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THE PROBLEM WITH THE NEUROSCIENCE BACKLASH

By **Gary Marcus** June 19, 2013

Aristotle thought that the function of the brain was to cool the blood. That seems ludicrous now; through neuroscience, we know more about the brain and how it works than ever before. But, over the past several years, enthusiasm has often outstripped the limits of what current science can really tell us, and the field has given rise to pop neuroscience, which attempts to explain practically everything about human behavior and culture through the brain and its functions.

A backlash against pop neuroscience is now in full swing. The latest, and most cutting, critique yet is “Brainwashed: The Seductive Appeal of Mindless Neuroscience,” by Sally Satel and Scott Lilienfeld. The book, which slams dozens of inconclusive studies that have been spun into overblown and downright dubious fields, like neurolaw and neuromarketing, is a resounding call for skepticism of the most grandiose claims being made in the name of neuroscience. The authors describe it as “an exposé of mindless neuroscience: the oversimplification, interpretive license, and premature application of brain science in the legal, commercial, clinical, and philosophical domains.” The book does a terrific job of explaining where and how savvy readers should be skeptical.

Unfortunately, the book is also prone to being misread. This is partly because it focusses largely on neuroscience’s current limitations rather than on its progress. Some, like David Brooks in the *New York Times*, are using books like “Brainwashed” as an excuse to toss out neuroscience altogether. In Brooks’s view, Satel and Lilienfeld haven’t just exposed some bad neuroscience; they’ve gutted the entire field, leading to the radical conclusion that “the brain is not the mind.” Brooks goes so far as to suggest that “it is probably impossible to look at a map of brain activity and predict or even understand the emotions, reactions, hopes and desires of the mind,” and that “there appears to be no dispersed pattern of activation that we can look at and say, ‘That person is experiencing hatred.’” The core of his claim is

the idea that, if activity is distributed throughout the brain, it cannot be understood or interpreted.

But that claim is simply false. Just because a given activity or response is spread across the brain—involving many different regions rather than just a single section—does not mean it is beyond understanding. It just means we need to work harder to discern its underlying principles. And already, in 2013, using tools that will seem antiquated in a decade, there has been considerable progress in accurately imaging the brain as a way to peek into the workings of the mind. Last summer, for example, Jack Gallant, at U.C. Berkeley, reported a study in which people watched movies while having their brain scanned. After the data was collected, Gallant's team used complex mathematical techniques to analyze the brain scans. There was no single spot that lit up when people were watching a car chase as opposed to a conversation, but, by looking at the ensemble of brain activity, Gallant's group at Berkeley could easily distinguish between the two. Over all, they were able to reconstruct, with surprising accuracy, which parts of the movie people were watching at a given time, based on analyses of the patterns of activity displayed across their entire brain.

It is reasonable to think, based on current research, that no single spot of the brain maps to hatred. But there is no principled reason to think that we will never be able to find some neural pattern, or set of patterns, that correspond to that emotion. Another group, in Europe, recently started to analyze emotion using techniques similar to Gallant's; they found that it may be “possible to discriminate between healthy and depressed individuals based on differences in brain-wide responses to emotional cues.” A soon-to-be-published paper from Carnegie Mellon similarly suggests that emotions can be discerned using complex, whole-brain analyses.

In the current backlash against brain science, it is important to realize that neuroimaging is just one of many tools used in neuroscience. Equally important is the fact that it is widely viewed as rudimentary in its current state—the equivalent of a one-megapixel camera when we are striving to build a gigapixel camera. It seems all but certain that we will continue to understand the brain better as technology allows us to zoom in tighter, with greater precision.

But the idea that the mind is separate from the brain no longer makes sense. They are simply different ways of describing the same thing. To talk about the brain is to talk about physiology, neurons, receptors, and neurotransmitters; to talk about the

mind is to talk about thoughts, ideas, beliefs, emotions, and desires. As an old and elegant phrase puts it, “The mind is what the brain does.”

The worst possibility of a full-scale, reckless backlash against neuroscience, to the exclusion of the field’s best work, is that it might sacrifice important insights that could reshape psychiatry and medicine. A colleague at N.Y.U., the neuroscientist Elizabeth Phelps, wrote in an e-mail: “It would be ridiculous to suggest that we shouldn’t use brain science to help in the treatment/diagnosis of mental disorders, but if one takes the [current backlash] to the extreme, that is the logical conclusion.”

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If critics are too pessimistic about what the future holds, they are right about one thing: over the past decade, neuroscience has become overprivileged as a method of examining the mind. Journalists, courts, and sometimes even scientists seem to believe that a brain scan can be more telling than a profile of an individual’s behavior. Perhaps as neuroscience progresses, it is possible for objective, physiological assessment of the brain to win out as the ultimate arbiter of truth when it comes to the mind. But that’s a long way off, if it ever will be possible at all. For now, we still need fields like psychology and psychiatry, which take the mind as their starting point, rather than the brain, to complement neuroscience. The basic elements of psychology, like beliefs, desires, goals, and thoughts, will likely always

play a key role in our understanding of human behavior, which is why science needs researchers who study the mind every bit as much as it needs researchers who study the brain. Our aim should not be to pick the brain over the mind, or vice versa, but to build stronger bridges between our understandings of the two.

Credit: BSIP/UIG/Getty.



Gary Marcus is a professor of cognitive science at N.Y.U. and the author of “Guitar Zero.” [Read more »](#)

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