Emergence: Process Organization, not Particle Configuration

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The intuition of emergence is that new properties, properties that make a causal difference in the world, can emerge in higher level organization. A realm of issues in which the metaphysical possibility (or impossibility) of emergence is focal is the realm of mental phenomena. Are minds – in particular, yours and mine – genuine emergents, with causal power in the world, or are they at best epiphenomena, with no consequence? I will argue that the simple intuition of emergence is roughly correct, but that it requires a very non-simple shift in underlying metaphysical framework in order to make sense of it. In particular, it requires a rejection of standard particle or substance metaphysical frameworks in favor of a process metaphysics.

A Short History

I begin by looking at some of the history – a very short history – of the metaphysical frameworks that, so I will argue, make emergence so much of a mystery. The story begins with the Pre-Socratics: An argument was generated whose outcome has dominated Western thought since.

Heraclitus, famously, argued that all is flux, everything is process (Graham, 2006). Parmenides countered that change is not even possible: In order for change to occur, in order for A to change into B, for example, A would have to disappear into nothingness and B would have to appear (emerge)[2] out of nothingness. But nothingness cannot exist, therefore change cannot occur. The appearance of change in the world is mere appearance, not genuine.

The nothingness that Parmenides was alluding to was a metaphysical nothingness (a vacuum, for example, is not nothingness in this sense). A contemporary parallel might be something like "the nothingness" that "exists" outside of the universe. It is not clear that such a notion makes any sense at all, and similarly for Parmenides and his Greek readers. Furthermore, to talk about or think about something was, for the ancient Greeks, akin to pointing to it, and nothingness cannot be pointed to. A contemporary parallel for this point can be explored in the difficulties that Russell and Fodor (and many others) have had in trying to account for representations of non-existents or falsehoods.

In any case, the Parmenidean arguments were taken seriously, and responses attempted. Empedocles proposed that earth, air, fire, and water were the basic substances out of which everything is composed. These substances did not change, and, thus, satisfied the Parmenidean constraint. Apparent change is constituted in

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2. Not to imply that any notion of emergence was available.

changing mixtures of the substances. Similarly, Democritus proposed indivisible atoms as unchanging Parmenidean wholes, with apparent change being constituted by alterations in the configurations of these atoms.

Aristotle, among others, also took these issues quite seriously, and developed his own earth, air, fire, and water framework. This was much more sophisticated than that of Empedocles, and change was possible from one into another, but there was still a Parmenidean-satisfying base of unchanging prime matter (Bickhard, forthcoming, in preparation; Campbell, 1992; Gill, 1989; Guthrie, 1965; Taylor, 1997; Wright, 1997). This is the heritage from which the Western tradition of substance and particle derives.

Problems

This tradition appears to resolve the problems that Parmenides introduced, but, unfortunately, it introduces problems of its own that have perplexed or perniciously guided many since then. Three of them are:

1. Stasis or stability is the default. Change requires explanation, and self-movers are not possible.
2. Emergence is not possible. Earth, air, fire, and water can mix, but there is no possibility of generating a fifth substance.
3. A metaphysical realm of substance or atom is created. This realm might also involve cause and fact, but it does not include normativity, intentionality, or modality. These are split off into their own second realm, leaving the relationships to the first problematic.

Given the apparent necessity of a substance or particle metaphysics to satisfy the Parmenidean argument, and the resultant metaphysical split, there are only three general possibilities. Two distinct realms could be explicitly proposed, and the metaphysics of the world addressed from within such a two realm framework. Aristotle's substance and form, Descartes' two kinds of substances, Kant's two realms, and analytic philosophy's realm of scientific fact set off from that of linguistic normativity and modality would all be examples. A second possibility would be to attempt to account for everything in terms of the intentional realm alone, resulting in some sort of idealism, such as those of Hegel, Green, or Bradley. And, finally, one could attempt to account for the world just in terms of the physicalistic realm, as with Hobbes, Hume (on most interpretations), Quine, and most of contemporary philosophy and science.

There is, of course, a temptation to try to account for mental phenomena as emergents from a non-normative, non-intentional, realm, but that is precisely one of the conceptual possibilities that is precluded by the metaphysics that generates the split in the first place.

Hume

This framework has been explored and elaborated in many ways. One that I will address, that has had a major influence in subsequent centuries, is Hume's argument against being able to derive norms from facts (Hume, 1978). As standardly interpreted (Hume didn't actually elaborate the argument), Hume concludes that any valid reasoning containing only factual terms in the premises can have only factual terms in the conclusion. The argument is that any new terms that might be introduced in the course of the reasoning must be defined using the terms in the premises together with any terms previously defined. Any new terms, therefore, can always in principle be back-translated through their definitions – substituting the defining phrase or clause for the defined term – ultimately ending up with only terms that were in the original premises. Any valid conclusion, therefore, can always be stated using only factual terms, and will thus be a factual, not a normative, conclusion.

But Hume's argument turns on the assumption that all legitimate forms of definition permit back-translation, and that assumption is false. In particular, implicit definition does not. Implicit definition was most forcefully proposed by Hilbert in his implicit definitional axiomatization of geometry (Chang & Keisler, 1990; Doyle, 1985; Hale & Wright, 2000; Hilbert, 1971; Kneale & Kneale, 1986; Kolaitis, 1990; Otero, 1970; Quine, 1966). The basic idea is that the relations in the axioms define the class of models that would satisfy those axioms (though model theory per se took some further decades to develop). More generally, implicit definitions are definitions in terms of such classes of satisfiers of relational criteria.

Most importantly for current purposes is that implicit definitions are legitimate, and they do not permit back-translation. Hume's argument, therefore, is unsound.

Note that, in its general form, Hume's argument precludes any valid reasoning from arriving at anything other than certain re-arrangements of the original terms in the premises. In this form, it not only excludes deriving norms, it excludes deriving anything new: It is an argument against emergence. It expresses a term-level version of the substance/particle assumption that the only possibilities are just rearrangements of what is already there. Because the argument is unsound, however, this block to emergence is eliminated.

Jaegwon Kim

A second elaboration of the underlying framework that I will address is that of Jaegwon Kim. Kim argues that any apparent causal regularities manifest by a higher level configuration will be epiphenomenal relative to the causality of the particles making up that configuration. Therefore, although it may be that new causal *regularities* may appear, they will simply be the working out of the causal interactions among the constituent particles within that configuration, and no new genuine causal *powers* will appear.

His primary argument for this is the preemption argument. Either higher level causal regularities are in fact new and non-epiphenomenal, in which case the micro-physical "world" is not causally closed and we have some sort of dualism – or, perhaps, one of the British emergentists notion of emergence (McLaughlin, 1992) – or else the particle level causal interactions suffice for the manifest regularities, in which case it is superfluous to posit any additional causality beyond them. The particle level causality preempts any purported higher level causality (Kim, 1991). Configurations, then – unless we abandon the causal closure of the micro-physical world – are just the stage settings within which the genuine causal interactions of the particles take place. Everything else is causally epiphenomenal appearance.[3]

This is a powerful argument, but there is a basic flaw. It assumes a particle framework, that physical causality is constituted as particle causality. The key here is that particles have no organization. They can participate in organization, they can be arranged in configurations, and work out their causal interactions accordingly, but they have no organization themselves. In this view, then, everything that does have causality does not have organization. Organization is delegitimated as a potential locus of causality by the metaphysical framework within which the argument is made. But, if organization cannot be a locus of causality, then emergent causality is not possible. The argument, at best, begs the question.

Worse, however, is that the particle framework assumed here is false. There are several lines of consideration that demonstrate that. First, a pure point particle metaphysics would yield a world in which nothing ever happens: particles have zero probability of ever hitting each other. Second, in what is perhaps the standard naive view today, the world is constituted not only by particles, but also by fields in terms of which the particles interact. But fields, then, must have causal power, and fields have whatever causal power they do in virtue (in part) of their organization. So organization cannot be delegitimated as a locus of causality without removing causality from the world.

Third, and most serious, our best physics tells us that there are in fact no particles at all. The world is constituted of (interactions among) quantum fields, and quantum fields are processes – and fields (and processes in general) have whatever causality they have in virtue of their organization. So, again, organization cannot be delegitimated as a potential locus of causal power without eliminating causality altogether.

The apparent particle-like properties of quantum field interactions are due to the quantization of such interactions, and the conservations of (some of) such quantized properties (Aitchison, 1985; Aitchison & Hey, 1989; Bickhard, 2003; Brown & Harré,

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3.   In recent years, Kim has been exploring the possibilities opened up by excluding relations from the definitions of various kinds of bases – supervenience base, micro- macro base, and so on (Kim, 1998, 2005). This has led him to at times even endorse a kind of emergence (Kim, 1998, 2005). But such changes in stipulative definition cannot ultimately do any metaphysical work. I find his earlier argument against emergence to still be the strongest, and it overrides his subsequent flirtation with emergence – the earlier argument is not blocked by his later work (except for his definitions, which he gives no particular reasons for accepting), and so it can just be run against his adversions to emergence (Campbell & Bickhard, 2008).

1988; Cao, 1999; Clifton, 1996; Davies, 1984; Halverson & Clifton, 2002; Huggett, 2000; Kuhlman, Lyre, & Wayne, 2002; Ryder, 1985; Sciama, 1991; Weinberg, 1977; Weinberg, 1995; Zee, 2003). But this quantization is akin to the quantization of the number of wavelengths in a guitar string, and there are no particles in either case – there are no more physical particles than there are guitar sound particles.

Everything is (quantum field) process, all the way up and all the way down. Organization, therefore, *must* be a potential locus of causality, including, in particular, complexly hierarchically organized such organizations, such as, perhaps, you or me. Such causal manifestations of higher level organization, then, are not blocked from being possible emergents, emergents with causal consequence in the world.

Kim, in effect, has found a reductio of the classic particle and property metaphysics: Everything that we know is emergent. That is, nothing that we know of was present thirteen or fourteen billion years ago, but those phenomena do exist now. Therefore, they have to have emerged. If some metaphysical framework precludes emergence, then it is refuted by the emergence of the universe as we know it.

A rejoinder might be to claim that "all that we know" is in fact epiphenomenal because all causality is resident in basic particles and that those particles (whatever physics ultimately finds them to be) have been in existence since the Big Bang. But this reversion to particles encounters the points made above: 1) nothing but particles yields a universe empty of phenomena, 2) fields are required for particles to interact, and fields already legitimize causally efficacious organization, and 3) quantum field theory shows that particles do not exist, and that, among other consequences, it is not the case that some basic set of particles has been in existence since the Big Bang.

A last attempt at a rejoinder might be to point out that contemporary physics is incomplete and certain to be wrong in at least some respects. This is correct, but any conclusion that there is a possibility of a reversion to particles fails. We still need fields of some sort, and, so, we need causally efficacious organization. And there are multiple strongly empirically supported phenomena that violate the assumed local independence and non-relational existence of anything like a particle model.[4] Particles are gone, and gone for good. The Empodoclean/Democritean heritage has run out. We must return to process – to Heraclitus, if you wish.

Reversing the Metaphysical Split

If we adopt a process metaphysics, we reverse all three of the central consequences of the substance/particle metaphysics:

1. Change becomes the default, and stability, should it occur, requires explanation.
2. New organization is a candidate for emergent causal power – the possibility of emergence is not precluded.

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4. Such as the exclusion principle, the Casimir effect, Rindler and related quanta, virtual "particles", and so on, and on (e.g., Bickhard, 2003; Cao, 1999; Halverson & Clifton, 2002; Sciama, 1991).

3. And the possibility is available that normativity, intentionality, and other mental phenomena are emergent from non-normative, non-intentional phenomena.

These reversals open up possibilities that had been blocked. They do not tell us how such emergent phenomena are to be modeled. They only make it metaphysically sensible to assume that such phenomena might be emergent, and might be understandable as such. In particular, they make it sensible that emergence can occur in (higher level) organizations of process, but not in configurations of particles.[5]

Conclusion

The substance and particle tradition began in Western thought with the earliest beginnings of the differentiation of naturalistic explanation from myth and religion (Graham, 2006). It has been an extremely powerful metaphysical framework that has borne scientific and conceptual fruit for over 2500 years. Nevertheless, so I argue, it is false and it generates insurmountable conceptual problems in attempting to understand the world. In particular, it elevates stasis to a default condition, it makes genuine emergence impossible, and it splits a metaphysical realm of substance, particle, fact, and cause from that of normativity, intentionality, and modality.

This aporetic nest of issues has its strongest contemporary focus with respect to mind and mental phenomena: are they part of the natural world, or do they involve some sort of special non-natural realm or substance or property? They cannot be understood as part of the natural world so long as that world is understood to be constituted in substances or particles. That is the metaphysical framework that generates the split in the first place. But shifting to a process metaphysical framework is not only conceptually and scientifically advisable, it also dissolves all three of the basic sources of that split. Removing these metaphysical barriers does not in itself provide explanatory models of such phenomena as intentionality or normativity, but it does make the project of attempting such models no longer pointless. It makes emergence metaphysically possible, no longer mysterious, and even ubiquitous.

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5. For an attempted account of emergent normative phenomena – in particular, normative function and representation – see Bickhard (2004, in press-a, in press-b, 2008).

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