmanspacher, 1994, p. 5, italics in original), for "every fact has a physical side; perhaps every fact has a psychical side" (Peirce 1.265). Using other terms, this is the familiar mind/body distinction and has been described as 'the Cartesian cut' (Matsuno, 1999; Atmanspacher, 1994, 1999; Primas, 1993). These measurements establish irreversible material instantiations that are referenced to a formal or mental model of cohesive computation. Computation provides holonomic, which is to say, stable resilient constraints of communal norms, understood as Peircean Thirdness, that resist the dissipative forces of the non-holonomic singular expressions of Secondness which confront this resilience. That is, "the elements of *res cogitans* are non-material entities like ideas, models or concepts [and] the elements of *res extensa* are material facts, events or data" (Atmanspacher, 1999, p. 128). An important point to consider is that these measurements are encoded, or measured, differently. The formal model as a computational or mental process is encoded digitally while the informal instantiations are encoded analogically.

What we have set up is an architecture of dynamics operating within a series of ontological and epistemological cuts. Matter and mind are not the same and our world operates within a basic duality. However, in contradiction to the Cartesian and Platonic dualism, matter and mind cannot exist separately but only within a permanent entailment. We may postulate a universe that began in symmetry and moved into increasing modes of asymmetry. These cuts would then be mediated or entailed by the emergence of relational bonds, the Peircean 'taking of habits' of Thirdness. In order of extremes, a relational interaction will set up iconic, indexical or symbolic entailments. An iconic or mimetic relation is operative where the differentiations in codification established by the measurement cuts are slight, where there is a "mere relation between the sign and the thing signified" (CP 1.372). Indeed, the relation subsequent to the cut is "a mere quality" (CP 2.243) for the cuts and subsequent separations are amorphous and unstable. A more unequivocal cut will enable a distinct separation and a subsequent indexical relation which acknowledges the physical separation by being itself an "actual existent" (CP 2.243). The most asymmetrical cut will enable a symbolic relation, involving abstract "imputed characters" (CP 1.558). The symbolic relation that links these entities requires an intentionality and as such the symbolic relation permits the most plastic and innovative relations for these relations exist entirely by "the fact that it is used and understood as such"(CP 2.307). On another point it should be noted

that asymmetry increases the length of time that it takes to establish a relation. Iconic measurements can establish relations rapidly for there is little to differentiate and recognize; indexical requires the establishment of a physical bond and increases the reaction time; the symbolic, which is arbitrary and learned, requires the longest reaction time. These temporal discrepancies cannot be overlooked in a consideration of the entire semiosic architecture.

Energy-as-mass operates within dynamic phases or steps that are non-equivalent and non-reducible. What we have are a "linear superposition of states"..with these states themselves involved in a superposition of "different spacetime geometries" (Penrose, 1995, p. 337). What are these levels of codification of energy and how do they interact? We will consider five basic codifications of energy. We must be careful to distinguish these different modes of organizing energy and also understand that they are, though separate, entangled.

The Three Semiosic Modes or Categories of Codification/Measurement

I will outline here the three basic modes of measurement or codification of energy within the Peircean categories of Firstness, Secondness and Thirdness. The universe operates within a semiosis that produces mass operating within an absolute first of total possibility, an absolute second of individuality or instantiations and an absolute third of norms or habits of the community. These are only the basic modes; in the actualization of energy to mass, these modes will readily combine and become more complex.

Firstness

Firstness is a mode of codification of energy that generates mass organized in a codal behaviour that can only be described as a 'plenitude of potentialities'. As Peirce notes "The idea of First is predominant in the ideas of freshness, life, freedom. The free is that which has not another behind it, determining its actions...freedom can only manifest itself in unlimited and uncontrolled variety and multiplicity; and thus the first becomes predominant in the ideas of measureless variety and multiplicity" (CP 1.302). This measurement is "an instance of that kind of consciousness which involves no analysis, comparison or any process whatsoever, nor consists in whole or in part of any act by which one stretch of consciousness is distinguished from another" (CP 1.306). Codifications operating in a state of Firstness are operative at a high temperature, continuously perturbed, and encoding a profusion of potentialities which are real in themselves but in such an amorphous state that they are unable to move into discrete

instantiations or measurements. This type of codification is completely internal, i.e., without the capacity for differentiation which is supplied by an ontological cut between 'inside' and 'outside'. This level is unable to implement descriptive referential properties as stabilizers. As noted, "the internal perspective is fundamentally distinction-free, i.e., no object can be distinguished from anything else" (Atmanspacher, 1994, p. 15). Therefore, it is not a sensual experience, it is not a subjective experience, for "it is not anything which is dependent, in its being upon mind, whether in the form of sense or in that of thought. Nor is it dependent, in its being, upon the fact that some material thing possesses it" (CP 1.422). Without the constraints of definitive measurements and a referential memory to stabilize the codal relation, this type of codification enables energy to explore its internal phase space in an expansive and arbitrary manner, in what is conceptually understood as 'emotive' or 'imaginative'. It has an expansive mobility lacking in the discrete modes of codification and "properties can pass from definiteness to indefiniteness and conversely" (Shimony, in Penrose, 1997, p. 151). This is because energy encoded in a mode of Firstness merely seeks out iconic representations of itself in its most amorphous and indefinite formulae, which can be found in almost any encodement.

Firstness is an internal and therefore insulated processing of energy where its codal properties are homogeneously spread out in a continuous space. Energy encoded in a state of Firstness is, as indeterminate, operative as multiple superpositions of potentiality. Energy in such a mode operates as "the present, being such as it is while utterly ignoring everything else, is *positively* such as it is" and therefore "The first category, then, is Quality of Feeling, or whatever is such as it is positively and regardless of aught else" (CP 5.44). Energy in this state exists as mass but a mass which, in itself, uncertain in its profusion of possibilities, is non-local and therefore incapable of 'doing work', of setting up relations within local differentiations that would transform energy from one distinction to another.

Secondness

Secondness is the basic mode of all our sensate and conscious experience, in the sense that it describes both a physical and mental awareness of differentiations within our external environment. Secondness refers to "such facts as another, relation, compulsion, effect, dependence, independence, negation, occurrence, reality, result" (CP 1.358). Secondness is the collapse of the expansive symmetry of Firstness, it is the compression of the high temperature and energy actions of Firstness within asymmetrical constraints

such that energy is then 'cooled' and 'slowed' such that it can move into a state of observable or differentiated concrete facts. Energy in a mode of Secondness operates within an integrity of cohesion that produces discrete demarcations. These demarcations emerge within the irreversible selection of a specific path, where a 'choice', random or intentional, is made, and that particular instantiation or fusion of mass emerges as differentiated from another mass. The "idea of second is predominant in the ideas of causation and of statical force…constraint is a Secondness" (CP 1.325). Secondness is 'the element of *Struggle*" (CP 5.45). Secondness is the mode of codification that underlies the actual 'felt' experience that compels attention, the concrete immediate action-reaction of our experience. Energy coded in this way acts as the "mutual action between two things regardless of any sort of third or medium, and in particular regardless of any law of action" (CP 1.322). The key to Secondness is the indexical physical link, that state where "it is a real thing or fact which is a sign of its object by virtue of being connected with it as a matter of fact" (CP 4.447). Mass encoded within Secondness is bonded to its local context. With an obvious reference to classical physics Peirce states that "there has been during the nineteenth century a decided leaning of scientific opinion to understand a dynamical force to be a purely brute force with no element of inherent reasonableness in it, but merely to be the only force that scientific research could discover" (CP 6.329). This is an externalist or non-interpretive mechanical interaction and we should remember that these discrete instances are brittle, contextually bound to initial conditions and without, themselves, the stability of memory.

Thirdness or Coherence

Thirdness is a mode of mediate measurement that we have, as a result of the Newtonian focus on proximate and indexical causality ignored and indeed denied for years. However, "there is some essentially and irreducibly other element in the universe than pure dynamism or pure chance [and this is] the principle of the growth of principles, a tendency to generalization" (CP 6.322, 6.585). As Peirce states, "universality is a relation of a predicate to the subjects of which it is predicated. That can exist only in the mind, wherein alone the coupling of subject and predicate takes place" (CP 8.18). Mind, as a universal process of logical development, is real. "Not only may generals be real, but they may also be *physically efficient*, not in every metaphysical sense, but in the common-sense perception in which human purposes are physically efficient" (CP 5.431, italics in original). Thirdness operates as the ongoing analytic or interpreted compression of contextual or local analog codes into decontextualized digital codes.

"Judgement in general is the faculty of thinking the particular as contained under the universal" (Kant, 1991, M18). This gravitational compression (Taborsky, 2000, 2001) of the codes from the local to the global enables a broader codal measurement that has the ability to "propagate over the whole system…[and] for this reason they are also called 'collective modes'" (Vitiello, 1998, p. 192). Thirdness takes descriptions of codification of mass from the diverse local instantiations of the community and develops a syncretic diagramme or general laws of relations of these descriptions such that discrete local instantiations, within Firstness and Secondness, can emerge in the future as contextual versions or representations of these more generalized communal Laws.

The two processes, the particular and the general, are entangled in a basic evolution of each other. "Argument can only urge the law by urging it in an instance" (CP 2.253). As such a developing future-oriented interpretation, as a universal or collective process of generalization and habit-taking, Thirdness is a regulative principle and as such a measurement, it is a "matter of law, and law is a matter of thought and meaning" (CP 1.345). A key point is its temporal nature. Thirdness is a generative or future-oriented or evolutionary process, expanding the community from the local to the global, from past time to future time, for "not only will meaning always, more or less, in the long run, mould reactions to itself, but it is only in doing so that its own being exists [and it]…is that which is what it is by virtue of imparting a duality to reactions in the future" (CP 1.343). This awareness of the differentiation of time into the 'current' and the 'future' is a vital point and will be considered later in the paper. Codifications within Firstness and Secondness operate in current time (see Matsuno's present progressive and present perfect, respectively, 1998). Codifications in pure Thirdness link this present-time mass to future-time mass.

Pure Thirdness, as interpretation, has no mass and is therefore the exclusive property of Mind rather than Matter. As mind, "the infinite does not exist potentially in the sense that it will ever have a separate existence; it exists potentially only for knowledge. For the fact that the process of dividing never comes to an end ensures that this activity exists potentially, but not that the infinite exists separately" (Aristotle *Metaphysics* 1048b15). Thirdness is therefore completely different from the modes of codification of Firstness and Secondness for these latter are not interpretations or representations but are first order physical expressions of interpretation that exist in current time. Thirdness, as a process of interpretive compression; that is, an analytic argument of these first order physical units is entangled with them but is clearly a different procedure. Therefore we have not only an ontological cut between the internal and the

external, but the differentiation of codes between physical and mental sets up an epistemological cut that distinguishes 'matter' and 'mind' and present time and future time. To conclude that mind and brain or mental and physical states are the same, is to say that form and function are the same, and that current and future time are the same, or at least, isomorphic to each other and this paper is denying such an architecture. Mind, which operates within "final causation" (CP 1.265) and matter, operating in efficient causation, cannot be merged, for "to confound these two things together is fatal" (CP 1.265). Thirdness, that primal mental process, is the process of evolutionary learning, the "power of taking habits" 1.390). Paton calls such a process of developing this epistemological coherence 'glue' (Paton & Matsuno, 1998). This is a succinct image of its cohesive powers as a resilient dynamic force of an evolutionary cohesion.

What we must consider, however, is that this dyadic architecture with its ontological and epistemological cuts is not adversarial but indispensable. The reality of the cuts and the introduction of asymmetry establishes a dynamic and evolving process of codification. Again, the cuts set up different rates of energy flow and modes of organization to deal with this dynamic flow. Each codal action provides different properties of both constraint and dissipation and as a whole, enables the entire system to develop an active flexibility and adaptive capacity.

The Five Basic Codal Predicates

I posit five basic codal predicate operations; that is, five different processes of codification that encode energy to mass, within these ontological and epistemological cuts. A sign is actually a sentence, made up of a noun or particle and a predicate or relation. (Taborsky, 2001). I am here considering only the predicate or relational properties of the sign. They are:

Firstness as Firstness [1-1] This develops a pure possibility
Secondness as Firstness [2-1] This develops a possible existent
Secondness as Secondness[2-2] This develops an irreversible existent
Thirdness as Firstness [3-1] This develops a law of probabilities, of possibilities
Thirdness as Secondness [3-2] This develops a law of actual existences

The point is, these five different predicate codal processes are not all found within the same zone of operations. They are spread out over both the external and internal, physical and mental zones. In the external zone, the operative codes are: Secondness as Secondness [2-2] and Thirdness as Firstness [3-1]. In the internal zone the operative codes are: Firstness as Firstness [1-1], Secondness as Firstness [2-1] and Thirdness as

Secondness. Epistemologically, Thirdness will always be encoded within a digital measurement and Firstness/Secondness within an analog measurement. The conclusion can only be that we cannot live within one side of the cuts but require both sides.

Analog and Digital

Energy is transformed by measurement to mass, which is thereby enabled to act as ‘informed’ or mass-in-relationships. There are two basic codal modes of measurement; the digital code provides a compressed decontextualized or distributed measurement and the analog code provides an entailed contextualized measurement. The digital codes provides collective cohesion by increasing its breadth of codal coverage and reducing the depth. The analog code decreases the breadth and increases the depth to provide a discrete instance of encoded mass. Both forms of codification constrain energy, the digital by gravitational compression and the analog by contingent bonds.

A digital code is broad, general, expansive; an analog is specific, once-only and niche-dependent. Dretske outlines the difference between an analog and digital encoding as ‘the difference between a continuous and a discrete representation’ (1981, p. 136). Temporally, the digital code operates in past/future time and acts as a future oriented cohesive pattern of habitual interactions while the analog code sets up a local and irreversible once-only mass. The *haecceity* or contextualized *thisness* in current time is the essential demarcation of an analog code. The digital abstracts information from the local contexts and sets up an interpretation that is general enough that an analog instantiation can replicate that interpretation in another place and another time. Obviously, the digital is a codal process operating in Thirdness, while the analog is a codal process operating in Secondness. Mass that is codified within a digital mode cannot in its nature as a formal abstraction ever be completely articulated within these analog instances. Peirce was quite emphatic on the distinct identity of the two codal categories of Thirdness and Secondness. “It is first requisite to point out something which must be excluded from the category of fact. This is the general” (CP 1.427). The category of Secondness, with its capacity for “the contingent, that is, the accidentally actual” (CP 1.427) provides the analog with an expansive freedom of exploration.

The two sides of this episteomological cut, the digital and analog, mind and matter, together provide important features for a complex system. Digital codification establishes a metareferential measurement operative in past future time. It can only operate in past/future time because it has no contextual or current ‘thisness’ links - for these links only operate within Secondness. There are two dominantly digital codes:

Thirdness as Firstness and Thirdness as Secondness. Both these modes establish a different metamodelling process. On the other hand Firstness and Secondness are measurements, within analog codes, that establish instances in current time that are dependently linked with other instances. We have in our table, three types of dominantly analog codes: Firstness as Firstness, Secondness as Firstness and Secondness as Secondness. Let us explore these measurements in more detail.

The External Zone

The external zone is the zone of our individual lived experiences, measured within Secondness, the category "which the rough and tumble of life renders most familiarly prominent" (Peirce 1.324). Measurements and interactions of mass on this level of codification refer only to externally measured units functioning as discrete instances that are modular and impenetrable except by division. There are only two possible interactions within this zone are the brute force of physical analog interactions of action and reaction, encoded as an analog Secondness-as-Secondness [2-2] and the generalizing mediation of the statistical central tendency of these instances, encoded as a digital Thirdness-as-Firstness [3-1].

The codal process of pure Secondness [2-2] is a clear differentiation of energy as encoded from another mass of energy-as-encoded. Bonded or fused energy is encoded into a discrete mass, differentiated within local spatial and temporal parameters, whether for a nanosecond or a century. It operates in a temporal state of 'now', Duns Scotus' famous '*hic et nunc*', a state that is currently finite and currently closed within points, in what Matsuno has termed 'the present perfect' (Matsuno, 1998), a 'present active' time within precise mechanical instantiations which can be measured quantitatively. It is easy to transfer some of the active energy stored in a state of Secondness directly to another system in a state of Secondness. This is Newton's mechanical proximate force, where a kick can propel a football. Bonded energy interactions are mechanical and are based on attraction and repulsion of individually differentiated particles of mass[1]. This is why we say that the classical or external realm is mechanical, lacks emotion, subjectivity, imagination, connection, stable relations and all the other complaints we have against this level.

Each zone within the ontological cut, the external and the internal, also has two epistemological codes, the digital and the analog. External analog codification measures energy within discrete units of pure Secondness. This mass operates as a random babble of discrete units without any general sense of order or communal interaction or even

any ability to self-organize such a normative rule. A common metaphor for this phase is the chaotic savagery of a primitive mode of existence, whether a geological primal soup or human asocial barbarity. These random interactions can only move into an ordered state by means of the other epistemological code, the digital, which operates as an inductive referential process, a features-extraction top-down process of digital measurement.

The metalevel description of Thirdness as Firstness [3-1] sets up a formal prototype model to provide a cohesive overview, a stochastic average of probabilities, which acts to reduce entropic dissipation by establishing a normative or relatively inert 'rule of order'. These laws are not analytic arguments about the discrete units but are descriptive or formal standards. That is, this code acts as an abstract diagramme (its mode of Firstness) but with the authority of Law (its mode of Thirdness) and describes/represents reality as uniform. This measurement is 'Thirdness degenerate in the second degree', where "the irreducible idea of Plurality, as distinguished from Duality, is present" and it is "where we conceive a mere Quality of Feeling, or Firstness, to represent itself to itself as Representation" (CP 5.70, 71). As Peirce noted, "induction depends for its validity upon the uniformity of Nature" (CP 6.410). Codifications of the discrete units, to be credible rather than deviant, must refer to and iconically model themselves after these authoritative rules of the normative. This model therefore constrains the codal nature of instances by its exclusion of marginal measurements from its normalizing template. This 'negative habit' actually induces a massive loss of energy from this peripheral zone, which energy dissipates entropically to a lower level of organization, the internal, where it is picked up and recodified. Therefore, the external mechanical realm is itself a dynamic source of thermal energy, of Firstness-as-Firstness [1-1], which will be reorganized within the internal realm.

We have read this view of the dyadic nature of classical mechanics often in descriptions of animal life or of primitive man. In these scenarios, the preconscious random mode of 'original chaos' is understood to last until an authoritative communal modeling process emerges to develop constraints by an authorial description which governs agent-environment interaction. This diagramme, by virtue of its authority, serves to reject nonessential and peripheral interactions as 'noise' or atypical. A question to answer is - does this cohesive process require a human agent as its collator and enforcer? The answer is no- for a process such as natural selection achieves the same result, with its focus on the average and its indifference to the marginal.

The external processes of codification can only describe itself by means of this general

representational diagramme, and this leads to another problem, for this referential model as a formal model can only refer to and accept the normative majority. It rejects deviation as toxic to its design and therefore, as a stand-alone process, the external zone is unable to evolve new codifications. As a stand-alone system, the only way for a new formal model to develop would be for a systemic destruction and replacement of the model, as in catastrophic extinction and social and political revolution. In addition, if physically and temporally separated from its mass, the diagramme can become reified into an atemporal and aspatial inflexibility, with no capacity for modification and learning. The static model can then take operative precedence over reality, which becomes enslaved to the model[2] and all potentiality is reduced to a homogenous symmetry.

The classical mechanical form of measurement, however, is vital. What it provides is, first, the integrity of mass, encoded in its 'thisness'. These instances interact without knowledge of their identities beyond a physical attraction or repulsion. The cohesion, the normative glue that sets up the laws by which these discrete entities interact is, as noted,Thirdness-as-Firstness [3-1], which is to say it is a normative stochastic average which ignores and is insensitive to the marginal. This mode of instantial interaction increases asymmetry because it repels the unfamiliar; the mode of cohesion acts as a 'negative habit' (CP 1.390), where the law, that statistical average, will forget peripheral behaviour. These two negative relations serve to increase asymmetry and the system will struggle to rehabilitate itself, it will dissipate as much energy as it can to decrease this asymmetry and reduce uncertainty. The increasing entropic release of energy by the external zone can be called 'the principle of forgetfulness' (CP 1.399). This released energy enables another zone to act as a dynamic enterprise. The released energy will be picked up by the internal zone, the quantum zone which will transform that thermal energy into new and innovative mass.

The Internal Zone

Measurement or interactions of mass in this zone include a basic uncertainty and amorphousness such that discrete separation of internal codal properties is impossible. Internal measurements operate by quantum mechanics and codification in the internal zone is actually more complex than in the external zone. The >asymmetrical, endo processes [are] more energetic than exo interactions@ (Farre, 1998, p. 684). There are three types of measurement: two are analog, Firstness-as-Firstness [1-1], Secondness-as-Firstness [2-1] and the digital is Thirdness-as-Secondness [3-2].

The first action of codification is an inclusive sweeping 'take-all' gathering of energy within the initial causes that establish the internal/external boundaries of the instance, within the code of Firstness-as-Firstness [1-1]. This is thermal energy, a radiant energy available, not only in itself as low-organization mass, but for energizing other forms of codification, which is why we understand thermal interactions to take place via conduction, convection and radiation This sets up an analog iconic codification of inclusiveness that is so unfocused that it is able to present a diversity of properties superpositioned simultaneously and potentially available, a quality of feeling that shows "myriad-fold variety" (CP 5.44). Mass codified within a state of pure Firstness provides a rich potential of energy. The system oscillates between all its potentials simultaneously. Mass could, theoretically, stay this way in an eternal mist of potentiality. The reason it does not do so is because the first ontological cut has established an inevitable contact with an external reality - and that external reality, encoded within classical mechanics, imposes the constraints of both uniqueness [2-2] and majority description [3-1]. An observation or more accurately, a relation established between one 'mass' of energy and another - in this case, between an internal and external zone of codification - will collapse and reduce this internal primal potentiality to one choice (McFadden & Al-Khalili, 1999; Penrose, 1995). This vague mass of potential properties of pure Firstness will therefore be reduced, it will be contextualized, its properties will "be conceived in a relational way as they depend on a changing material context@ (Kampis, 1994, p. 103).

The second codification in the internal zone is a borderline zone codification that operates witin the membrane phase between the internal and external zones. This borderline code, an absolutely vital process, has properties that are external, i.e., Secondness, and properties that are internal, i.e., Firstness. It is a codification of Secondness-as-Firstness [2-1] and operates as a mode of prescission, a highly charged electromagnetic zone of attraction, which focuses "attention to one element and neglect of another" (CP 1.549) and yet this process is based on "perception without judgment" (CP 7.643). It is a degenerate form of Secondness where the second part of the measurement is qualitative and dynamically open, and acts as an enzymatic demiurge of editing mediation. As such, this measurement operates as an attractor funnel, ready to attract, bond and confine itself within the precise existent codes of the external realm and yet also exploratory due to its internal vagueness. "The endo/exo interface can now be recognized as an *information amplifier*" (Kampis, 1994, p. 90) but it does not act merely to amplify an already existent inert code but to actively explore and create new codal relations. We can certainly say, because of this indexical link with the external realm, that this borderline codal process will also be affected by the external cohesive

central tendency descriptive properties of Thirdness-as-Firstness [3-1] as well as the internal cohesive inclusive properties of Thirdness-as Secondess [3-2]. It is a decisive and key codal process and can be explored as ‘free energy’.

Free energy is not ‘free’ in the traditional sense of the word but is a mixed or degenerate codification of energy, a mixture of the internal and external, the quantum and the classical properties of codification. It is “an available work potential that is free of actual energy” (Stoner, 2000, p. 110), which is to say, it is energy encoded in such a way that it is not in the closed fused state of pure Secondness [2-2] nor is it in the random expansive and almost out-of-reach state of pure Firstness [1-1]. We must not understand the term ‘genuine’ or ‘degenerate’ in an evaluative manner. A degenerate semiosic process is one that merges with another category, therefore degenerate Secondness includes a process of Firstness. A degenerate Secondness can be understood to “arise from the mind setting one part of a notion into relation to another” (CP 1.365) without the actualization of that notion into a discrete sign unit. Therefore “free energy expenditure is what makes things happen within finite amounts of time” (Stoner, ibid). It is, like pure Firstness, an internal mode of codification, for “all degenerate seconds may be conveniently termed internal, in contrast to external seconds, which are constituted by actual fact, and are true actions of one thing upon another” (Peirce 1.365). However, free energy is in a mode of active decision-making; it is, as prescission, focused upon a specific interaction with the external realm of encoded mass and as an attractor, is not merely a result of the external statistical average (i.e., a result, for example, of natural selection), but is also an active agent in moulding that cohesive digital code.

As for the internal digital code, we find that it operates by a process very different from the external cohesive process. The classical level cohesive force of Thirdness-in-Firstness sets up an authoritative overview that is impervious to local noise and that acts as an iconic diagramme of the whole. However, in the quantum level, mass in its instantial or analog forms of Firstness-as-Firstness [1-1] and Secondness-as-Firstness [2-1] is not stabilized by being referenced to that >higher-being= representational codal system as found within classical mechanical codification, but is stabilized by being actually physically linked within a network of plastic relations encoded as Thirdness-as-Secondness [3-2]. This is Thirdness degenerate in the first degree, where the cohesive relation is a type of Secondness, as “a pin fastens two things together by sticking through one and also through the other” (CP 1.366). This is an ‘accidental third’ (CP 1.366) where the bonds are without either descriptive or analytic powers. The digital

computations that develop a communal memory within the internal zone of experiences operate as a >natural system of representation=, which A have their *own* intrinsic indicator functions, functions that derive from the way the indicators are developed and used *by the system of which they are a part*” (Dretske 1988 62:italics in original). Internal cohesive codal relations do not depend on a higher-being or statistical average perspective. Rather, the internal digital cohesion is “thought playing the role of a Secondness, or event” (CP 1.537). The internal computation sets up a network of physical relations that link each instance to another instance. In contrast to the external zone, these digital laws include rather than exclude deviation from the norm. This spider-like network is held together, not by symbols, not by authority, but only in its nature as a physical inclusiveness of all mass, in any form, in its local environment.

The two realms

Change to the classical model can only come about by a population change such that the statistical average is recalculated at threshold interims. Change to the connectionist quantum network is continuous for the system operates within a plenitude of disorder with its superposition of potentialities that effectively operate on and affect each other. Therefore the indexical internal network is always in an impermanent state of an emergent holistic discourse. This emergent discourse will move into the external realm via the membrane phase codification of Secondness-as-Firstness [2-1]. As we saw, within the external zone, Thirdness acts as a normalizing cohesion, a judgmental agency of stabilization, rejecting and effectively starving deviants into dissipation. Internally, Thirdness is holistically inclusive, physically linking without discrimination or judgment all and every item of codification. In this internal zone there is no such thing as the peripheral and the irrelevant, no such thing as true or false. They are all ‘part of the operative community’. Without the capacity for discrimination, it cannot select its future and therefore it too, if operating as a stand-alone realm is like the external and unable to evolve. However, if one links the ontological internal and external realms, then the cosmos suddenly becomes dynamic. It is capable of moving energy by measuring it within different modes of codification. If one adds an epistemological capacity for storage and expansion of these codes, and for variation of codification within single instances, then evolution is inevitable.

The reality of the ontological and epistemological cuts seems to establish a basic dualistic struggle with two very different methods of encoding energy - one familiar over the centuries as the dilemma of continuity versus plasticity. Suggestions to deal with

this separation have ranged from decreasing their opposition, as in the gradualism or slow-learning model, where small seemingly random changes on the microscopic or quantum level will, in the long run, supposedly in an additive fashion, provide a new property on the classical macroscopic level. A version of this has been the 'hidden-unit' concept, where the microscopic code is understood to be supervened by the macroscopic privileged code; it is alleged that errors of interaction will eventually degrade the dominant code and the hidden or enslaved code will emerge. Then, there is the catastrophic model, where the tension between the system and the environment will collapse its normative rules to permit the quantum level (again understood as tacit or hidden) to take over, for a time, to randomly generate new links and interpretations and representations, which will then develop hierarchical habits and the classical level of dominant enslavement will then take over. What we must consider, however, is that this dyadic architecture should not be reconciled but maintained as indispensable, because each codal system provides unique properties of mass and time. A triadic mode of mediate codification has long been argued as the means to both permit and engage this basic duality, including the famous middle term of Aristotle, for "all questions are a search for a 'middle'" which are the causes" (*Post. An.* 90a-35). With this, we may begin to understand the function of pure Thirdness, which governs the two forms of degenerate or mixed Thirdness.

The Material Forms of Thirdness

Thirdness works to set up a cohesive template, to glue, to bind. Pure Thirdness does not operate in present time and space. It cannot, for it is massless. This past/future codal force only exists when its codal actions are bound with mass, that is, when its digital codes are processed within current-time mass-forms of codification using Firstness and Secondness. There is Thirdness-as-Firstness [3-1], which is the inductive abstract averaging that we find within classical mechanics. This is where "'Nature's Laws' are nothing but prognostic generalizations of observations" (Peirce doc. 3804-10; in 1998, p. 70). In this mode, Thirdness-as-Firstness acts as a communal referential constraint on discrete instantiations of Secondness by setting up general definitions within a set-theoretic model of the universe. And, there is Thirdness-as-Secondness [3-2] which is the internal measurement-induced link that we find in quantum mechanics. This is a holistic network of internal attachments, a malleable fabricated net rather than an objective description. In these two degenerate modes, Thirdness leaves observable or material traces within the instantiations of Secondess, whether within free energy [2-1] or bonded energy [2-2].

The Question of Pure Thirdness

There is one further mode of codification that we have so far neglected, and that is pure Thirdness, Thirdness-as-Thirdness [3-3]. Thirdness in any form is a gravitational force, acting as a process of cohesive compression and contraction. However, Mind as pure Thirdness is massless. Can it exist?

If we posit current time as dominant (see Matsuno's present progressive and present perfect time, 1998), then degenerate Thirdness can operate in quantum mechanics as the two-dimensional holographic distributed process in the brain as differentiated from three dimensional actual mass-instantiations (Pribram, 1986, 1991), it can operate as coherent excitations in cell membranes (Frolich, 1984), as microtubule vibrations operating in Objective Reduction in molecules (Penrose/ Hameroff, 1998). It can operate within classical mechanics as a referential diagramme of normative behaviour. Within these two generate modes, as an abstract codal force of gravitational cohesion, "it can span the whole system volume without inertia" (Vitiello, 1998, p. 193) and it is understood that "the ordering information will be carried around without losses and that the ordered pattern is a stable one" (1998, p. 193). That is, if we posit that pure Thirdness, in itself massless, will entangle with the codifications of Secondness and Firstness in any of their forms, then the quantum microscopic network will entangle, by means of this mediation, with the classical macroscopic referential system. What happens is that the ontological and epistemic gaps in the dyadic architecture will at a critical degree of mediate intervention become unstable and an objective or Thirdness-mediated reduction will take place, coalesced by the force of gravity, that will link the codes of the two zones: the external and internal. As Hameroff points out, 'the precise outcome is chosen by the effect of this hidden logic on the poised system" (1998, p. 207). However, because of the filiation of Thirdness with the other forms of codification, this codification is not 'necessary' or 'pure' but open to chance, for "the logic of evolution and of life need not be supposed to be of that wooden kind that absolutely constrains a given conclusion. The logic may be that of the inductive or hypothetic inference" (Peirce 6.218), which is to say, of Thirdness-as-Firstness or Thirdness-as-Secondness. The necessary entailment of Thirdness with Firstness and Secondness nullifies essentialism, denies necessity and permits both pure chance and reactive measurements to operate in our cosmos.

Penrose and Hameroff see the relation of Law to Mass as a process generated by Platonism, where "ideas have an existence…an ideal Platonic world…accessible by the intellect only…this Platonic world of forms" (1994, pp. 412-417). That is, they see pure

Thirdness as Law operating within present time Mass, while I suggest that only degenerate or mixed Thirdness operates within present time. In differentiation to the Platonic and Penrose format of an ideal and self-existential Form, I see pure Thirdness as equally an operation of logic and therefore Mind, but operating within the Aristotelian and Peircian insistence that it only exists, analytically separate though it is, in a degenerate form as physically entangled with mass, within the physical and mental world of immediate reality. For "all mind is directly or indirectly connected with all matter…so that all mind more or less partakes of the nature of matter" (Peirce 6.268). Pure Thirdness as massless is not self-existent in itself, it does not exist as a 'hidden logic' (Hameroff, 1998) and therefore cannot act in current time as a discrete objective observer or separate Ideal Form. Thirdness is instead a process of codification that operates within the masses of other systems, binding and reorganizing different temporal and spatial scales. A law , as an abstraction, requires its embodiment within mass. So the law is true "only in so far as the law has its being in instances" (CP 2.262). Aristotle, for example, argues long against the separation of Form from Matter. He agrees fully that the two exist but not apart, for "to reduce all things thus to Forms and to eliminate the matter is useless labour" (*Metaphysics* 1036b20). Aristotle continues with "again, it would seem impossible that the substance and that of which it is the substance should exist apart; how, therefore, could the Ideas, being the substances of things, exist apart" (991b). Aristotle's answer is that these Forms and interpretations do not exist, in themselves, as mass (998a), but they exist within mass (999b). Calling this 'the universal', he inserts it as a relation, a predicate, for "by the universal we mean that which is predicable of the individuals" (1000a). Throughout the Metaphysics, it is agreed that the universal or form is not a substance, i.e., is not mass, and is "common to the many" (1053b), and operates as a predicate, i.e., a logical or interpretive relation.

Is genuine Thirdness doomed to operate only in its mixed or degenerate forms, as Thirdness-in Firstness, that inductive collation, or as Thirdness-in-Secondness, that spider's web of quantum links? For Peirce, despite the fact that Thirdness is not 'ipso facto real' (Peirce 5.95), which is to say, it is not a discrete mass, these "general principles are really operative in nature" (CP 5.101). I suggest that genuine Thirdness operates, not in current time, but in its temporal format as past/future codifications, as a gravitational attractor to these two degenerate forms of Thirdness. That is, it operates with them, separate, yet linked, as an additional force of mediative attraction focused on the pragmatics of the future and as such, is the genuine final cause, acting in its pure form, within symbolic rather than iconic or indexical codification. In other words, the socioconceptual realm, is a vital component of our cosmos, linked with the physico-

chemical and the biological realms (Taborsky, 1999).

The Architecture of Organizational Complexity

What we have is a cosmos made up of three different semiotic realms, the physico-chemical, the biological and the socioconceptual. Each realm operates within both ontological and epistemological cuts and, at the least, five different modes of codification operate within each realm within a constant dialogical discourse. The types of codification will differ according to the realm because the degree of separation of the cuts is not the same in each realm. This means that, in total, we will have a complex 'buzz' of semiotic complexity within the cosmos.

Epistemologically, we have an intricate entailment of mind and matter. In the physico-chemical realm, the cuts are minimal, codal relations are primarily iconic and therefore encodements are unable to clearly differentiate type from token, external from internal, digital from analog. The physico-chemical realm operates smoothly within minimal temporal and spatial disparities. This enables a universal iconic spread of these physico-chemical properties but prevents variation and evolution. In the biological realm, the temporal and spatial disparities increase. The codal relations to mediate these discrepancies can no longer be iconic but become physical links and are predominantly indexical. Therefore, tokens are chance variations of types. This enables the biological realm to produce diversity and irreversible variations according to the local ecology. In the socioconceptual realm, the temporal and spatial disparities increase to enable symbolic relations where the tokens are metaphors of the types. This enables an explosion of innovation, while at the same time, it inserts the requirement of a conscious and accountable choice.

Ontologically, we have the external and internal zones. The external provides relations that enable discrete entities and a cohesive force that focuses on the strengths of the majority while at the same time, it promotes entropic dissipation of the marginal, so that this energy - affected by its external experiences and thus recodified - is returned to an open system for further codification. As noted, this 'return' will affect the internal measurements which will, in their own cycle, affect the external. The internal provides relations that promote expansion and exploration and a cohesive force that focuses on an indiscriminate inclusion of all variations. What is of interest is that the external becomes another system's internal; the internal becomes another system's external. This means that the external and internal, the classical and quantum are not exclusionary but are operating at the same time in the same space in a parallel process.

These two realities, the external and internal zones have been viewed as antithetical to each other. How does one deal with this perspective of contradictory worlds? Some have rejected the one in favour of the other. One level is real and the other a figment of our imagination B and which is the real and which the fictive has been a matter of intense debate, whether between the symbolists and connectionists in artificial intelligence or the modernists and postmodernists in social theory. What if, rather than the one or the other of these zones, we postulate that our world necessarily requires both? How can we have one world operating with processes that are contradictory to each other?

The solution to the >problem= of the ontological and epistemological cuts may be an acceptance and promotion of both their mass and temporal asymmetries along with their associative filiation - within the process of codified measurement. Together and only together, they provide the capacities for a generative and exploratory transformation of energy to mass, creating closures as actual >bits= of informed, i.e., contextualized mass, dissolving these closures and generating new closures, not haphazardly, but within the workings of an exploratory and evolutionary logic and pragmaticism. If we accept that Athe emergence process is itself the result of the binding of two dynamical regimes, the endo-regime which is synergetic in nature, and the exo-regime of complex interactions@ (Farre, 1998, p. 685), then, we must both insist on and aggressively research the nature of this binding. What new understandings would be required to break with the established view which sees these two worlds as separate and non-dialogical? We advocate an architecture somewhat like a moebius strip, where the boundaries of these two realities or worlds are filiated, as in a double-helix, without denigrating the integrity of each string. This dynamic synechism of energy, moving it within various processes of codification, is the semiosic nature of our universe.

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Endnotes

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1. Bonded energy can be described by an external stable referential system, which would then make that natural data ‘information’. Measurement is a property of information; however, information is not a physical entity but is a representation of a physical entity. ↩
2. This is the operative basis for fundamentalism, where the rules are detached from interaction with the current instantiations and are set up as an a priori authority. ↩