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Some Consequences (and Enablings) of Process Metaphysics

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Abstract The interactivist model has explored a number of consequences of process metaphysics. These include reversals of some fundamental metaphysical assumptions dominant since the ancient Greeks, and multiple further consequences throughout the metaphysics of the world, minds, and persons. This article surveys some of these consequences, ranging from issues regarding entities and supervenience to the emergence of normative phenomena such as representation, rationality, persons, and ethics.

Keywords Metaphysics · Process · Supervenience · Emergence · Normativity · Function · Representation · Action · Rationality · Modality · Persons · Ethics

Contemporary thought is dominated by a particle-based metaphysics that can be traced to at least Parmenides and the responses of Democritus and Empedocles (Graham 2006; cf. Palmer 2010). There are, however, multiple reasons for working within a process metaphysics rather than a substance or particle metaphysics,[1] both in terms of consistency with current science and in terms of the further philosophical and theoretical developments that are thereby enabled.

[1] Parmenides argued (against Heraclitus) against change, and Democritus and Empedocles proposed models of apparent change with an unchanging substrate—atoms for Democritus and substances for Empedocles (Graham 2006). It is this underlying assumption of the metaphysical necessity of an unchanging substrate that is crucial to the position in the main text, and I refer to such an assumption as that of a substance metaphysics, for both "stuffs" as for Empedocles and "atoms" as for Democritus.

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The interactivist model is in fact based on a process metaphysics (Bickhard 2004a, 2009a), and interactivism has explored a number of consequences and enablings of such a metaphysical framework. In this article, I survey several of them. To anticipate two of the advantages: (1) A process metaphysics is consistent with contemporary physics, and (2) it enables an account of ontological emergence, including normative emergence. The discussion provides a quick overview of some crucial parts of the interactivist model from an ontological perspective.

1 Why Process?

I begin with some considerations in favor of accepting a process framework. Five will be outlined:

1. Our best contemporary physics tells us that there are no particles.
2. A pure point particle physics *cannot* model our world.
3. A process metaphysics *can* model our world.
4. A substance or particle framework constrains possible models in detrimental ways, while a process framework reverses those constraints.
5. A process metaphysics enables multiple further models.

1.1 No Particles: Quantum Field Theory

Quantum fields are processes, and have banished classical notions of particles. Interactions between quantum fields are quantized and sometimes local, and those two properties are all that is left of particle notions (Bickhard 2009a; Cao 1999; Davies 1984; Halvorson and Clifton 2002; Huggett 2000; Weinberg 1977, 1995). But those two properties provide no justification for a metaphysics of basic particulars. The mathematics of quantum field theory is that of an oscillatory field, and quantization of interactions of such fields no more entails particles than does the similar quantization of the waves in a guitar string entail guitar sound particles.[2]

1.2 Point Particles

Nothing would ever happen in a world of point particles: point particles have zero probability of hitting each other.[3] Contemporary loose characterizations of the

[2] Quantum field theory is not a complete physics, and, in fact, cannot be fully correct. But there is no returning to a particle framework: non-localities of interactions, a lack of a consistent definition of particle detections in an accelerating frame, vacuum activity (such as the Casimir effect; Aitchison 1985; Mostepanenko et al. 1997; Sciama 1991), and other phenomena are not consistent with the particularities and localities of particles.

[3] Finite sized "particles" would have non-zero probability of interaction, but they encounter serious problems of their own. For example, if they are deformable, then it is not clear in what sense they are fundamental, rather than decomposable. If they are rigidly not deformable, then they would transmit force through their width instantaneously, in contradiction to the special theory of relativity. There would be extreme difficulty in explaining differing kinds of interactions, such as gravity and electromagnetism, and so on. As mentioned next in the text, if a hybrid position is considered, in which point particles interact via fields, this is strictly false, but it nevertheless already grants much of what I take to be of basic importance in a field-as-process framework.

quantum world in terms of particles interacting via fields is a reasonable approximation for some purposes (though strictly false), but for most of my purposes below such a view already grants what I take to be most important from a process metaphysics: particles can participate in organizations, but they do not themselves have any organization. In contrast, fields do have organization, and necessarily so.

In a view in which particles are the basic bearers of causal powers, there is no reason to grant causal power, even potentially, to organization, and, therefore, no reason to take seriously the possibility of *emergent* causal powers in higher level organization. If fields as relationally organized process are recognized as having causal power, however, then causal power must be accorded to the organizations of those fields, and the possibility is open that new process organizations might yield emergent causal power (Bickhard 2009a).

1.3 Process is Necessary and Sufficient

Quantum field theory already demonstrates that a process model can account for most of our world. The necessity for fields constitutes a necessity for process. Seibt (2003, 2009) is exploring the formal adequacy of a process ontology to account for our understandings of our world.

1.4 Constraining Presuppositions of Substance Metaphysics

Against Heraclitus, Parmenides argued that change could not occur, because for A to change into B, A would have to disappear into nothingness and B appear out of nothingness. Nothingness cannot exist, so this is not possible. Democritus and Empedocles proposed resolving this paradox via the postulation of unchanging substrates underlying change: atoms for Democritus and substances Earth, Air, Fire, and Water for Empedocles (Gill 1989; Graham 2006; Mann 2000; Seibt 2003, 2009).[4]

There are three presuppositional consequences of this framework that I initially focus on:

1. The default condition is that of unchangingness. Change requires explanation.
2. Emergence is precluded. The change that is accounted for is in terms of alterations in the configurations or mixtures of unchanging atoms or substances. E.g., you cannot get a fifth new substance out of Empedoclean Earth, Air, Fire, and Water.
3. The metaphysical realm of atoms or substances is a realm of "matter", fundamental physical facts, and physical causes. In particular, it does not encompass intentionality, normativity, or modality. Thus we have the heritage of

[4] Aristotle developed a sophisticated metaphysics that also honored this Parmenidean constraint. Classically, he has been interpreted as assuming a basic level of Prime Matter that does not change as a substrate for change. Some contemporary interpretations argue that he was not committed to Prime Matter—the notion of an unchanging substrate for each change, however, is still maintained (e.g., Gill 1989).

two fundamentally different metaphysical realms, with resultant questions of how they are related, and whether we need both. In this framework, there are only three basic orientations: (1) Posit two realms: Aristotle, Descartes, Kant, Logical Positivists; (2) Make do with just the "mental" realm: Hegel, Green, Bradley; and (3) Make do with just the "physical" realm: Hobbes, Hume, post-Quine philosophers and scientists. It can be tempting to try to account for the relationship between the two realms, and thus integrate them into one, via the emergence of "mental" phenomena out of "physical" phenomena, but such emergence is precisely what is precluded by the underlying particle or substance metaphysics that generates the split in the first place (Bickhard 2009a, in preparation).

A process metaphysics reverses each of these three, and induces multiple other consequences, including important enablings of further models.

1.5 Some Consequences and Enablings of a Process Metaphysics

Elaborating these is the focus of the rest of this paper. I will address roughly ten of them (depending on how they are "individuated"). These will include:

(1) The possibility of metaphysical emergence, especially of normative emergence;
(2) The inadequacy of some classical metaphysical assumptions and questions, such as of boundaries, individuation, and supervenience;
(3) A relational metaphysics, rather than particularism;
(4) Problems with notions of cause;
(5) The emergence of normative function and representation;
(6) Problems with models of action;
(7) Problems with models of rational thought;
(8) An approach to characterizing modality;
(9) A non-substance, social-ontological model of persons;
(10) And an emergence approach to ethics.

2 Reversing the Substance Presuppositions

The three presuppositions of a substance or particle metaphysics, mentioned above, are individually and collectively reversed. The reversals of these assumptions, the undoing of these constraints, have major and ramified consequences.

2.1 Unchangingness

For a substance metaphysics, stasis or inertness is the default. Change requires explanation. In contrast, process is inherently and always changing—a return to Heraclitus, if you will. Change is the default. In such a view, any stability of organization or pattern of process requires explanation—and we will find that the kinds of these explanations can be of fundamental importance.

2.2 Emergence

Neither Democritean atoms nor Empedoclean substances can generate new kinds of atoms or substances. It is precisely such emergence that they were intended to block—and any such model of unchanging substrate for all change does so quite well. A substance metaphysics, then, makes any genuine metaphysical emergence impossible.

A process, however, has whatever properties it has, including causal properties, in virtue (in part) of its organization: new organizations may generate new (causal) properties (Wimsatt 1997)—emergence is not a metaphysical aporia.[5]

2.3 The Normative and Intentional

If metaphysical emergence is not blocked within a process metaphysics, then perhaps normativity and intentionality can be accounted for as emergents within a process metaphysics. However, while a process metaphysics may eliminate the barriers to such an emergentist account, actually constructing such an integrative model is a separate task. I have presented a model of this integration-via-emergence of the two realms elsewhere (Bickhard 2004a, 2009a), and will outline parts of that model below.[6]

3 Entities, Boundaries, Supervenience

I begin with a few consequences of a process metaphysics for some classical concepts. Issues in classical metaphysics are organized around objects and their properties (stemming at least from Aristotle; Gill 1989; Mann 2000). Both the questions and the proffered answers presuppose that this is at least roughly the right framework. But issues can look rather different from a process perspective.

3.1 Boundaries

A rock, for example, has several relatively clear boundaries: e.g., a phase change boundary from solid to gas, a boundary at which it can be isolated, and a boundary at which it can be pushed. For the rock, these are co-extensive. Consider a candle flame, however: it has several phase change boundaries (different colors), no boundary at which it can be isolated, and no boundary at which it can be pushed.

Consider, in fact, any far from thermodynamic equilibrium system—in general, they are open systems, and are open of ontological necessity, not just as contingent

[5] I argue that Jaegwon Kim's arguments against emergence, and Hume's argument against deriving norms from facts, both depend on unstated substance and particle assumptions (Bickhard 2009a, in preparation).

[6] Note that a model of the emergence of normative phenomena out of non-normative phenomena must address Hume's argument that this is impossible. For the unsoundness of Hume's argument, see Bickhard (2009a, in preparation).

fact. As such, they cannot be isolated. Nor, often, can they be directly, conventionally pushed.[7] They may (or may not) involve phase changes.

In general, instances of processes can have multifarious boundaries, but need not, and, if there *are* boundaries, they are the products of the dynamics of the process, not metaphysical necessities of existence. To illustrate further: What is the boundary of molds, fungi and the like that absorb and re-absorb one another, or of a species or population? Why do cells, individuals, species exist at all—why not a pan-biosphere enzymatic soup? Such biological examples illustrate that, not only do boundaries exist as products of the dynamics, but that there can be strong dynamic reasons for the emergence of boundaries.[8]

3.2 Individuation

Similar issues afflict classical assumptions about individuation. It may be clear that *this* rock is different from *that* rock, but what makes it clear and how such questions apply to processes more generally is not so obvious. If a candle is moved from one location to another, is it the same flame? If a candle is lit from another candle, how many flames are there? When do they become two (if they do at all)? How about if two brush fires merge, and perhaps split later—how many fires are involved, at which times? How many individuals in a field of crab grass, with some clumps still connected to others by runners, others no longer so connected, and still others partially connected? Or in a grove of aspen, which grow up from a common underground root system? I list such questions not to demand answers, but to illustrate that there are not necessarily *any* answers—or, alternatively, that any answers depend on the criteria of individuation involved, including possible criteria involving boundaries, if such exist, and that the answers may differ depending on what criteria are invoked or presupposed.

Metaphysical discussions have partially understood the importance of issues of unity and continuity for examples like a human being, or the ship of Theseus, but have not in general recognized that process instances pose such problems in ongoing, continuous, boundary-less, ubiquitous form. Further, self-organized and self-maintenant examples such as waves or vortices show, again, that any answers depend on what criteria are taken to be relevant. If a cloud vortex produces a tornado, which then retracts, and then a funnel descends from the same cloud vortex, how many instances of a tornado process are involved? In terms of criteria of ground level damage, there are two (or more), but, in terms of criteria of locus of self-organization, there may be only one (the wind shear and consequent roll that produces the cloud vortex). In some respects, this example is similar to that of the molds and fungi, and differently to the grove of aspen: multiple forms in space and/or time, but only one dynamic system that produces them.

[7] They can be indirectly pushed if they happen to be in a directly pushable container. They can be moved in various ways, e.g., by manipulating the thermodynamic gradients in which they are operating (e.g., shifting the course of a hurricane by altering air temperature gradients), and this could be considered unconventional "pushing".

[8] See Bickhard and Campbell (2003).

Similarly, consider the activity in a (quantum) field. There is only one field, everywhere and everywhen, and in that sense there is always only one root "object". But a field may be spatio-temporally variegated and this permits more superficial delineations of regions as 'objects' so long as the dynamics sufficiently sustains distinctive local variation patterns to constitute a distinguishable space–time trajectory. Other than this condition, there need not be any fact of the matter; such delineations will depend on the purposes of the question, and may not have any answer at all.

Thus, there may be one region in which a local maximum of the activity occurs and a nearby region in which a lower local maximum occurs. How many instances of field process are there? Two: two local maxima? One: there is only one field of activity? Why need there be any fact of the matter about this? Again, it will depend on the purposes of the question, and may not have any answer at all.

3.3 Supervenience

A relatively recent metaphysical notion that has at times been taken to be of fundamental importance is that of supervenience. The intuition is one of a kind of dependence of (one level of) analysis or description on another, usually a lower level. One first approximation would be that a relation of supervenience of A on B holds if there can be no changes or differences in A without there being changes or differences in B.[9] It was hoped by some that supervenience might do the work of emergence without the metaphysically problematic aspects of emergence (these positions, critical of emergence, generally took British emergentism as their target) (e.g., Kim 1998). That hope was not fulfilled: it was realized that supervenience (1) did not *explain* any relationship between supervenient levels, and (2) was a common assumption to almost any non-dualistic metaphysics (Kim 1998, 2005), and, thus, did not succeed in specifying any particular metaphysical position beyond that anti-dualism.

But, yet again, these discussions have proceeded with background assumptions of substances and entities as their metaphysical frameworks, and the issues are altered within a process perspective. In particular, formal definitions of supervenience are, in general, in terms of some higher level entity (property, event, substance) being supervenient on some lower level entity (property, event, substance). It makes a major difference whether or not the *relations* are taken to belong to the supervenience base (though that is not often recognized; Campbell and Bickhard, this issue), but there is an even more fundamental problem with such a notion: it doesn't apply to large regions of our world, including central canonical problem domains, such as of biology in relation to chemistry and physics, or mind to biology.

The point is actually fairly simple, given the examples in above discussions: in a far from thermodynamic equilibrium system—consider again a candle flame, or

[9] There are multiple variants of supervenience, depending on the scope and strength of the modalities involved and of the presumed base (McLaughlin and Bennett 2005). The discussion in the text does not depend on these variations.

a plant or animal, or a wave or vortex—there is of ontological necessity an ongoing flow of energy and material into and out of the system. In fact, the system ***is*** that ongoing flow. So, there is no base of particles—atoms or molecules—for that flame because they are always changing, and *it is the flow of the process of changes that constitutes the system*. Still further, there is no boundary at which it can be isolated, so there is no definite set of atoms or molecules that could serve as a supervenience base even at some hypothetical instant in time. And yet further, a flame is a flow, a process. It does not and cannot exist at a single moment of time, and any model of such a flame-state is at best a mathematical abstraction that carries with it the temporal flow of the process in the time-differential equations that describe the process.[10] I would submit that the same point holds for mental "states"—they do not metaphysically exist (Bickhard 2004a, in preparation).[11]

3.4 Taking Process Seriously

Taking process seriously, then, transforms classical metaphysical questions and issues. Taken-for-granted assumptions based on entities do not necessarily hold. Some issues, such as those of individuation of process instances, unity through time of instances of process, the possible but not necessary production of multiple kinds of boundaries, supervenience relations on set of particles (properties and relations) transformed into realization relations on topologies of process flow, and so on, can be recognizable in a process perspective, but they do not remain unaltered. A process metaphysics is not a variant of an entity and substance metaphysics.

4 Relationalism

One major consequence of a shift to a process ontology is a shift away from a metaphysics of particulars to a relationalism. I have already argued against notions of *particles* as particulars, but there is a tendency to retreat to a conception of space–time points—perhaps events—as particulars (e.g., Jackson 1998), and I will focus on such notions here.

A process metaphysics *motivates* a relationalism in that process flow is an organizational, thus a relational, phenomenon. A process metaphysics *forces* a relationalism in that it offers no privileged reference frame in which particulars can

[10] As with fields and other processes, an instant of time can be defined as limit point (i.e., relationally), but a spatial distribution of values or particles (or atoms, molecules, etc.) cannot constitute a flame (or any other process): the temporal flow must also be included. If the process can be modeled mathematically, this is generally via differential equations, but the basic point holds independently of the mathematics: just consider exactly the same physical distribution of molecules as in a candle flame, but with completely random momenta.

[11] Such "states" can exist as ongoing conditions, such as the condition of *burning* or of *thinking about metaphysics*, but these are by definition themselves conditions of temporally extended process, not infinitely thin time slices.

be individuated and identified—everything is process, and everything is relational.[12]

A different perspective on this point is available from the observation that there are no such privileged reference frames available, and there cannot be. Neither physics nor epistemology offers a privileged reference frame (Hooker 1992). At best, we find the construction, both in child development and in science, of stronger and stronger invariances, but this process never reaches an asymptotic God's eye view. Thus, there are no reference frames within which metaphysical particulars can be particularized.

Yet another perspective derives from the fact that particulars cannot construct a continuum, so particulars cannot be the basic building blocks of the world. We have "known" this at least since Zeno, but the implications are generally missed, usually because it is assumed that limit theory solved Zeno's problems, and thereby refuted him. But limit theory is relational! So the problems were "solved" by moving away from the particularisms that were assumed.[13]

So, something like particulars might be identifiable within partially objective reference frames, but they are still relative to the individual and social bases upon which and within which they are constructed. And they cannot constitute the basic kinds of constituents of the world.

One immediate consequence is that point-events, as in physics, must be mathematical idealizations, and cannot be metaphysically basic. Furthermore, they are mathematical idealizations via the relationalisms of limit theory (or equivalent), so they cannot be metaphysical particulars even if attributed some sort of metaphysical reality.

4.1 Humean Supervenience

At almost the opposite pole from the relationalism of a process metaphysics is the particularism of Lewis's Humean Supervenience.[14] Humean Supervenience is a metaphysical framework consisting only of particular space–time points, with external relations of distance among them, and values (e.g., mass) at each point (Lewis 1986a, b, 1994). Lewis suggests the analogy of a dot-matrix picture for the idea that everything is located at a "spatio-temporal arrangement of points" (Lewis 1994, p. 14). The distance external relations are already a deviation from a pure

[12] There is a further perspective on this regarding substances or particles: in a process metaphysics, there is, arguably, no ground for postulating either bare particulars or (clusters of) proper properties. Everything is patterns of unfolding relations in larger unfolding patterns. 'Instances of patterns' is as close as possible to notions of entities, and relationally located regions in dynamic patterns is as close as possible to 'particular' point locations.

[13] Similarly, what might appear to be exceptions, such as various forms of non-standard analysis, are based on inherently relational category theory or inherently relational model theory. Still further, the apparent units bases of developments in physics, such as string theory or loop quantum gravity—strings and loops—are also relational (Smolin 2001). There is an assumption of an absolute background in current string theory, but that is a defect to be overcome, not a metaphysical implication of the approach (Smolin 2001).

[14] Perhaps the strongest opposite pole would be Teller's "local physicalism" or "particularism" (Teller 1986, 1989), but Teller introduced this framework as part of arguing that it is incompatible with quantum mechanics.

particularism, but, insofar as those distance relations can be considered to be external to the points, the points themselves remain particulars.

Relationalism excludes such particularism, so the interactive process metaphysical framework excludes Humean Supervenience. But it is perhaps worth noting that Humean Supervenience is not tenable on its own, in ways that support a relationalism.

First, it seems clear that the relations involved in quantum entanglement do not supervene on particular points and their individuated values (Butterfield 2006; Karakostas 2009; Ladyman and Ross 2007; Loewer 1996; Oppy 2000; Teller 1986). Thus, Humean Supervenience is not true of this world, though Lewis contends that he is only arguing for the philosophical tenability of the thesis, not necessarily that it is true of our world.

One challenge that has been widely considered is whether or not Humean Supervenience is compatible with vector fields, such as electromagnetism or quantum fields. A thought experiment version of this is to specify how a 'stationary' solid sphere or disk, made of continuous material (not atoms), could be distinguished from a 'spinning' sphere or disk, if those were the only inhabitants of the world. This poses the vector challenge strongly, in that only with some spatially directed vector field does it seem possible to make the distinction.

The discussions about vectors as problematic for Humean Supervenience have mostly focused on two aspects: (1) the vectors are not themselves single values, and (2) they seem to require spatial directedness, thus relations to other points beyond the "external" distance relations. Some have argued that these make vectors, thus vector fields, incompatible with Humean Supervenience (Butterfield 2006; Karakostas 2009; Robinson 1989). If so, it becomes difficult to model how any world could satisfy the constraints. Others have argued that they can be accommodated, thus that Humean Supervenience is tenable in spite of this challenge (Busse 2009).

I find the defense of Humeanly Supervenient vectors to be unpersuasive, but there is an even deeper problem that seems to be ignored: it is not just vectors at points that are required—they must form vector fields over the underlying manifold, and that requires that they honor various smooth and differential relations with respect to the (differential) *manifold* of space–time. The underlying manifold still has to be a manifold, with differential properties in order for the field equations to make sense, and those differential properties require neighborhood relations. A single isolated particular point removed from its relations in a differential manifold makes no sense. It is not an "element" of a differential manifold independent of those relationships. Differential manifolds (and the fields on them) require a relationalism, and, thus, cannot be modeled within the particularism of Humean Supervenience (Campbell 2009a). Fields are not just values (or vectors or tensors or probability distributions) at space–time points (or regions): those "values" must honor temporal differential equations—a field *is* a (temporal) *process*, not just an instantaneous distribution of values.

The notion of a world in which field vectors (e.g., electric) had random orientations on each point is not coherent: that would not be a physical field and no dynamics could be defined on it. Or consider a differential manifold in which the differential properties at each point had no relation to those at other points—e.g.,

a tangent "fiber bundle" with no connection, and even no topological properties in the underlying manifold—again, it makes no sense. Differential properties are inherently relational (and require more than just distance relations).[15]

In Lewis's terms, but contrary to Lewis, the spatio-temporal relations in spacetime are not, and cannot be, external: the "points" have no existence beyond those relational (topological and metric) properties. What could an isolated manifold point possibly be, outside of its topological and metric relations?

The points must be relationally defined in order to obtain limits, differentials, and so on. As mentioned above, it is this relationality that I will be arguing is most important in the shift to a process framework. In this regard, it is worth mentioning that possibilities of a non-continuous space–time do not offer any support for a resurrection of Humean particularities: in loop-quantum gravity, for example, there are discrete loops, and minimal dimensions, but everything is relational (Smolin 2001).

Even stronger than the recognition that the points in space–time must be relationally (implicitly) defined—and, therefore, cannot be independent particulars—is the full relationalism that holds that the world is process (relations) all the way up and all the way down (Bickhard 2000, 2009c, in preparation; Campbell and Bickhard, this issue; Ladyman and Ross 2007). Any "points" are mathematical idealizations (relationally defined), not metaphysical particulars.

4.2 Cause

But, if spacetime points cannot be particulars, then events, considered as spacetime points, cannot be particulars—and, therefore, cause as relationships between events must be rethought, and causal chains as chains among strings of events cannot be foundational, if they exist at all.

I would suggest, in fact, though this point does not derive necessarily from a process metaphysics, that cause is itself a not-fully-objective-reference-frame notion. More specifically, cause is itself ultimately defined relative to individual and social reference frames, roughly as "points" (or locations) of idealized potential interventions (Piaget 1954; Rouse 2002; Woodward 2003). The kinds of dynamics that can accommodate such idealized interventions range from quantum mechanical to billiard balls to commands in an army. There is no unitary dynamical process that answers to "cause".

One important implication of this point is that (continuously relational) phenomena such as self-organization cannot be modeled in terms of causal chains, and, therefore, that a metaphysical background assumption of causal chains misdirects attention and understanding away from such phenomena. This can be seriously distorting because processes such as self-organization can have very different properties than do point events in causal chains.[16]

[15] Note that this is not a nomic relation; it is a kind of relationalism necessary in order for any (field) laws to be definable, even in Lewis's "best system".

[16] Mathematical modeling of self-organization is seriously problematic in any case (Hooker, forthcoming), but the claim here is not just that self-organization cannot be mathematically modeled in terms of discrete causal chains, but that discrete causal chains cannot metaphysically capture the relational grounds of self-organization.

Self-organization is a global 4-dimensional process. Self-organization produces relational organization, and it is dependent on relational organization for it to occur. Such relational processes cannot be modeled just in terms of particular points, nor (causal) chains of particular event points. Such phenomena constitute counterexamples to the common assumption that the world can be rendered in terms of causal chains of particulars. Process requires metaphysical attention to organization, and self-organization is "just" one important realm of examples.

5 Two Normativities: Function and Representation

I will illustrate the integration-via-emergence of the factual realm and the normative realm with brief outlines of two forms of normativity—normative function and representation—together with comparison with one major alternative in the contemporary literature.

5.1 Normative Function

Some processes are fleeting; some are relatively stable. Of stable organizations of process, there are two kinds that I will mention: (1) Organizations that are stable in virtue of their being in an "energy well". Such a process organization will remain stable so long as it does not receive some above-threshold amount of energy that can knock it out of its "well". A contemporary atom is a good example. (2) Organizations that are stable in appropriate far-from-thermodynamic-equilibrium conditions. A canonical example here is a candle flame: So long as above combustion temperatures are maintained, along with supply of oxygen and elimination of waste products, such a flame will tend to be stably existent.

There is a fundamental asymmetry between these two kinds of stability. Energy well stabilities can be isolated without deleterious effects on their stability. An isolated atom, for example, will go to thermodynamic equilibrium and remain there for perhaps cosmological time periods. In contrast, a far-from-equilibrium organization of process must be *maintained* in its far-from-equilibrium conditions, and this is not possible if it is isolated. A far-from-equilibrium stability must be an open system, in exchange with its environment, in order to remain stable—in order to remain in its ontologically necessary far-from-equilibrium conditions. If it is isolated, it goes to equilibrium and ceases to exist.

There are two special cases of far-from-equilibrium stable process organizations that I will consider: (1) Organizations that make contributions to their own far-from-equilibrium stability conditions. The candle flame is, in fact, a canonical example of this: it maintains above combustion threshold temperature, and, via the induction of convection, brings in oxygen and gets rid of waste products. I call these kinds of systems *self-maintenant* (Bickhard 2004a, 2009a). (2) Organizations that can shift their process organizations so as to contribute to their self maintenance in response to shifts in their environments or their relationships to those environments. A canonical example here is Don Campbell's bacterium that can swim and continue swimming if it going up a sugar gradient, but tumble if it finds itself going down a

sugar gradient (Campbell 1974). It maintains its condition of being self-maintenant in these two different situations. I call these kinds of systems *recursively self-maintenant*.

The key point for this discussion is that far-from-equilibrium systems must be maintained in their far-from-equilibrium conditions. Such maintenance contributes to the continued existence of the process organization. In that sense, such contributions to maintenance *serve a function* relative to the process organization whose existence they contribute to maintaining.

5.1.1 A Comparison: Millikan's Etiological Approach

This initial focus on *serving* a function differs from the dominant, etiological approach to function—which has a primary focus on *having a function*. In this model, an organ, such as, for example, a kidney, has a function—filtering blood—insofar as ancestral kidneys were selected for having that filtering consequence. Having a function, thus, is constituted in having a right kind of selection (evolutionary) history (Millikan 1984, 1993). In this model, serving a function occurs when an organ that has a function "succeeds" in accomplishing that selected-for functional consequence.

One consequence of this model is that two systems could be identical in dynamical, causal properties, but differ with respect to having functions. In particular, one might have functions and the other not because of differences in their histories. This is illustrated by Millikan's example of the lion that pops into existence that is, by assumption, molecule by molecule identical to the lion in the zoo: the zoo lion has the right kind of history, and, therefore, its organs have functions, while the dynamically identical lion that just appeared will not have organs with functions. A less science-fiction example would be the first time that an organ does something useful for the organism. After sufficient generations of selection for that "useful" consequence, such organs will come to have that consequence as a function. But the organs with functions may not differ dynamically from those earlier organs that do not have functions (Bickhard 1993; Christensen and Bickhard 2002).

In general, then, etiological models yield models of function that are causally epiphenomenal: they yield systems that are dynamically, causally identical, but not functionally identical—and, in fact, in which one system has functions while the causally identical system has none. In contrast, in the interactivist model of function, serving a function is constituted in current dynamic organization of the system, and, thus, is not epiphenomenal.

5.1.1.1 "Having a function" from "Serving a function" A model of *serving* a function leaves a promissory note to account for *having* a function—here I outline how that can be modeled. A particular form of process will serve a function for a system only under certain conditions. In the case of the candle, for example, those conditions involve such properties as the atmosphere containing sufficient oxygen. If we consider an organ in an organism, that organ may succeed in serving functions only if other functions are served by other organs in the body. In general, such

enabling or supporting conditions are *implicitly presupposed* by the processes of the organ in the sense that those processes succeed in being functional only under those conditions.

Such functional presuppositions in an organism will, in general, involve the assumption of other parts of the body successfully serving functions: if those other parts do not accomplish the presupposed consequences—serve their presupposed functions—then the enabling conditions for the given organ to serve (a) function(s) may not be met. If such a network of functional presuppositions picks out certain organs as being presupposed to accomplish certain consequences, then those organs *have* those consequences as their *functions* relative to that network, and, thus, relative to that organism.

5.1.1.2 Other Differences There are a number of other differences between etiological models and the interactivist model of function, and I will mention a few of them here (Christensen and Bickhard 2002). First, the interactive model can account for functions being *served* even if there is no organ that *has* such a function, such as leg muscles helping blood circulation on long plane flights. Second, the interactive model has no difficulty accounting for an organ having multiple functions, nor for functions being distributed across multiple organs, while etiological models, with their dependence on specific selection histories for particular consequences, face difficulties with such phenomena. Third, the interactive model, in focusing on serving a function as primary, is easily extendable to artifact functions as derivative, including the presuppositional relationships that constitute artifacts *having* functions.

Finally, etiological notions of function depend on notions of usefulness to an organism (or something equivalent). Relevant selection has to be selection for such usefulness in some form. But such usefulness is already a normative relationship, and, thus etiological models at best explicate normative function in terms of normative usefulness—they do not account for the emergence of normative usefulness per se, and, therefore, not for the emergence of normative function. The interactive model, in contrast, models the emergence of normative function in terms of non-normative thermodynamic properties, and, thus, does account for such emergence.

One crucial kind of phenomena that further emerges from the relationships of functional presupposition is that of representation.

5.2 Representation

Functional presuppositions are enabling or supporting conditions for various processes—including processes of interaction between a system and its environment. But the existence of such a presupposition does not ensure that those conditions obtain: the indication of interactive possibility and appropriateness might be *false*, because the presupposition might be *false*. That is, interactions taken as possible and appropriate in a particular environment might in fact not be possible or appropriate. Thus, if a frog takes a certain sort of tongue-flicking and (fly-)eating to

be possible, it might be correct, or, perhaps, someone has tossed a pebble into its visual field, in which case it is incorrect. With respect to interactions with an environment, this constitutes the crucial emergence of primitive representational normativity: that of truth value.

Such presuppositions are involved in engaging in an interaction, and also in taking an interaction as possible or appropriate for an environment.[17] For complex agents, this latter point is of central importance. A complex agent will, in general, have many things that it could do at any particular time, and it must select among them. But, in order to engage in such a selection process, there must be some functional indications of what interactions are possible. This is the agentive problem that drove the evolution of complex representation: such indications of potential interactions can become complex webs of potentiality within which interaction trajectories are guided (Bickhard 2004a, 2009a, b, in preparation). For current purposes, what is crucial is that such indications of potentiality can themselves be true or false: they make functional presuppositions about available support for those interactions, and those presuppositions can have truth values.

5.2.1 Organism Detectable Error

Standard information-semantic models of representation have difficulty accounting for the possibility of representational error. In general, they posit some special correspondence between representation and represented—informational, causal, nomological, structural—that constitutes the representational relationship. All of these relationships are factual and cannot exist unless the represented end of the relationship exists. The basic problem encountered is then this: if the special relationship exists, then, by assumption, the representation exists, and it is correct, and if the special relationship does not exist, then the representation does not exist, so there cannot be false (incorrect) representation; but to account for the phenomenon of error it is essential to the representational role that false representations are possible. There have been multiple attempts to account for this possibility, but none succeed, and, even if they did succeed on their own terms, they are from the perspective of an external observer of the organism and its environment.[18] They do not even attempt to account for representational error from the perspective of the organism.[19]

Organism detectable error might seem to be a subsidiary problem, best left for later work. But organism detectable error certainly occurs, and is of central

[17] The environment affords (or is constituted by) various potentialities, while *indications* of such potential interactions are in the animal's CNS.

[18] Millikan and Cummins (Millikan 1984, 1993; Cummins 1996) propose respective models that separate the determination of representational content from that which is represented, and, thus, have an approach for attempting to account for representational error: the content falsely applies to the represented. But these models too fail to account for organism detectable error (Bickhard 2009a, in preparation).

[19] Some models—e.g., Dretske (1988) and Clark (Clark 2001; Wheeler and Clark 1999)—are explicitly presented as accounting for representation, thus representational error, *only* from the perspective of an external observer—an analyzer or explainer of the system. But this leaves *sui generis* representation, as has to have emerged in evolution, unaddressed. Further, it leaves the representations of the analyzer or observer unaddressed (Bickhard 2004a, 2009a, in preparation; Bickhard and Terveen 1995).

importance: error guided behavior and learning depend on it. So, any model that cannot account for it is thereby impeached, and any model that renders it impossible is thereby refuted. There are no standard models in the literature that even address organism detectable error, and, arguably, it is impossible to account for within any of them (Bickhard 2004a, 2009a, in preparation). So, they stand refuted.

Organism detectable error involves a deep problem: the radical skeptical argument. We cannot determine whether our representations are correct, so the argument goes, because to do so would require that we step outside of ourselves (become observers of ourselves *and* of our environments) to compare what we are actually representing with the content that we are attributing to it. We cannot step outside of ourselves, so we cannot check our own representations. This argument has been around a while, without solution. But it has to be invalid or unsound in some way, because we know that organism detectable error occurs. I argue that it is unsound because it is dependent on a false assumption about the nature of representation (Bickhard 2004a, 2009a, in preparation).

5.2.1.1 Interactive Detectable Error In particular, the interactive model can account for organism detectable error: if an indicated interaction does not proceed as indicated, then the attribution of that interaction potentiality is false; the presuppositions involved are falsified; and such divergence from indication is internal to the organism interactive processes, and, thus, is detectable internally. Representational error, therefore, is organism detectable.

One perspective on the crucial difference here is that the interactive model of representation is a future-oriented, pragmatic model, instead of a past-oriented "spectator" model (Dewey 1960/1929; Tiles 1990). Dominant models of representation since the ancient Greeks have assumed that representation involves peering backwards down the input stream to "see" where it is coming from. And the radical skeptical argument is a *reductio* of that basic assumption. Functional anticipations of the future, however, are not addressed by that argument: the organism enters into that future and can determine whether it supports those anticipations in the course of such engagement.

5.2.2 More Complex Representations

Representation as interactive anticipation is much simpler than canonical representations, such as of physical objects, and, therefore, it needs to be shown that the interactivist model has the resources to be able to address such complexities. This is in general a massive project, addressing multifarious kinds of representations. Here I will illustrate with one example, that of small manipulable objects.

Indications of interactive potentiality can *branch*, as for a frog that could, at a given moment, flick its tongue toward a fly in one direction, perhaps another fly in another direction, and a worm below to the left. Indications of interactive potentiality can also *iterate*, such as if one interaction creates the conditions under which some other interaction(s) become(s) possible, e.g., the frog turning to flick its tongue then sees a further fly, or the toddler opens the toy box which makes possible

grasping a special toy. Such branching and conditional iteration can yield complex webs of interactive potentiality, and it is here that (some) further special forms of representation can be generated.

In particular, consider a child's small toy block. There are multiple visual scans that such a block affords[20] and multiple manipulations, and, furthermore, any one of these can be reached from any other: the web of potential scans and manipulations is internally completely reachable. Still further, that local subweb is itself invariant under numerous other interactions and happenings. It is invariant, for example, under dropping, chewing, going into the next room, putting away in the toy box, and so on. It is not invariant, however, under crushing, burning, and so on. Such invariances of internally reachable interaction possibilities constitutes the child's representation of the small manipulable object.

This is "just" a translation of Piaget's model of object representation into the interactive model. This is a possibility because of the common pragmatic basis in process and action (though there is divergence in other respects).[21]

6 Action

One domain in which the abandonment of causal chains can make a deep difference is that of action (Juarrero 1999). Action is at least plausibly (and arguably necessarily, but I don't need that strong a point here) a matter of self-organizing ongoing feedback processes in the central nervous system, body, and world. But such four-dimensionally organized processes cannot fit into the point-events of causal chains, nor can such continuous relational organizations be constructed out of causal chains, and, therefore, action cannot be adequately modeled in terms of initiations of causal chains.

Instead, action is a global process, an ongoing self-organization, modulated by ongoing interaction (Campbell 2009a, b; Hooker 2009). Such a model has further consequences for issues of intentionality and ethics.

For example, a locus of self-organization may involve boundary conditions at which some degree of control intervention is possible, and, in that sense, causal intervention might be possible, but there are no temporally prior causal chains converging in a self-organizing locus that constitute that process. There is, thus, no possibility of exhausting the influence of a self-organizing locus on subsequent dynamics in the world via the causal influences from such past causal chains (Skewes and Hooker 2009).

If decision making and action is characterized by such self-organization, then, the influence of those decision making and action processes cannot be eliminated in favor the prior causalities. At least some of those influences will proceed from the *global* organization of the process, and that is not renderable in terms of either constitutive or "incoming" causal chains.

[20] The allusion to Gibson is deliberate, and is elaborated in Bickhard and Richie (1983) and elsewhere.

[21] See (Piaget 1954; Bickhard 1988a; Bickhard and Campbell 1989).

7 Rationality

Rational thought is often equated to thought that follows the laws of logic. There are multiple fatal problems with such models. Here are a few: (1) the warrant for the foundations of such models—both the representations upon which those laws "operate" and the laws themselves—cannot be non-question-beggingly established: foundationalisms cannot establish their own foundations (Bickhard 2002), (2) the computational processes that are invoked in models of "law following" have fatal problems of their own (Bickhard 1996; Bickhard and Terveen 1995), (3) there are numerous logics available, with more being constructed, so which one is the "rational" one? and (4) multiple instances and forms of prima facie rational thought are irrational on this account. One illustration of the latter point can be found in the history of logic. No logic can construct a logic more powerful than itself, but the history of logic is a history of the constructions of more and more powerful logics. Thus, if rational thought is thought that follows the laws of logic, then the history of logic is irrational.

Consider an alternative model. Self-organization occurs within whatever boundaries delimit the far-from-equilibrium conditions involved. If such self-organization can occur in the central nervous system, relative to boundary activities that constitute relevant constraints, then the creative self-organized constructions can function as tentative constraint satisfiers for whatever constraints are involved. If the constraints are representations of kinds of possible error, then this constitutes a model of constraint satisfaction problem solving. If there are various heuristics for such constraint satisfying constructive attempts, then this constitutes a model of heuristic problem solving (Bickhard and Campbell 1996).

If those constraints, such as knowledge of potential errors, can themselves be learned, and also heuristics (or algorithms) for constructions of satisfiers can be learned, then we have a model of an internal version of evolutionary epistemology (Campbell 1974; Bickhard and Campbell 2003). The self-organizing construction processes constitute creative variations, and the constraints constitute selection criteria. Such a system will tend to learn about (possibly domain specific) errors and about ways to avoid those errors (Bickhard 2002; Hooker, this issue). This constitutes a candidate model of rationality as a tendency of such kinds of processes, rather than as a fixed following of particular (logical) laws. Rationality is, in this view, the progression of learning more about possible errors and more about how to avoid those errors. It is a model of rationality as movement away from error, rather toward some unknown truth (Bickhard 2002, in preparation). This model is much broader than classical models—able to accommodate multifarious kinds of strategies and skills, including physical activities in the world, not just "logical" deductions.

On the other hand, it can also accommodate classical realms of logic and mathematics. One domain in which there are deep possibilities of error is that of reasoning and argument with language. Learning the kinds of errors that are possible here and ways to avoid those errors (sometimes algorithmic) yields classical conceptions of logic. Similarly, consideration of reasoning and argument

concerning the realms that satisfy interactive representations[22] yields logic and mathematics (Sher 1991; Tarski 1986; Bickhard 2002, in preparation; cf. Bonnay 2008).

Such a model of rationality also integrates rationality with creativity and motivation. This is in contrast to classical conceptions of opposition between reason and passion. This integration makes sense of experience, as well as of results that demonstrate that emotion is essential to what is called rationality (Damasio 1995).

8 Modality

One issue that has been an axis of concern regarding rationality and logic is that of modality. I will address two points regarding modality here: (1) How can the interactive model of cognition and rationality account for modality? (2) How does this model address the classic problem of whether modality exists in the world or in the mind (or language)?

8.1 Modality and Cognition

Standard models of representation take as their central realm the representation via encoding correspondence of *actualities* (or, taking into account the temporal flow of the input stream, *recent* actualities). In contrast, modality is *inherent* in interactive representation: representation is of *possible* further interactions.[23]

In the development of error criteria in rationality processes, one important kind of criterion is that of some representational connection or implication not having any exceptions or counterexamples. A criterion for not having any counterexamples within some realm X of possible counterexamples constitutes a criterion for an X kind of necessity. In particular, if the realm of consideration is that of conceivabilities, then we have a criterion for the widest form of necessity. Narrower realms of consideration for possible counterexamples generate narrower conceptions of necessity, such as that of metaphysical necessity, physical necessity, legal necessity, existential necessity, and so on (Bickhard 2002, in preparation).

The interactive model of representation and cognition, thus, is a rich realm with natural and intrinsic modalities. Representation is fundamentally of future possibilities, not of past actualities. Furthermore, via the construction of criteria of possible error, one kind of error is that of having counterexamples. The criterion of not having such counterexamples, thus, is a criterion for necessity.

[22] This amounts to a kind of functional-dynamic version of implicit definition (Bickhard 2009a).

[23] Consistent with this, in the development of understandings of modality in children, we find an early phase of a lack of coordinated differentiation among modalities, not one of an absence of modality to which modality is later added (Piaget 1987; Bickhard 1988b).

8.2 What is the Source or Location of Modality?

Where is modality located: is modality "in the world" or is it in the mind (or language)? Russell's notion of logic as the most general regularities in the world had no clear approach to modality. Wittgenstein in the *Tractatus* proposed a model of combinatorial modality in terms of his atomic objects, while most of the logical positivists construed modality as properties of linguistic convention (Suppe 1977).

The interactive model offers a different kind of model. Interactive indications are of future potentialities, and, in that sense, those potentialities seem to be "located" in the processes that constitute representation and cognition. Similarly, representation of necessity involves, for example, representation of there being no counterexamples within some range of an indication.

But, it is the environment, or, more broadly, the world, that satisfies or fails to satisfy an organization of indicated interactive possibilities. And it is the world that satisfies or fails to satisfy an indicated further possibility given that it satisfies one upon which that indication is based. So, the potentialities that are indicated in interactive representation are potentialities afforded by the world, and the necessity of some further property holding given that something satisfies some conditional property entails that, if anything in the world does satisfy the initial condition(s), then it does, necessarily, satisfy the consequent condition(s).

Modalities, then, are what is represented in and about the world, both in the sense of potentialities of interactions and in the sense of necessary (or not) relations among represented properties. Modalities are represented in mental processes, but are manifest in what those processes represent.

In this sense, insofar as some logic or mathematics holds for some domain in the world, that logic or mathematics serves as a kind of local formal ontology[24] for that domain—or for some abstractions from that domain. In a sense, then, Russell's notion of logic(s) as maximally general regularities is resurrected, but in a way that addresses modality directly and naturally. Modality emerges in potentiality, and is central to both representation and to the processes in the world that are represented.

It is worth noting that function has been modeled in terms of a thermodynamic asymmetry, representation in terms of a presuppositional asymmetry, and modality in terms of a modeling asymmetry—each one based on the preceding. Thermodynamics is the only source of such asymmetries in basic physics (with the possible exception of the non-linearities of gravity).

9 Persons

Are persons entities? If so, of what kind? If not, what are they—or does any such "thing" exist at all? Given a process metaphysics, persons cannot be entities in any classic metaphysical sense because no such metaphysically basic entities exist. Correspondingly, issues concerning such entities, such as those of individuation, continuity, boundaries, etc. may or may not have answers, and, if they do, they may

[24] A term for which I am indebted to a conversation with Raymundo Morado.

or may not resemble the kinds of answers that classical metaphysics assumes that they must.

Consider, for example, issues regarding continuity of identity. What is the relationship between an infant and the adult that he or she grows into? Or between a campfire and the forest fire that it starts? Or between the tropical depression and the hurricane that it grows into? Ship of Theseus problems, for all of their lack of resolution, do not even touch these issues: the ship is not a far-from-equilibrium process, so the questions concerning the changing of the constituents—the wooden planks—fail to apply to questions about humans, fires, hurricanes, and so on: such processes are *constituted* by the flow of changes in their "constituents". If persons are processes, as they must be in a process metaphysics—and, further, as living, they must be far-from-equilibrium processes—then these questions do not necessarily have any intrinsic answers.

But how could persons be made sense of as processes? What sort of process model, if any, could address the special characteristics of persons? This is not the place for an elaborated model, but some important indications can be outlined.

A first differentiation is of those processes that are agents. We already have a model of minimal agency as recursively self-maintenant systems, but this minimal model applies to one-celled animals, and, so, does not model anything very specific about adult human agents.

One further property that characterizes human persons is that persons are social. But so also are ants and bees—is that the kind of sociality of persons? I argue that it is not, and offer an alternative model in which persons have an emergently social ontology (Bickhard 2004b, 2008a, in preparation).

There is an emergent sociality at the level of an ant nest, but not at the level of individual ants. There is also emergent sociality in human society, but, unlike ants, humans have to develop into the right kinds of individual social agents to participate in and help constitute that society. Human persons, then, participate ontologically in the emergent social level that they realize.

Making sense of this requires a model of social ontology.

9.1 Social Ontology

Social ontology emerges naturally among sufficiently complex agents, and does so as a resolution to a problem that itself emerges in situations with multiple complex agents. In representing a situation that contains a child's toy block, the block can be represented by an organization of indications of interactive potential that has the right properties of internal reachability and invariances, and such a representation can be appropriately set up on the basis of even rather limited initial visual interactions. That is, an initial visual scan is redundant with, provides information concerning, complex further interactive possibilities.

But what if the situation contains another complex agent? Many of the interactive potentialities that another agent might afford are not recoverable from, are not redundant with, a simple visual scan. The agent might be, for example, in any of various emotional conditions, or have any of an unbounded realm of possible goals,

which are not manifest (at least not fully, though perhaps partially in the case of some emotions) in anything accessible to simple visual scan.

More deeply, the other agent is also in a situation that contains an agent—the first agent (perhaps you). And that agent's interactive characterization of the situation requires characterizing the first agent. Neither agent can adequately characterize the interactive situation without characterizing the other, but that *other* will similarly require an interactive characterization of the situation. Both agents have an interest in being able to resolve this problem, but neither can do so except via some joint solution—mutual characterizations that are consistent with each other.

There are multiple possible joint solutions to such a problem, so the difficulty is in finding or creating one. This kind of situation fits Schelling's definition of a coordination problem, and a solution to it, therefore, fits Lewis' (modified) definition of a convention (Schelling 1963; Lewis 1969). Because such conventions constitute conventions about the nature of the joint social situation, they have been dubbed *situation conventions*.[25] I have argued that situation conventions provide a general ontology for social reality (Bickhard 1980, 2004b, 2008a, b, in preparation).

Situation conventions are *emergent* in that they are constituted in the global relations among social participants' interactive representations of the situation. They constitute an *ontology* in the sense that they manifest influences on the course of interaction, including "resistance" if they are violated. Consider, for a trivial example, someone acting like they are at a birthday party when the conventional situation in which they are doing so is a formal meeting. There is feedback from situation conventional realities, directly akin to trying to walk through a table.

9.2 The Ontology of Persons

Infants alone could not constitute a society: they are agents, but not (yet) the right kind of agents to participatively constitute any particular society or culture. In developing in a society, infants come to be able to participate and share in the conventions, institutions, values, resources, and other aspects of society and culture—and, in so doing, they become the kinds of agents that can participatively constitute that society and culture (or those societies and cultures). There is a developmental emergence of social persons—agents constituted in important part by their agentive appropriateness for such participation and constitution.

The ontology of such social person agents is functionally dual to that of the social realities that they create. Persons are created by and participatively constitute those social realities, so the ontologies of persons share that emergent level (Campbell

[25] Situation conventions do not constitute the only resolutions of mutual "social" situations: I may be only interested in killing you, for example, perhaps even without you ever realizing that we are in a mutual situation, and certainly without a coordination problem solution. Or I may be interested in deceiving you in a con game or espionage move, in which I may want you to think that some conventions are in place, but in which I intend to violate the purported coordinative resolution—there is a situation in which or level at which I intend to deviate from the purported coordination. More commonly, we take a social situation to constitute an organization of conventional frameworks, but discover in the course of interacting that there are senses in which we are not in full accord. These most commonly yield attempts to restore or repair situation conventions, but can also yield a destruction of all but the most minimal frameworks for competition or conflict (Bickhard, forthcoming).

2009a; Hooker 2009; Martin 2003; Martin et al. 2010; Martin et al. 2003; Poli forthcoming-a, forthcoming-b; Bickhard 2004b, 2008a, in preparation). Social persons constitute a developmentally emergent ontological level.

My focus at this point is that the model of persons outlined here is a process ontology model: It models persons as special social kinds of agents, and agents as recursively self-maintenant organizations of process. Further, it centrally involves an ontological emergence—of socio-cultural realities—a kind of emergence that is inconsistent with substance or particle metaphysics. A process metaphysics, thus, enables a different framework for approaching the understanding of persons.

10 Ethics

Interactivist models of action, cognition, and rationality pose serious challenges to standard metaethical assumptions. In particular, actions are not constituted as causal chains and rational thought is not a matter of following encoded rules or maxims: computationalism is false (Bickhard 1996; Bickhard and Terveen 1995).

Most fundamentally, however, the normativities of ethics, so long as the metaphysical split between the realm of factual substances or particles and that of normativity and intentionality is presupposed, cannot be given any non-circular ground or warrant. The realm of normativity, including that of ethical normativity, has, in this framework, no inherent connection to that of substance, particle, fact, and cause. At best, it blends with such factual phenomena, but it must stand independently with regard to any normative warrant.[26] That is, ethical and moral arguments proceed from ethical and moral foundational principles that are themselves assumed rather than derived (MacIntyre 1998).

The enabling of various kinds of normative emergence within a process metaphysics, however, suggests the possibility that ethical normativity too might be a "natural" emergent. If so, it would offer the completion of a natural integration of metaphysical realms that have been sundered—at least in Western thought—for millennia.

I argue that ethical normativity is in fact emergent in the basic ontologies of human persons, and will here briefly outline how that might be so. I will limn just the architecture of the model and arguments, showing how the metaethical possibility of normative emergence opens up some new possibilities.

10.1 Ethics and Action

First, a few words about some metaethical implications of interactivist process models of cognition and action. Action, as mentioned, is commonly assumed to involve the initiation of causal chains following from some sort of motivated reasoning process that can be captured in rules or maxims.

[26] One manifestation of this is that even truth purportedly becomes a factual, non-normative property—e.g., a factual matter of Tarskian correspondences (or not) (Campbell 1992, forthcoming).

Insofar as explorations of ethics regarding action have been framed by such causal chain notions, they have been misframed. Action is constituted as temporally extended self-organizing interaction. Issues of free will and responsibility are generally framed by a causal chain assumption, and, therefore, need to be re-examined. In particular, acting cannot in general be traced via causal chains *prior to* the self-organizing processes that generate and produce that acting.

Further, acting is not in general done in accord with rules or maxims, either explicit or implicit. Interactions are worked out as they proceed, though that might generate an interaction "close" to some prior plan, if explicit planning were involved. But rules and planning cannot always do all the work, e.g., rule-following cannot adequately model ethical problem solving that either requires re-formulating the original problem or creating new rules for the context, and these cover the deepest, most important ethical dilemmas. If action does not in general involve the following of rules or maxims, then the ethical or moral status of action cannot be determined in terms of such rules or maxims.

10.2 Ethics and Character

Interaction manifests the creative and value constrained processes of decision making and guidance (an extended process, not a single "event"). Action, then, manifests background global self-organizational and feedback processes within value constraints. Values and the constraining of interaction with respect to values offers a candidate for the ontology of *character*.[27]

10.2.1 Character and Development

Such values must be *developed* and the heuristics for creative processes attempting to fit those values must also be developed—as noted by Aristotle, character must be developed. That is why, for example, infants are not ethical creatures.

A focus on action, however, tends to distract attention away from developmental issues to issues of judgement and decision making (construed in terms of rules and maxims). This is yet another problem with action focused ethical frameworks.

10.2.2 Character and Action Consequences

An ethical character, arguably, will and should care about consequences of action, as well as warrant for action. So these considerations would seem to be subsumable in a character—or person—based ethical system.

Consequentialism, thus, is not at all irrelevant to ethical evaluation, but, on its own, it must presuppose normative criteria for such evaluation (not to mention the epistemological issues involved in making predictions about distant consequences).

[27] A more complete model of values can be found elsewhere (e.g., Campbell and Bickhard 1986; Bickhard 2006, in preparation). This model requires, in its turn, a model of reflective consciousness (Bickhard 2005).

These too cannot generally be traced farther than some assumed normative foundation.

10.3 Error of Being

How could an emergence model address the emergence of ethical normativity? A general approach begins by noting that other kinds of normative emergence have intrinsic, or internally related, properties: serving a function from the positive and negative "contributions" to the stability of far-from-equilibrium systems, having a function from the presuppositions of functional processes, representation from the presuppositions of interactions with the world, rationality from possibilities of error in interaction and thought, and so on.

Is there a candidate for an intrinsic normativity at the ethical level? The model to this point suggests that the social person, a level of agency that is itself emergent, with intrinsic values and interactions, might be such a candidate. That is, it is arguably possible to be in error in one's being, in what (kind of) person you are (being), and such errors constitute ethical errors.

The general approach to ethics in terms of errors of central properties of human being is not new. For Aristotle, eudaimonistic fulfillment is flourishing of the (social) function of human beings. But he does not offer an acceptable model of such function. For Kant, ethical being is the fulfillment of human nature as rational, reasoning beings. But he does not offer an acceptable model of such rationality and reason. Also, he has at best a weak argument for why a rational and reasoning nature yields the moral principles that he describes.

The model suggested here is closer to that of Aristotle than to Kant, but it shares in this very general framework. Kant is not often described in such a manner, but his attempt to integrate notions of autonomy and individual fulfillment from the Greeks with the Christian and feudal notions of duty as obeying externally given commands strongly manifests the Greek heritage as well as the command-and-duty heritage (MacIntyre 1998).

Within this general framework, then, what the interactivist model proposes is a different, and hopefully better, model of the crucial nature of human being, and of the emergent potentialities for error in that being. Part of this has already been outlined: the social person as an emergent. One intrinsic characteristic of human beings is that human infants are essentially open to develop as social persons (Berger and Luckmann 1966). The particularities, as well as some quite general characteristics, of that development will be socially and culturally sensitive—it can differ from one society to another. But the sociality per se is intrinsic.

What would constitute error in this being of persons? The general architecture of the model that I would propose is in two parts: (1) some ways of being preclude other ways of being, and (2) some ways of being are intrinsically more satisfying or fulfilling than others. If so, then developing as a kind of person that precludes being more flourishing kinds of persons will constitute an error of being.

Regarding (1), it is clear that some possible ways of being can preclude others: e.g., developing as a person who is thrilled by torturing others precludes being a person who can relate deeply to others. Regarding (2), it seems to be a simple fact—

perhaps an evolved fact—that individual internal coherence (of values, rationality, character, etc.), including especially with respect to human interrelationships, is more fulfilling than internal and social inconsistency (Fowers 2010). More deeply, however, it can be argued, as follows, that this fact is intrinsically emergent in being human:

Human beings are capable of more cognitive-emotional complexity than any other species, especially temporal complexity (Bickhard 1992a, b, in preparation). This is manifest in the complexities of social ontologies and processes (and arguably evolved with respect to those ontologies; Humphrey 1976; Fowers 2010). In being *capable* of such depth and complexity, persons *offer* such depth and complexity to each other, more so than any other form of interaction can offer. That is, the most fulfilling kind of life will involve deep relationships with others, and, thus, requires being a kind of person who is capable of such relationships. Among other characteristics that can interfere with such depth is pragmatic and cognitive inconsistency of values and valuing processes. The person and the social relating are functional interactive duals of each other, and each is required for the other.

Errors of being, thus, are those ways of being that preclude developing more satisfying and flourishing ways of being.

10.4 Ethics and Morality

Morality is sometimes assumed to be in conflict with ethics, especially egoistic ethics, and to trump it when they are in conflict. This is a complex issue, but I would like to point out one metaethical problem with the framework within which this discussion usually proceeds. I will take a quote from Sterba as my example of the position that I will criticize.

> While egoism is an ethical perspective because it provides norms about how one should behave, it is not what I would regard as a moral perspective because it never requires a person to sacrifice her overall interest for the sake of others. Yet, even when egoism is seen in this way as an ethical, not a moral, perspective, the egoist can still be regarded as immoral when she fails to conform to requirements of morality. Sterba (2008, p. 67, footnote 2)

This might seem to make sense if considered strictly from the perspective of action and decisions to act. But it does not make sense from the perspective of the development of character.

Why cannot one's overall self interest include an interest in the (kind of) person one is and will become and is becoming? If so, then the opposition claimed in the Sterba quote need not hold, and the definition in terms of the dichotomy is a failed definition. Again, the focus on action, with no attention to person or to development of person, obscures this point.

That is, if it could not be in my interest to be or become a person who does my duties because they are my duties, then the Kantian framework is internally contradictory. But if it is or could be in my interest to be or become … then duty and interest cannot be so dichotomously separate and opposed: duty is part of what is in the interest of being a (rational) person. I don't fully endorse Kant's focus on duty as

a framework for morality, but, even accepting a duty framework, recognizing that Kant's framework for "morality" ignores issues of a person's interests in his or her development as a person does show that the Kantian framework is at a minimum question-begging with regard to "interest".[28]

10.5 Levels of Possible Error

I have been discussing ethics as emergent in the possibility of errors of being. But persons are processes, and developing processes, and so the being of persons is developing process (not substance). Thus, there are at least three differentiable levels at which a person engages in life selections (however implicit), and, therefore, in possibilities of error: selecting actions, selecting kinds of person to become, selecting kinds of becoming to engage in. These are not metaphysically distinct levels: each higher level of selection is already implicit in lower levels. Higher levels unfold from and become realized in the possibilities inherent in lower levels. Reflection on these levels and even explicit decisions regarding them, however, is possible, however unusual. (Inter-)acting in the world is the base of all such levels: others are implicit in the ongoing interacting of the individual, though they may become (partially) explicit in reflection.

11 Conclusions

A process metaphysics forces multiple changes, such as of assumptions about individuation, boundaries, and so on, and enables multiple new developments, such as of normative emergences of multiple kinds. Shifting to a process metaphysics is complex and requires new patterns of thought: there are innumerable consequences of substance and particle metaphysics that are deeply buried in the presuppositions of Western thought. They can be difficult to uncover, to correct, and to trace and undo their consequences.

Nevertheless, substance and particle metaphysics are unsupportable. They are internally contradictory, inconsistent with contemporary physics, and impose metaphysical splits and constraints that sunder fundamental aspects of the world from each other.

The world is process, and recognizing that fact has ramified consequences throughout metaphysics. Among these is the enabling of an integration via emergence of the normative world with the rest of the natural world.

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[28] He perhaps partially recognized this tangle of problems, especially the weak arguments deriving moral principles from the rational and reasoning nature of human beings, in his point that morality in this life would be rewarded in the afterlife—and that the necessity for such a balancing of justice in an afterlife is a reason for believing in an afterlife.

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