

# Reduction and Emergence

Christian Wüthrich

Phil 245, Fall 2013

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Class schedule: Tu 2:00-4:50pm, HSS 7077 (Philosophy seminar room)  
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Both ancient thought and modern science encourage a metaphysical view of our world according to which the macroscopic denizens of our world are constituted by unobservable microscopic objects. This view's grip is so powerful that questions regarding the relationship between the microscopic objects, their properties, and our best theories about them on the one hand, and the macroscopic objects, their properties, and our best theories about them on the other hand take central stage in much of theoretical philosophy, e.g. in metaphysics, philosophy of mind, and philosophy of science. These relationships are often explicated in terms of reduction, emergence, and supervenience. This seminar will articulate these concepts and discuss the philosophical problems that arise from them. Since this is a course in philosophy of science, we will also pay significant attention to scientific perspectives on reduction and emergence, alongside metaphysics and philosophy of mind. We will read a combination of contemporary classics and recent contributions to the field.

*Prerequisites:* Graduate standing or permission of the instructor.

*Distribution requirements:* This course can be counted towards the fulfillment of the distribution requirement in philosophy of science.

## Required texts

- Mark A Bedau and Paul Humphreys (eds.), *Emergence: Contemporary Readings in Philosophy and Science*, MIT Press (Cambridge, MA, 2008). This collection is available at the Price Center bookstore.
- Further mandatory (and perhaps some recommended) readings will be made available through e-reserves or online (password is 'cw245').
- The Stanford Encyclopedia of Philosophy (<http://plato.stanford.edu/>) has many excellent background and survey papers.

## Course requirements and evaluation

The following are necessary and jointly sufficient conditions to obtain letter grade credit for this seminar:

1. **Participation:** You are expected to attend all classes and to actively participate in discussions. If you have to miss a class, you must let me know promptly.
2. **Class presentations:** Every participant should expect to give three presentations of roughly 15 minutes. You are expected to do something visual (blackboard, overheads, handout). Do not try to be comprehensive; rather, synthesize the important parts (main thesis, main argument) and offer some critical thoughts for discussion.
3. **Short papers:** Submit 5 short papers of 3 to 4 pages, reflecting readings for the meeting when the paper is submitted. I want to see a clear statement of the main thesis of the article you are discussing, a brief summary of the main argument, and *your independent judgment and critical reflection*.

or

**Seminar paper:** Submit a term paper of 15 to 20 pages or so, on a topic approved by me. Please submit a paragraph-long outline of your project by Tuesday, **26 November 2013**. The full paper is due on Thursday, **12 December 2013**.

## Topics and readings

Please note that the topics listed do not map bijectively to meetings; the plan would to just go through them more or less in order. The reading list is tentative and will be adjusted to meet participants' interests. In particular, I only expect us to cover a strict subset of this list. Talk to me if you would like to read some general background texts in metaphysics or read up on a particular topic. 'BH $xx$ ' signifies essay number  $xx$  in the collection edited by Bedau and Humphreys.

### (1) Classics

- C D Broad, 'Mechanism and emergence', in Jaegwon Kim and Ernest Sosa (eds.), *Metaphysics: An Anthology*, Blackwell (1999), 487-498.
- Carl Hempel and Paul Oppenheim, 'On the idea of emergence', BH02.
- Wilfrid Sellars and Paul E Meehl, 'The concept of emergence', in Herbert Feigl and Michael Scriven (eds.), *The Foundations of Science and the Concepts of Psychology and Psychoanalysis*, Minneapolis: University of Minnesota Press (1956), 239-252.

### (2) General concepts

- Ernest Nagel, *The Structure of Science*, excerpts.
- Ernest Nagel, 'Issues in the logic of reductive explanations', BH19.
- Jaegwon Kim, 'Emergence: Core ideas and issues', *Synthese* **151** (2006): 347-354.

- David Chalmers, ‘Strong and weak emergence’, in Philip Clayton and Paul Davies (eds.), *The Re-Emergence of Emergence*, Oxford: Oxford University Press (2006).

### (3) The philosophical debate

- Jaegwon Kim, ‘Making sense of emergence’, BH07.
- Paul Humphreys, ‘How properties emerge’, BH06.
- John Searle, ‘Reductionism and the irreducibility of consciousness’, BH03.
- William Wimsatt, ‘Aggregativity: Reductive heuristics for finding emergence’, BH05.
- Mark Bedau, ‘Downward causation and autonomy in weak emergence’, BH08.
- Daniel Dennett, ‘Real patterns’, BH09.

### (4) More in philosophy of mind

- Robert Van Gulick, ‘Reduction, emergence and other recent options on the mind/body problem: a philosophic overview’, *Journal of Consciousness Studies* **8**/9-10 (2001), 1-34.
- J J C Smart, ‘Sensations and Brain Processes’, *Philosophical Review* **68** (1959): 141-156.
- Donald Davidson, ‘Mental events’, in his *Actions and Events*, Oxford: Clarendon Press (1980; second edition OUP 2001).
- Ted Honderich, ‘The argument for anomalous monism’, *Analysis* **42** (1982): 59-64.
- Ted Honderich, ‘Smith and the Champion of Mauve’, *Analysis* **44** (1984): 86-89.

### (5) Multiple realizability

- Hilary Putnam, ‘The nature of mental states’, in his *Mind, Language and Reality*, Cambridge: Cambridge University Press (1975), 429-440.
- Jerry Fodor, ‘Special sciences’, BH22.
- David Lewis, ‘Review of *Art, Mind, and Religion*’, *Journal of Philosophy* **66** (1969): 23-35.
- Jaegwon Kim, ‘Multiple realization and the metaphysics of reduction’, in Jaegwon Kim and Ernest Sosa (eds.), *Metaphysics: An Anthology*, Blackwell (1999), 515-530.
- William Bechtel and Jennifer Mundale, ‘Multiple realizability revisited: linking cognitive and neural states’, *Philosophy of Science* **66** (1999): 175-207.

## (6) Supervenience

- Brian McLaughlin, ‘Emergence and supervenience’, BH04.
- David Chalmers, ‘Supervenience’, BH23.
- Jaegwon Kim, ‘The nonreductivist’s troubles with mental causation’, BH24.
- Stephan Leuenberger, ‘Supervenience in metaphysics’, *Philosophy Compass* **3** (2008): 749-762.

## (7) Reduction as a relation between theories

- Larry Sklar, ‘Types of inter-theoretic reduction’, *British Journal for the Philosophy of Science* **18** (1967): 109-124.
- Robert Richardson, ‘Functionalism and reductionism’, *Philosophy of Science* **46** (1979): 533-558.
- Thomas Nickles, ‘Two concepts of intertheoretic reduction’, *Journal of Philosophy* **70** (1973): 181-201.

## (8) Scientific perspectives on emergence

- Andrew Assad and Norman Packard, ‘Emergence’, BH11.
- P W Anderson, ‘More is different’, BH10.
- Robert Laughlin and David Pines, ‘The theory of everything’, BH 14.
- Michael Berry, ‘Chaos and the semiclassical limit of quantum mechanics (Is the moon there when somebody looks?)’, in Robert John Russell, Philip Clayton, Kirk Wegter-McNelly and John Polkinghorne (eds.), *Quantum Mechanics: Scientific Perspectives on Divine Action*, Vatican Observatory CTNS publications (2001), 41-54.
- Robert Batterman, ‘The tyranny of scales’, in his *The Oxford Handbook of Philosophy of Physics*, Oxford: Oxford University Press (2013).
- Herbert Simon, ‘Alternative views of complexity’, BH13.
- Steen Rasmussen et al., ‘*Ansatz* for dynamical hierarchies’, BH17.
- Edmund Ronald et al., ‘Design, observation, surprise! A test of emergence’, BH16.
- Stephen Wolfram, ‘Undecidability and intractability in theoretical physics’, BH21.
- Thomas Schelling, ‘Sorting and mixing: race and sex’, BH12.
- Stephen Weinberg, ‘Newtonianism, reductionism, and the art of congressional testimony’, BH18.

Please let me know if there are particular topics or readings you would like to discuss in the seminar. I (and the class) may be willing to accommodate your wish.