Book Mirroring People

The Science of Empathy and How We Connect with Others

Marco Iacoboni
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Recommendation

In this fascinating book, Marco Iacoboni wordily explains his research into mirror neurons, generally in language that laypeople can understand. He convincingly issues a challenge to the individualistic foundations of Western thought. People imitate one another, Iacoboni argues, on a neurological level: Their brains respond to the actions of others, almost as though they were doing those actions themselves. What's more, different levels of neural activity occur depending on context and purpose. The human world is social, and each person's actions have immediate, neurological implications for everyone else. Because of the number of fields Iacoboni touches on, and the broad implications mirror neurons have for society, *BooksInShort* recommends his book to readers who are interested in communication, advertising, cognitive science and philosophy.

Take-Aways

- Human beings are connected to one another on a neurological level.
- When you watch someone else, your mirror neurons create a simulation of their actions.
- When you unconsciously mirror others' experiences, you empathize with them.
- When you use phrases that refer to the body, such as "give a hand," your motor neurons fire.
- Gestures are as important a part of communication as words.
- When the person to whom you are talking gestures as he or she speaks, your mirror neurons fire as if you were doing those actions.
- Mirror-neuron research has led to new treatments for autism.
- It shows that people are always monitoring social interactions.
- Mirror-neuron research challenges the idea that individuals are completely responsible for their actions, because people neurologically respond to others' actions.
- Mirror neurons suggest people don't make sense of the world as individuals but rather through interaction.

Summary

Reading the World, Reading Each Other

As you move through life, you "read the world." More than anything, this means you read the people you encounter. You interpret their faces, gestures and moods based on subtle behavioral cues. You can fathom "the deepest aspects of the minds of others" because of brain cells called mirror neurons, which are "highly and narrowly specialized."

> "Mirror neurons undoubtedly provide, for the first time in history, a plausible neurophysiological explanation for complex forms of social cognition and interaction."

When mirror neurons discharge, they set off a kind of imitative impulse in your brain that reflects what you perceive others to be doing. This is so finely tuned that the mirror neurons fire differently depending on the intention of an action. For example, if you see someone reach for a cup in the presence of contextual cues indicating that he or she is about to drink from it, your mirror neurons will fire differently from the way they would if the cues indicated that he or she were picking it up to clear the table. Cues may be visual – you might see steam rising from the cup, for example – or auditory – you might hear a dishwasher running in the kitchen.

> "Modern science requires...technological innovations, management skills and lots of money."

Mirroring and interpretation are crucial parts of learning. Humans imitate one another almost as soon as they are born: One study showed a newborn imitating adults' expressions when he was only "41 minutes old." Children play together by imitating one another's behavior, even before they can speak. When they're older, they imitate on a more complex level; this is how people pass on cultural practices. Unfortunately for parents, children are so acutely attuned to imitation that they'll copy what you do, rather than do what you say.

> "I think one of the primary goals of imitation may actually be the facilitation of an embodied 'intimacy' between the self and others during social relations."

Experience also shapes your neurological response to the world. One study showed that groups with different physical experiences responded differently to images: Dancers' brains responded more intensely to videos of dancers, while practitioners of capoeira, a Brazilian martial art, responded more intensely to videos of their practice. Researchers who study advertising have noted a neurological sense of "affiliation," whereby people perceive themselves as being similar to the people they see in ads and respond powerfully to them.

The Discovery of Mirror Neurons

Like many scientific breakthroughs, mirror neurons were discovered by accident. Giacomo Rizzolatti was leading a team of neurophysiologists in Parma, Italy, who were studying brain activity in macaque monkeys. They were monitoring cells in the brain's "premotor cortex," which is dedicated to "planning, selecting and executing actions." When they inserted electrodes into the monkeys' brains to monitor "motor cell" activity during tasks, they received an unexpected response. An experimenter did something within sight of a monitored monkey, and the monkey's nerve cell fired as though the monkey itself had performed the action.

> "The mind is not a book. I do not think we 'read' other minds, and we should stop using terms that already contain bias about the way we think about such a process."

The existing theory could not account for this. It said that different parts of the brain related to different functions: Some parts controlled perception, some action and so on. Yet the monkey's neurons seemed to be responding more holistically, as if action and perception were closely tied – and as if the monkey's perceptions of others' actions were linked to its own actions. Additional research showed that this was indeed the case: The neurons fired in response to particular actions. For example, they fired in response to a hand grasping food but not to a hand miming the act of grasping food, indicating that the monkeys perceived the action's purpose on a neurological level. And the neurons fired differently when the hand grasped larger objects, such as apples, from when it grasped smaller objects, such as raisins.

"Embodied Semantics"

Researchers realized that meaning does not reside in abstractions but rather in the details of and interactions among internal and external phenomena. Like monkeys, humans are aware of intention on a neurological level, as if they can read one another's minds. Older theories of human and animal intelligence didn't value imitation. More recent theories, though, reverse this, asserting that the ability to imitate is both central to intelligence and a good measure of it. It's also an important part of communication and language.

> "During conversation, we imitate each other's expressions, even each other's syntactic constructions."

Watch people talk. They use more than words. They wince, smile, pause and gesture. "Iconic gestures" parallel the content of the words the speaker uses, while "beat gestures" establish the timing and rhythm of speech. Beat gestures help the speaker keep track of what he or she is saying, while iconic gestures help the listeners, whose mirror neurons fire as though they themselves were performing those actions. When you use figurative language that refers to the body, such as the phrase "grasping a concept," the motor neurons that you would use in grasping fire. Physical movements facilitate linguistic communication because of this motor neuron activity in response to language.

> "Mimicking others is not just a form of communicating nonverbally; it helps us perceive others' expressions (and therefore their emotions) in the first place."

A powerful developmental link exists "between hand and mouth early in life." Gestures precede language. Studies of which neurons fire when people observe gestures indicate that mirror neurons are central to "language development and language evolution." When a child's gestures and speech don't match, that's a sign that they're wrestling with "new concepts."

> "Almost instinctively we humans tend to synchronize our movements."

All of this leads to the linguistic theory of "embodied semantics," which sees "linguistic concepts" as developing from specific "sensory-motor" realities. Mirror neurons' role in language helps explain why people find taking part in a conversation easier than listening to a monologue. If speech flowed outward from the isolated self, listening to a monologue would be easier. However, people find conversations easier, because they synchronize with one another neurologically, echoing one another through mirror neurons.

Mirror Neurons and Emotions

If you ever watched an emotionally charged sporting event that had a lot riding on the outcome, such as the World Cup final or game seven of the World Series, you probably recall important moments from that contest vividly. When you do, you may feel the same surge of elation or disappointment that you felt when you were actually watching the game. Your emotions aren't just those of a spectator; you probably feel empathy with the players themselves, wincing with their pain even in memory. This happens because of the "neural mechanism for mirroring in the brain." Empathy plays a central role in human society and interaction.

> "At least six different laboratories using a variety of techniques for studying the human brain have recently confirmed deficits in mirror neuron areas in individuals with autism."

When people interact, they indicate through more than their words that they understand one another. They tend to synchronize their expressions and gestures. Research has shown that in couples, the more intense the "motor synchrony" the greater the "emotional rapport." Mirroring others helps you to understand their emotions. When people look at pictures of faces expressing various emotions, their own faces echo the expressions in the pictures. If individuals are unable to move their faces freely, for example, if they are holding a pen between their teeth, limiting movement, they are markedly less able to identify what another person's expression communicates.

Mirror Neurons and Medicine

One of the researchers' original purposes for studying motor neurons in macaque monkeys was to find ways to help humans who'd lost some "motor functions after brain damage." In mirror-neuron research, scientists have found hope for treating other conditions as well. Understanding the role of mirror neurons in cravings may improve treatment of addiction, and mirror-neuron research holds great promise for the treatment of autism.

> "Given the high rate of relapse for practically every known form of addiction, a better understanding of the role of mirror neurons in relapses will be extremely important in the treatment of addictive behaviors."

Autistic children have visual focuses different from those of children who are developing normally. One early sign of an autism-related condition is that the young child shows "severe deficits in social relations." One hypothesis says that this is because their mirror neurons do not function as they should. Thus imitation, one of the functions of mirror-neuron activity, may work as part of a therapy for autism. The therapist would imitate the autistic child's actions to stimulate his or her mirror neurons. Eventually, this would lead the child out of isolation and into synchronization, and social and emotional harmony with others.

Politics, Philosophy and the End of Individualism

In the late 1990s, a political science graduate student, Darren Schreiber, undertook research at the Brain Mapping Center at the University of California San Diego to test "theories about how political attitudes are formed" and to determine whether people make political decisions rationally. An established body of observations about survey data showed differences in how quickly people responded to political questions. Respondents with clear political positions tended to answer questions quickly, and their answers were usually consistent: A liberal answer on one question predicted a liberal answer on others. Respondents without political affiliations took longer to answer, and their answers tended to scatter across the political spectrum. Theorists suggested that the difference in speed corresponded to different processing procedures in the brain for familiar tasks than for new ones.

> "A healthy democracy, in my opinion, needs mechanisms of empathy and identification between the people and their political representatives."

Schreiber used brain imaging to monitor neural activity in two groups of college students, "political junkies" and "novices," as they looked at pictures of faces. The political junkies' brains showed activity that indicated they felt a "sense of belonging" when they viewed pictures of politicians, while the brains of the novices, who did not recognize the politicians, showed no change. In another study, researchers presented the subjects with a series of politically charged statements. The paradoxical results surprised the researchers. In the brains of practiced political thinkers, elements of the "default state network" kicked in, which happens when people are completing mundane tasks. Essentially, their expertise enabled them to respond to the statements without much new thought. The more they knew, the less reasoning took place. In contrast, the novices "geared up for cognition."

> "Mirror neurons are the brain cells that fill the gap between self and other by enabling some sort of simulation or inner imitation of the actions of others."

Another study examined the sort of brain activity that occurs during different kinds of social relationships. Subjects watched videos in which people demonstrated different modes of interaction: one showed "communal sharing," with kind and egalitarian interactions, while another demonstrated "hierarchical inequalities." When subjects watched these videos, brain scans showed that both their mirror neurons and their default state networks were highly engaged, indicating both that they were empathizing with the people in the videos and that paying attention to social relationships was routine – a default state.

> "We are wired for empathy, which should inspire us to shape our society and make it a better place to live."

These results have implications for politics and philosophy. Western philosophy assumes an autonomous, rational self. The 17th-century French philosopher Rene Descartes summed up this idea with the Latin phrase, "*Cogito ergo sum*" ("I think, therefore I am"). The problem with this perspective is that it ignores intersubjectivity – the meaning produced through interaction. Various thinkers have attempted to explain how humans understand one another. Some believe they do it using analogies: individuals understand themselves, then extrapolate to others. However, this idea has two problems: Most people aren't that self-aware; and analogical thinking requires a great deal of conscious reasoning, while most people understand one another quickly and intuitively.

The "neural mechanisms of mirroring and simulation" are what enable people to connect. They also explain intersubjectivity and mutual understanding. Mirror-neuron studies show that humans aren't isolated individuals, as Western thought has traditionally portrayed them, but rather that they are connected on a neurological level. The wiring in the human brain predisposes people to interact and share experiences. "Existential neuroscience" shows that humans generate meaning not through individual effort but rather through mutuality.

Mirror-neuron studies may also illuminate the effects of violence in the media. Behavioral studies of children who see media violence have come to a variety of conclusions, including the disturbing one that violence may increase among children who watch violent media – although children's environments can mitigate some of this effect. New understandings of mirror neurons underscore the likelihood that people will imitate actions that they observe. After all, the function of mirror neurons is to promote imitation on a cellular level. People's influence on one another, right down to the level of cellular activity, is a direct challenge to long-established models of personal responsibility and autonomy.

About the Author

Marco Iacoboni directs the Transcranial Magnetic Stimulation Laboratory at the Ahmanson-Lovelace Brain Mapping Center at the University of California Los Angeles.