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Issues in Process Metaphysics

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In the last several decades, there has been a growing—even if partial—appreciation of the importance of process, or dynamic, approaches in cognitive science. All sciences, in fact, have passed through phases in which their basic object of study was taken to be some sort of substance into appreciations that that focus of study is in fact some sort of process: the supposed substance phlogiston was replaced with processes of combustion; the substance caloric as heat was replaced with random kinetic motion; vital fluid replaced with special forms of open system processes; singular atoms or other basic particles with processes of quantum fields; and so on. The major exception has been studies of mind and mental processes, such as of cognition. The beginnings of a shift to process in these domains converges with this general historical trend in the sciences, but it is a late development.

Most often, however, process is conceptualized in terms of mechanistic causal interactions among fixed objects—that is, as interactions among classical substances and structures. This can be progress, but it is not an appreciation of a full process metaphysics. What I wish to illustrate in this article is that classical substance and atom assumptions permeate our thinking far more deeply and fundamentally than is generally realized and that, consequently, a genuine shift to a process metaphysics undermines those assumptions in ways that are not generally realized. In general, a process metaphysics overturns deeply embedded conceptual and explanatory defaults and enables new questions and explanatory frameworks.

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Substance and atomistic metaphysical frameworks have been dominant in Western thought at least since Parmenides' challenge to the very possibility of change and Empedocles' and Democritus' responses in terms of substances and atoms. Parmenides argued that for A to change into B, A would have to disappear into nothingness and B emerge out of nothingness. That is impossible; therefore change is impossible. But Empedocles' substances and Democritus' atoms alike were taken to be themselves unchanging, thus satisfying the Parmenidean critique, but could nevertheless account for at least the appearance of change in terms of more superficial alterations in mixtures and configurations of substances or atoms (Graham, 2006).

This framework of an assumed unchanging substratum for all change induces at least three basic further assumptions:

1. Unchangingness, stasis, or stability is the explanatory default; change requires explanation. One consequence is that there can be no self-mover.[1]
2. Metaphysical emergence is not possible. It is not possible, for example, to get a fifth substance out of Empedoclean earth, air, fire, and water.
3. A metaphysical realm of substance (or atom), and causal and factual relations among them is posited. This realm does not include properties of intentionality or normativity, and, thus, a basic metaphysical split between the two realms—substance and intentionality, fact and norm, cause and reason—is induced.

Within such a split metaphysical framework, there are only three possibilities: (a) posit two realms as irreducibly basic, such as Aristotle's prime matter and form, Descartes' two substances, or the logical positivists' realms of scientific fact and linguistic normativity; (b) attempt to account for the world just in terms of the realm of intentionality and normativity, as in classical idealisms, such as those of Hegel, Green, or Bradley; or (c) attempt to account for the world just in terms of the realm of substance (or atom), cause, and fact, such as for Hobbes, Hume, and Quine. Our contemporary world is the heir of Quine's demolition of the logical positivists' two realms: we live in an assumed world of atoms, facts, and (sometimes) causes, and nothing else. This makes it rather difficult to account for phenomena such as intentionality and normativity, and, correspondingly, the normativities of function (functional, dysfunctional) and representation (true, false) have been at the center of the difficulties in studies of mental phenomena.

Within this framework, the "natural" world is taken to be that of atoms and their causal and factual relations, so intentionality and normativity are excluded

[1]See Juarrero (1999) for an analysis of this point.

from being "natural" by assumption. It is tempting to consider that intentional and normative phenomena might be *emergent* in the natural world, but emergence too is one of the kinds of phenomena that are metaphysically precluded by the metaphysical framework being assumed.

The substance/atomistic metaphysical framework, thus, not only creates a split metaphysics that creates a serious problem of how the two realms are related to each other but it also blocks what could appear to be the most "natural" approach—that of emergence. No sciences other than sciences of mental phenomena directly address intentionality, thus no sciences other than sciences of mental phenomena are directly confronted with this basic metaphysical split. This is likely one of the basic reasons why the shift away from the underlying substance/atomistic to a process framework has been so delayed among sciences of mentality: no other sciences have had to directly address this basic split in its full depth.

Process or dynamics conceived of as interactions among classical objects does nothing to dissolve this split, but a genuine process metaphysics—a return to Heraclitus, if you will—does. In fact, a process metaphysics undoes all three of the basic consequences:

1. Change becomes the default, and it is stability, should such occur, that requires explanation;
2. The world is constituted in organizations of processes, so there is no in-principle mystery that new organizations might yield emergently new properties; and
3. If metaphysical emergence is no longer blocked, it makes sense to explore the possibility that normativity and intentionality might, after all, be emergent in the natural world.[2] More generally, explorations of multiple realms of possible emergence are enabled.

The consequences of a genuine process metaphysics, however, are much broader than this. Consider, for example, issues of boundaries. For a paradigmatic entity, such as a rock, we can identify at least three boundaries: (a) a phase change boundary from solid to the gas of the atmosphere, (b) a boundary at which the rock can be pushed, and (c) a boundary at which we can isolate the rock. We don't normally differentiate these three boundaries because, for the rock, they are all three co-extensive. For a more broadly illustrative example of a process, however, consider a candle flame. It has several phase change boundaries, involving the various temperature domains within the flame. It has no boundary at which it can be pushed, and it has no boundary at which it can

[2]I have addressed this possibility elsewhere (Bickhard, 2004, in press-a, in preparation).

be isolated because to isolate it is to destroy it.[3] Paradigmatic substance entities such as rocks can be highly misleading regarding a broader range of process organization stabilities.

In general, it is not always clear where the boundaries are, or if there are any boundaries, for organizations of process. This is deeply contrary to the assumptions of a substance framework (Seibt, 2003, in press). Furthermore, when there are boundaries, it cannot be assumed that that is the nature of things: boundaries must be explained (just like all other stabilities of phenomena). Why are there cell boundaries of the complex organization of reactions that make up living systems? Why are there species boundaries? With regard to the later question, consider that there are *not always* species boundaries or individual boundaries: When does a geographically isolated subpopulation become a new species? How many species are there in a geographically distributed population in which nearby opposite sex pairs can successfully breed, but matings from distant reaches of the distribution are not successful? Or, in a nonbiological realm, at what point do two merging fires become one, or a single fire that splits become two? Again, boundaries do not always exist, and when they do, they are products of the constitutive processes and must be explained as such.

The shift of boundaries from an assumed metaphysical given to a contingent phenomenon that must be explained has a parallel shift regarding individuation. How many individuals are there in a field of crabgrass, many clumps still connected by runners, but many no longer so connected? Or how many individuals in a cloned bunch of birch trees, all originally derived from a common ancestral individual? Under what conditions do such questions make sense? And, again, when they do make sense, the answers will involve explanations in terms of the relevant process organizations. The existence of answers cannot be assumed, and they require explanation when they do exist (Bickhard, in press-b, in preparation; Bickhard & Campbell, 2003). They are not metaphysical givens.

CONCLUSIONS

Consideration of complex systems is only recently underway in studies of cognition and of mental phenomena more generally. But a genuine shift to a process metaphysics has consequences far broader and deeper than is generally recognized. It overturns and reverses three basic assumptions that have dominated Western thought since the pre-Socratics: (a) that unchangingness is the default, (b) that metaphysical emergence is not possible, and (c) that the realm of intentionality and normativity is fundamentally split from that of substance

[3]This nonisolatability is one fundamental difference between process stabilities, such as those of rocks, and those of far from thermodynamic equilibrium processes, such as flames or living beings.

or atom and the causal and factual relations among them. In so doing, it enables new kinds of explorations of multiple phenomena, particularly of the possibilities of the emergence of normative and intentional phenomena.

It also puts into question standard assumptions, such as about boundaries and about individuation. Boundaries and individuated entities do occur, but they cannot be fundamental metaphysical posits. Instead, they are contingent products of underlying processes. Phenomena must be examined to see if boundaries and individuations exist, to determine what kind they are if they do exist, and, if they exist, they must be explained in terms of constitutive underlying processes.

Undoing the taken-for-granted assumptions of over 2 millennia of substance and atom metaphysics opens new possibilities of scientific and philosophical investigation. But those assumptions and presuppositions permeate our thought and our language: Shifting to a process metaphysics is a nontrivial undertaking.

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