

The book should attract notice from developmental biologists, anthropologists, and clinical researchers alike.

#### References and Notes

1. D. Harman, *J. Gerontol.* **11**, 298 (1956).
2. K.B. Beckman, B. N. Ames, *Physiol. Rev.* **78**, 547 (1998).
3. R. N. Anderson, B. L. Smith, *Natl. Vital Stat. Rep.* **53** (no. 17) (2005); [www.cdc.gov/nchs/data/nvsr/nvsr53/nvsr53\\_17.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr53/nvsr53_17.pdf).
4. See the NIH's calculator for body mass index at [www.nhlbivsupport.com/bmi](http://www.nhlbivsupport.com/bmi).
5. C. E. Finch, *Longevity, Senescence, and the Genome* (Univ. of Chicago Press, Chicago, 1990).

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## PHILOSOPHY

# Finding Freedom Through Complexity

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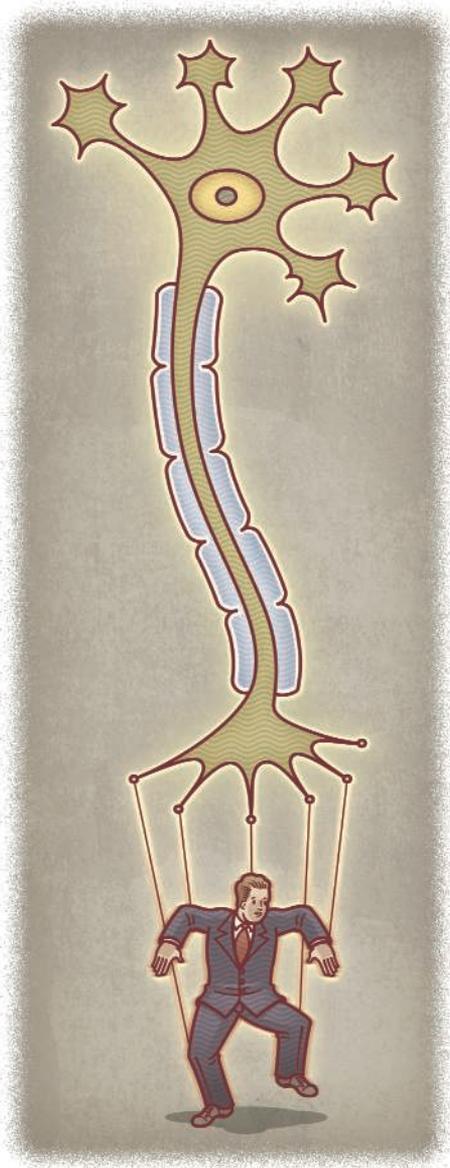
Since the 17th century one of the central problems of philosophy has been to make sense of certain phenomena that lack any obvious place in our modern scientific view of the world—phenomena like colors as we experience them, norms of thought and action, and free and responsible action. Nancy Murphy and Warren S. Brown's fascinating *Did My Neurons Make Me Do It?* touches on all of these phenomena, but its focus is on the third, on the difficult problem of understanding how such action might be possible in light of our growing scientific knowledge about humans and the world they live in.

When accounting for mental phenomena, philosophers typically wish to avoid the extremes of either outright eliminativism (the claim that many or all of the mental states posited by common sense are nonexistent) or supernaturalism. One middle ground popular among philosophers is to endorse a reductive view of the mental, the view that our mental lives are fully explicable in terms of our neurochemistry. This sort of view will often go hand-in-hand with the claim that mental states are nothing other than certain chemical states of the brain—the mind just is the brain. Although this way of thinking about the mind

fits nicely with the perspective of modern science, it appears to have the consequence that our choices and actions are fixed or determined by the laws of chemistry. And in that case there seems to be an important sense in which we are unable to do otherwise than what we in fact do. Because acting freely (in contrast with acting voluntarily) presupposes the ability to do otherwise, this reductive view of the mental evidently avoids eliminativism about the mental at the cost of denying the existence of genuine freedom.

There are several familiar ways to try to avoid this consequence that we lack freedom. One is to suggest that perhaps the laws governing the activity of our neurons are statistical in character and allow for genuine randomness. This suggestion by itself is inadequate because it is perhaps equally difficult to reconcile freedom with randomness or chance. A more common response is to insist that having freedom and responsibility is perfectly compatible with being determined at the neurological level. Murphy and Brown (professors of, respectively, philosophy and psychology at Fuller Theological Seminary, Pasadena, California) do not engage much with this traditional debate between compatibilists and incompatibilists. Instead, they focus on developing an alternative to the reductive view of the mental, an alternative that allows for top-down or emergent causation. Get rid of the reductive view of the mental, and you get rid of the main source of the worry that our actions are determined by laws of chemistry.

It is difficult initially to make sense of emergent causation. Suppose that a mental state or event M is realized by some neural event N and we want to say that M causes, say, efferent nerve stimulation N\*. Presumably M causes N\* only because there is a lawful connection between N and N\*. But in that case it is difficult to see what causal work M is doing. We want a plausible alternative to the reductive approach that avoids falling into some form of epiphenomenalism. Murphy and Brown suggest that complex systems can causally influence what bottom-level events occur by shaping the conditions that trigger those events. This suggestion has the advantage that it makes emergent causation seem less mysterious. Statements of causal laws will typically include some reference to the conditions under which the law is operative, and it would seem that structural features of a system might them-



selves serve as conditions that influence component, lower-level processes.

Murphy and Brown take their move away from the reductive approach to involve something akin to a paradigm shift. They do not engage in a detailed criticism of reductionist views. Rather, they sketch in broad outline ways of thinking about cognition, motivation, and language that are more in line with an emergentist point of view. Their discussion is rich in references to the relevant empirical research and a valuable resource for those interested in the literature on emergentism. The discussion is a bit one-sided at times, and it would have benefited from a more rigorous and charitable engagement with reductionist views. Nevertheless, *Did My Neurons Make Me Do It?* is a nicely written, engaging book that makes a genuine contribution to the growing literature on mental causation.

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**Did My Neurons Make Me Do It?**  
Philosophical and Neurobiological Perspectives on Moral Responsibility and Free Will

by Nancy Murphy and Warren S. Brown

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