

Emergence in Science and Philosophy

**Edited by Antonella Corradini
and Timothy O'Connor**

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Introduction

Antonella Corradini and Timothy O'Connor

The concept of emergence has seen a significant resurgence in philosophy and a number of sciences in the past couple decades. Yet debates between emergentist and reductionist accounts of specific phenomena, and of visions of the natural world generally, continue to be hampered by imprecision or outright ambiguity in the use of terms. The term ‘emergence’ is clearly evocative for thinkers across the spectrum of those who theorize about the relationship between ‘high-level’ theories, and the real-world properties and dynamics they seek to describe, and theories and phenomena that pertain to more basic physical systems.

Evocative, but extremely vague. Emergent phenomena are said to arise out of and be sustained by more basic phenomena, while at the same time exerting a ‘top-down’ control, constraint or some other sort of influence upon those very sustaining processes. To some critics, this has the air of magic, as it seems to suggest a kind of circular causality. (See Kim, 1999, for an argument to this conclusion.) Other critics deem the concept of emergence to be objectionably anti-naturalistic, requiring the onset at particular historical junctures of novel properties and behavior that are discontinuous with the world’s fundamental dynamics.

Objections such as these have led many thinkers to construe emergent phenomena as complementary to yet harmonious with the behavior of fundamental physical entities supposed to be uniform in every context, including those involving emergent phenomena. On this view, emergent properties and the patterns to which they give rise are explanatorily self-contained. They are embedded in nature at a relatively coarse-grained level of structure while not ‘disrupting’ or ‘violating’ the ordinary dynamics of the finer-grained (more fundamental) levels. Nature, on this understanding, has a hierarchical structure, with each level of the hierarchy (corresponding to basic physics, chemistry, various levels of biology, and psychology and other information-based sciences) requiring its own concepts and laws to capture the distinctive behavior it exhibits.

However, the preceding attempt at reconciling emergence with a (presumed) pervasive causal continuity at the fundamental level can seem to deflate emergence of its initially profound significance. It locates the

‘autonomy’ of higher-level sciences in their capacity to describe coarse-grained patterns in the world’s mosaic that, however interesting and useful, do not contribute to driving the world’s evolution. The true causal work, on this objection, is all done at the level of basic physics. On reflection, higher-level sciences appear as mere shorthand in the business of describing the world’s behavior. As it is often put, such an outlook threatens to turn emergence into an epistemological, rather than metaphysical, concept. (See O’Connor & Wong, 2006.)

Proposals and criticisms such as those just gestured at constitute, in skeletal form, the basic problematic informing modern discussion of the concept of emergence. It is mirrored by similar controversy over how best to characterize the opposite systematizing impulse, usually given the equally evocative but vague term, “reductionism.” We have collected the chapters in this volume in the belief that much progress has been made in recent years in clarifying the alternatives and the proper terms in which competing claims of evidential support should be advanced. While it is scarcely credible for a partisan to claim that his or her favored view has been more or less established, inadequacies in some older formulations and arguments have been exposed, narrowing the field a bit. The new essays collected here reflect that improved perspective and attempt to advance the debate along one or another front.

The volume has three parts. We provide a detailed introduction to each part immediately prior to the chapters in that part. Here, we make but short and general remarks.

Part I lays a general ontological foundation. In it, six authors consider different accounts of how we might develop an emergentist picture of nature. Most target avowedly metaphysical (and not merely epistemological) construals of emergence. Collectively, they advance a number of fresh proposals, while being informed by philosophical and scientific discussion to date. Through these chapters, the reader will get a pretty thorough understanding of the range of highly general alternatives that have been floated in recent discussion.

In Part II, the authors focus specifically on views concerning the status of mind in the physical world. Reflecting a general trend in contemporary metaphysics to try to refurbish and defend views that were thought dead during the long, dark night of much of the twentieth century when austere empiricism reigned, three of our authors argue for an emergent dualist account of human persons (as does Corradini in Part III of the volume). This is followed by two discussions of how notions of emergence might bear upon the plausibility of the belief that human beings have free will, or metaphysical freedom.

Part III of the volume turns to concrete examinations of particular sciences, asking whether and in what sense they indicate the reality of emergent phenomena. Physics, individual psychology, and the special case of mathematical intuition are all considered under the emergentist rubric.

(Chapter 3 by Bedau and Chapter 5 by Theiner and O'Connor also discuss specific instances of recent scientific theorizing where emergentist themes plausibly have application.) Attempts to show in convincing detail how different general accounts of emergence may or may not have application to the complex mess of going empirical theories are perhaps the most likely sources of fruitful philosophical discussion of emergence in the years to come.

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