Patterns of brain activity can only tell researchers so much.

NEUROSCIENCE

Rise of the neurocrats

Sandra Aamodt evaluates a cautionary account of how brain-scan results could be used and abused.

Imagine a world run by ‘neurocrats’ who use brain scans to detect lies, determine why people commit crimes, and control what brand of soap consumers choose. In *Brainwashed: The Seductive Appeal of Mindless Neuroscience*, psychiatrist Sally Satel and clinical psychologist Scott Lilienfeld explain that this vision of brain scanning exceeds our current abilities. They also argue that emphasizing neural causes of behaviour over psychological and environmental ones could undermine our belief in free will and personal responsibility.

Satel and Lilienfeld provide an engaging overview of the technical and conceptual factors that complicate the interpretation of brain scans obtained by functional magnetic resonance imaging and other techniques. One problem is flawed statistical analysis, as illustrated by the Ig Nobel-prizewinning study in which brain ‘activity’ was recorded in a dead salmon. A deeper concern is that activity in a particular human brain area rarely corresponds to a unique mental state. For example, amygdala activity is often associated with fear, but can indicate surprise, happiness, anger or valuing options.

Sloppy inferences of this sort are common in the popular press and embarrassing for the field, which is why many neuroscientists push back against such errors. One example is the opinion article ‘You Love Your iPhone. Literally’ (*The New York Times*, 30 September 2011), in which the author wrote that the observation of similar brain activity in response to both a phone and a loved one suggested that they evoke the same mental

state. A group of 46 prominent researchers wrote a letter to the newspaper’s editor to explain why the conclusions were unconvincing.

Beyond the reputation of neuroscience, misuse of brain imaging has potentially serious consequences for individuals. As Satel and Lilienfeld explain, brain-based lie detectors currently belong in the lab rather than the legal system: both the false-positive and false-negative rates are unacceptable for high-stakes applications. Almost all courts that have evaluated these methods have agreed. A lie detector based on electroencephalography was admitted as evidence in one murder trial in India, but an appeals court ruled the test “unscientific” and ordered that the defendants be released on bail.

Lawyers have had more success introducing brain scans during sentencing to support claims of diminished responsibility. Courts have considered evidence of brain damage, incomplete brain maturation in adolescents and unusual brain responses that are consistent with psychopathy. The authors note, however, that even when brain activity differs on average between groups with particular characteristics, the results typically overlap enough that individual scans are not diagnostic.

Brainwashed: The Seductive Appeal of Mindless Neuroscience
SALLY SATEL AND
SCOTT LILIENFELD
Basic Books: 2013.

Satel and Lilienfeld make a philosophical argument too: they believe that moral culpability, blame and even retribution serve important societal functions that we should not relinquish. The authors are responding to suggestions that we should rethink traditional ideas of blame, in light of the growing scientific consensus that many influences on actions and decisions occur outside conscious awareness.

Neuroscientists including David Eagleman, in *Incognito: The Secret Lives of the Brain* (Pantheon, 2011), argue that we should instead attribute antisocial behaviour to brain malfunctions that might be correctable. In one example, a previously law-abiding man became interested in child pornography and tried to molest his stepdaughter. He was found to have a brain tumour and his impulses disappeared when it was removed, but returned when it grew back. In such a case, cancer treatment would protect society more effectively than blame or punishment.

However, Satel and Lilienfeld argue that viewing responsibility from a biological perspective may backfire. Attempts to use neuroscience research to destigmatize mental disorders have produced mixed results. People who believe that conditions such as schizophrenia are strictly biological are less likely to blame people with the condition for their behaviour, but also view them as more dangerous and less able to change.

In addition, this outlook may have adverse consequences for drug addicts. Several population studies have found that more than 75% of addicts eventually quit, many without treatment. The authors speculate that people who think of addiction as a chronic, relapsing brain disease may be less likely to succeed in kicking the habit.

This philosophical debate over the relevance of neuroscience to free will may be less important than it seems because it is difficult to change people’s attitudes. New information tends to flow into well-worn cultural paths as people process it under their own assumptions and agendas. Psychologists find that non-specialists are not yet convinced that the self is a construct based in brain activity, nor that biology trumps free will. Instead, people assimilate scientific concepts into their previous ideas about the importance of responsibility and self-control.

In short, the neurocrats are not coming for your thoughts any time soon. In the meantime, *Brainwashed* offers much to bolster popular understanding of what brain imaging can and cannot achieve. ■

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