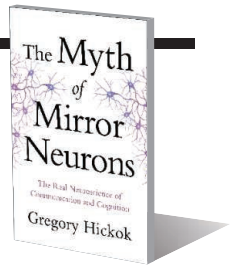
The Myth of Mirror Neurons
The Real Neuroscience of Communication and Cognition
Gregory Hickok
Norton, 2014. 302 pp.



NEUROSCIENCE

The straw man in the brain

Pop culture claims about the brain make for easy targets, finds Christian Keysers

Two decades ago, a team led by the Italian neuroscientist Giacomo Rizzolatti noticed something peculiar in the premotor cortex of macaque monkeys. In addition to firing during the monkey's own actions, some neurons also fired when an experimenter performed comparable actions. These cells, which came to be known as "mirror neurons," generated tremendous scientific interest and the most-cited neuroscience paper of the past decade (1).

After the initial report, two mirror neuron "cultures" developed side by side. Most neuroscientists focused on basic questions in their scientific publications: where in the brain do mirror neurons exist; what do they respond to; do humans have them? At the same time, journalists, bloggers, and even some scientists, speculated enthusiastically about the function of these cells in popular culture outlets, implicating mirror neurons in everything from obesity to autism, despite the fact that many of these claims so far remain untested.

*The Myth of Mirror Neuron*s reflects author Gregory Hickok's frustration with the persistence of exaggerated claims about these cells. As a cognitive scientist specializing in language, Hickok has clearly been irritated by attempts to reduce the complexities of human language acquisition and comprehension into something that can be explained by mirror neurons alone. He is equally unimpressed with the claim that mirror neurons are all that is necessary for us to infer intent from the actions of others, an ability known as action understanding.

If mirror neurons in the motor circuitry by themselves explain all of language and action understanding, he argues, then patients with impaired motor circuitry should be unable to understand the language and the actions of others. Referencing a 2008 study (2), Hickok points out that while some patients with damage to the motor circuitry show subtle impairments in language perception and action understanding, others do not. In Chapter 4, he elaborates further, pointing out that speech perception is possible in patients who have suffered damage to motor speech centers in the brain and that we can understand actions that we cannot, ourselves, perform. His arguments are compelling refutations of the pop-culture claims that mirror neurons are necessary and sufficient for language and action understanding.

The problem is that Hickok fails to refute any actual scientific claims about mirror neurons. Rizzolatti and his colleagues have maintained all along that mirror neurons are not sufficient for language or action understanding (3, 4). They are thought, instead, to represent one component of a complex circuit that can enrich action perception. According to Hickok, scientists working in this arena also "minimize the importance of simulation in nonmotor systems." In reality, a number of groups, my own included, have published research showing that nonmotor circuitry, including the limbic and somatosensory systems, plays a critical role in social cognition (5, 6).

Unfortunately, these examples are not exceptions but are reflective of Hickok's methods throughout the book: He presents and then deconstructs dramatically oversimplified claims about mirror neurons, implying that these reflect the proposals of the scientists working in this field. His refutations of these claims are passionate and compelling but, ironically, lead down the very path of mystification he tries to denounce.

Although the book fails to address the current state of understanding about the function of mirror neurons, it does make it clear how urgent it has become for the field of neuroscience to ramp up efforts to determine what mirror neurons contribute to our mind and behavior. The truth is that a scarcity of evidence is not evidence for the scarcity of their contribution.

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