Mind Reading

Whether we know it or not, we're all street-corner psychics. Without the ability to divine others' thoughts and feelings, we couldn't handle the simplest social situations—or achieve true intimacy with others.

by Annie Murphy Paul

If a baby starts to cry several hours after drinking his last bottle, his mother knows precisely what he's feeling: He's hungry. But suppose a woman's eyes brim with tears while she watches a DVD. Her husband sinks into the couch: What is she so upset about? She might tell him directly: "This movie is so tragic. It's all about a doomed romance." That may be true. But she could be thinking about how the story reminds her of her own marital troubles. Maybe she's feeling hurt because she thinks her husband should realize what's bothering her and acknowledge it. Or maybe she isn't even aware that her real-world concerns are intensifying her reaction to the fictional couple.

Quickly and unknowingly, he scours his mental files—on his wife's relationship history, on her reaction to the fight they had that morning, on the way she typically reacts to similar movies. He notes the particular quiver to her voice, observes the way she's curled up on the couch, watches the expressions flickering across her face. He takes in information from all of these channels, filters it through his own wishes and biases... until finally it hits him: She knows about his mistress!

Every day, whether we're pushing for a raise, wrestling with the kids over homework, or judging whether a friend really likes our latest redecorating spree, we're reading each other's minds. Drawing on our observations, our databank of memories, our powers of reason, and our wellsprings of emotion, we constantly make educated guesses about what another person is thinking and feeling. Throughout the most heated argument or the most lighthearted chat, we're intently collecting clues to what's on the other person's mind at the moment. "It's a perceptual ability I call mindsight," says Daniel Siegel, UCLA psychiatrist and author of The Mindful Brain. "It allows your brain to create a map of another person's internal state."

Mind reading of this sort—not to be confused with the infallible superhero kind of telepathy—is a critical human skill. It's the way we make sense of other people's behavior and decide on our own next moves. Mind reading enables us to negotiate, compete, cooperate, and achieve emotional closeness with others. It lets us figure out when we're being manipulated or seduced. It's how we know when someone finds our jokes hilarious or is humoring us out of politeness. Mind-reading ability is perhaps the most urgent element of social intelligence.

Do it poorly and the consequences are serious: It can lead to conflict born of misunderstanding. It can make us feel lonely within a relationship. It can even incite violence: Abusive husbands typically—and inaccurately—attribute critical thoughts to their wives; that's why they lash out. Difficulty divining others' thoughts and feelings—"mindblindness"—characterizes autism and is what makes the condition so socially debilitating.
Decades of research on mind reading (or, as psychologists call it, empathic accuracy) now reveal how it works, who's especially good at it, and how we can improve our ability to divine others' thoughts—even when our conversation partners may not know their own minds. The thoughts and feelings of others, including those closest to us, are far from transparent; that makes mind reading the only way to know someone beyond the mere surface. It's the only way to achieve true intimacy. And the only way to love someone for who he or she really is.

**The Great Trade-Off**

It's astonishing that we can peer into each other's minds at all—but in truth we generally don't do it all that well. Strangers (who are videotaped and later report their second-by-second thoughts and feelings, as well as their assessments of their counterpart's thoughts and feelings) read each other with an average accuracy rate of 20 percent. Close friends and married couples nudge that up to 35 percent. And "almost no one ever scores higher than 60 percent," reports psychologist William Ickes, the father of empathic accuracy, who is based at the University of Texas at Arlington.

Our (limited) ability to mind read has ancient roots, says Ross Buck, a professor of communication sciences at the University of Connecticut. Over thousands of years of evolution, humans' systems of communication grew more sophisticated, as living and working arrangements became more complex. Mind reading became a tool with which to "create and maintain the social order," as Buck puts it. It helped to know when to affirm a commitment to a mate or defuse a dispute with a neighbor.

Of course, in order to advance our own interests, we still needed to conceal feelings from others at times, and even to lie. "We didn't always want to show exactly what we were thinking, because others could use that to gain the upper hand," says Buck. Our merely adequate mindsight, then, can be thought of as the product of a tug-of-war between the need to show and the need to hide our true selves.

This delicate balance between perceiving and concealing has served humans well over our long history, but Siegel worries that mind-reading ability is now on the decline in our culture. Today's obsessed-with-success parents spend so much time stimulating their children with structured activities, noisy toys, and Baby Einstein DVDs, they are not sitting still and being "present" with their kids. As a result, they deny children the opportunity to learn how to get in tune with another person, physically and emotionally—that is, to develop mindsight. A reasonable degree of mindsight is required, he says, for a civil society in which adults are kind to one another.

**Seven Sides of a Sixth Sense**

If everyday mind reading is a sixth sense, it's a very complicated one that relies on all the other senses and fully exploits our cognitive and perceptual abilities. For starters: When we're trying to get inside someone's head, we comprehend the meaning of the words being spoken, we monitor facial expressions and body language, and we register the tone of voice and the cadence of speech.

Not all mind reading moments are created equal, however. There are break points, times where the interaction changes color and tone. A break point could follow an awkward pause or the entrance of someone else into the discussion, explains Sara Hodges, a professor of psychology at the University of Oregon. We don't have to pinpoint our partner's every fleeting thought and emotion, but we'd better gauge these moments right, because they carry more weight. "If you're reading someone pretty accurately but then miss the point where they go from laughing along with you to feeling teased in a hurtful way, or if you miss the point where a light conversation turns serious, then all your other points of accuracy may be blown, and it's going to reveal that you're not very empathically accurate."
Reading body language is a core component of mind reading. It can reveal a person's most basic emotions. Researchers have shown that when watching a body's movements reduced to points of light on a screen, observers can still read sadness, anger, joy, disgust, fear, and romantic love. We're primed to read emotion into movement—even when there's very little to go on.

Facial expressions are also cues we use to know what others are thinking. Despite the 3,000 different expressions we may deploy each day, it's the fleeting microexpressions that betray many feelings. Unfortunately, the vast majority of us are terrible at detecting them. Still, we tend to focus on others' eyes, and that helps us. The many surrounding muscles make eyes a richer source of clues than other parts of the face: downcast in sadness, wide open in fright, dreamily unfocused, starring hard with jealousy, or glancing around with bored impatience.

We know even more about someone's mind from the way the components of conversation fit together—someone's words, gestures, and pitch of voice may seem either aligned or incongruous. But despite all we glean from body language and voice tone, Ickes finds, it's the content of speech that contributes most to our success at mind reading. Words matter.

**All Together Now**

There's yet another, deeper level on which mind reading happens. Emotions are in a sense contagious, and we may sense what's on others' minds by "catching" what our conversation partners are feeling. Psychologists have long known that we tend to converge emotionally with others as we talk to them; without being aware of it, we copy them, altering our physiology from the outside in. Like the method actor who "becomes" her character, we start to "feel" what the other person is feeling. When we mimic other people's behavior, speech, rhythms, gestures, expressions, and physical attitudes, studies show, we gain a direct sense of their feeling.

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Mirroring Emotions: The Role of Mirror Neurons in Empathy

Submitted by Simone Shane on Wed, 04/09/2008 - 5:10pm

After reading an article about the role of mirror neurons in helping assuage some pain in those who experience phantom limb pain, I became very interested in what other roles mirror neurons play in the behaviors of human beings. Mirror neurons were first discovered by a team of researchers studying motor neurons in macaque monkeys who noticed that specific neurons in the ventral premotor cortex and anterior inferior parietal lobe were activated both when the monkeys performed an action (e.g. Grabbing) and when they observed someone else doing that same action (1, 6, 11, 12). In human brains, mirror neurons are thought to help explain many behaviors, including learning language, imitating motions, and the ability to understand others’ intentions and mental states. Mirror neurons, moreover, are also indicated in human’s ability to feel empathy. (1)

As defined by the Oxford English Dictionary, Empathy is “the power of projecting one's personality into (and so fully comprehending) the object of contemplation” (2). In plainer terms, empathy can be thought of as the ability to experience the experiences of someone else. The argument for mirror neurons role in empathy is quite simple: when we perceive an action or emotion of another person, a number of neurons that would become active should we ourselves be conducting that action or expressing that feeling begin to fire. Thus, we simulate the actions and emotions of those we observe.

Through functional magnetic resonance imaging (fMRI) to monitor neuronal activation, researchers have been able to monitor the activation of these mirror neurons during the experience and observation of different emotions and experiences. For example, neurons that fire both when one observes facial features and when they imitate them have been found in the premotor cortex (3); neurons that fire both when one feels pain and when they watch someone close to them feeling pain were documented in the Bilateral anterior insula, rostral anterior cingulated cortex, brainstem, and cerebellum (4), and neurons activated both when one smells something disgusting and when they watch someone else reacting to the disgusting substance have been found in the Insula and the Cingulate Cortex (5). Interestingly, it has also been found that we don’t even need to see something to have a mirror response: when participants heard a noise, the motor neurons associated with the actions needed to create that sound are activated. One example given is that when we chewing noises, neurons involved with moving the mouth are activated (6).

This article discussing the auditory mirror system and another article following up on the representation of
disgust (7) also found a correlation between participants’ scores on quotients measuring empathy and higher activation of mirror neurons during observation tasks. Simply put, it seems as though people with more excitable mirror neurons behave more empathically. These differences may also be noticeable not only between individuals, but between groups as well. Indeed, it is argued that males are innately more systematic while women are more empathetic (9) and recent research shows that females display higher mirror neuron activation when viewing a human hand while men showed higher activation while watching a dot (10).

Another interesting group that may fall on an extreme side of the empathy spectrum are those with autism. Autism, a developmental disorder associated in part with poor expressive language abilities, and social cognitive skills—precisely with which we believe mirror neurons assist. Various studies seemed to find a dysfunction in the mirror system of those with autism, as the neurons of autistic participants activate only when the participant himself is moving, but not when he is observing the movement of others (11), except when observing someone very familiar to them, such as a relative (12).

Yet, if those with autism fall on the far negative side of the empathy spectrum, where do sociopaths, people who do not feel empathy or remorse, fit in? Would they also fit on the spectrum in the place as autistic individuals? Something tells me that this is a dangerous and would be decried as unmoral for the social repercussions it may have. An article written by a psychotherapist for the Washington Post takes this even suggests that there should be a new diagnosis for Empathy Deficient Disorder to categorize people who have trouble simulating other people’s emotions (8). Do the people who would warrant this diagnosis have autistic tendencies? What about sociopathic tendencies?

If we narrow the scope to pain, I would also wonder where sadists and masochists would fit in to all of this. If sadists feel pleasure at others’ pain, is their mirror system not recognizing the distress of the one in pain? Is it misinterpreting the expressions of pain as those of pleasure? Also, when observing a masochist, do we still feel empathetic pain when watching them, or do we perceive their pleasure and simulate that as well? Unfortunately, I could find no articles about the mirror systems in these populations to answer these questions. The questions do, however, raise the interesting point of subjectivity and how we each perceive the favorability of different emotions.

Another somewhat unrelated question that must be made is, when we empathize—when we simulate in our brains the emotions/experience of others—do we truly feel what the other person is actually feeling? The easy answer seems to be, “of course not,” since the observer may have no knowledge of the strength of the feeling and the cause that initiated the emotion in the observed is certainly not present to validate the emotion in the observer. Yet, the observer may indeed experience at least some of the observed person’s emotions. The neurons that fire when watching disgust are located in a part of the brain has been previously found to induce nausea when prodded, suggesting that feelings of disgust may actually occur (5). While participants were not asked to report whether they felt disgusted at the imaged of others’ disgust, this suggests that they may have. Furthermore, the concept of an emotional contagion has been established. That is, emotions can be contagious and people have a tendency of getting caught up into the emotions of those around them (13). Could this be due to mirror neurons? If emotions truly are felt when viewing someone, than my answer would be strongly affirmative. Simulating another’s negative or positive emotions, especially over a long period of time, may influence whatever emotion one was already feeling. If the simulator of the emotion was not actually feeling the emotion, I would guess that they would be in an objective enough of a stance to not let it change their current emotion.

Yet, in the article discussing pain empathy, neurons in the somatosensory cortex, sensorimotor cortex, and
caudal anterior cingulated cortex only lit up when the participant felt pain themselves and not when they saw others go through that pain. The authors of this study suggest that the mirror neurons provided a means of conveying the affective correlates of pain, but not the actual sense of feeling pain, which is assumedly induced by the activity of neurons in the aforementioned areas that were only activated upon personal pain (8). This made me think back to the original article on phantom limb pain that led me to become interested in mirror neurons. This article mentioned that, despite the activation of motor neurons in the brain, we do not automatically enact the motions that we observe because our sensory systems are telling us that there is an incongruency. That is, if we watch someone doing a handstand, our sensory neurons will tell us that we are not also doing a handstand. The same seems to work for pain: the affective but not sensory aspects are involved. But what about the other emotions? Are there sensory systems telling us that we are in fact not sad, but happy when we simulate the sorrow of someone else when we are particularly joyful? Do we get feedback from the sensors in our face telling us that we are not making a sad face and therefore cannot be sad? Or maybe we do feel the other person’s emotion, but we are quickly normalized back to our own if it is particularly strong and the observed emotion weak? Is it whichever is strongest wins? While the role of mirror neurons in empathy seem fairly clear, the question of how personal emotions differ from emotions simulated by observing others remains.

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Comments

interesting article, good [5]

Submitted by Killer Rob (guest) on Sun, 12/14/2008 - 1:31am.

interesting article, good read.

so are we to believe that sociopaths lack the mirror neurons for empathy completely?

Mirror neurons and ... [6]

Submitted by Paul Grobstein on Sun, 04/20/2008 - 5:14pm.

Mirror neurons have become the fad of the decade in neuroscience and, like all fads, there are indeed reasons to be interested in them. At the same time, there is more complexity there, both in interpreting findings and in their likely role in behavior, as your description and questions suggest.

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Mirror, Mirror (neurons) in the...brain?

Katherine Cheng

When asked by neuroscientist Oliver Sacks about her personal life, Dr. Temple Grandin, a famed Associate Professor of Animal Science at Colorado State University whose more humane designs of livestock handling facilities have innovated the meat-packing industry, explained that because she is autistic, she has trouble understanding other people's feelings and therefore has difficulty maintaining intimate personal relationships. She is able to function successfully in a "normal" (i.e. non-autistic) world because she has developed a mental database detailing standard scripts of behavior and the appropriate responses. For example, when she sees droplets of water seep from someone's eyes, she matches this description to a model in her head and labels it "crying." Associations of emotions that match the physical signs supplement the script so that when all the indicators are evaluated, Dr. Grandin concludes that the person is "sad." By this process of match and elimination, Dr. Grandin is able to approximate what behavior she should enact on her part to respond as social norms deem appropriate. (9)This process, of course, takes long and can become quite burdensome. The social understandings and response mechanisms intrinsic to most people become in an autistic person a systematic process requiring generous cognitive activity. Recent studies on certain brain cells called "mirror neurons" may offer greater insight as to why autistic people seem more emotionally inaccessible than non-autistic people.

Mirror neurons, which are located in a subsection of the monkey pre-motor cortex designated F5, first caught the attention of Italian researchers at the University of Parma in the early 1990s. (1) By scanning the brains of Rhesus macaque monkeys, the research team headed by Dr. Giacoma Rizzolatti observed that certain neurons activated during the performance of a task exhibited similar patterns of activity even when the monkey stayed still and watched someone else perform the task. (2) Though the monkeys were not performing the task themselves, they recognized the execution of these skills by other people. (1) Luciano Fadiga of the University of Ferrara speculated that the human brain possesses a similar system and indeed discovered similar results in the anatomically equivalent section of the human brain called Broca's area. (3) Researchers reasoned that because mirror neurons fired off electric shots in response to the actions of others, thus "mirroring" the viewed action, these brain cells must function in recognition of the action. Recently, scientists from England probed further into the function of mirror neurons and came up with some startling results.

While scientists from the University College London used a MRI scanner to record their brain activity, Royal Ballet ballet dancers and experts of capoeira, a Brazilian martial art that resembles a mix of shadow-boxing and break-dancing, watched videos of ballet and capoeira movements being performed. As a control, or a standard against which the experimented subjects were tested against, non-professional volunteers also underwent brain scanning while viewing the videos. (4) The scientists, headed by Dr. Daniel Glaser, chose to study professional dancers for two reasons, the first of which being that professional dancers are skilled in certain movements that many people are not. Secondly, ballet and capoeira feature standard movements that every professional in the art can perform. The scientists were interested in determining how viewing these different dance forms effected neuron activity in the pre-motor cortex, which functions in movement control, and in the part of the brain responsible for seeing. (5) They discovered that dancers viewing dance moves standard in their own art form experienced greater activity in their pre-motor cortex than when they viewed a dance form they were not skilled in. By contrast, the non-expert brains did not experience heightened activity in either case; rather, the non-expert brains exhibited steady neuron activity regardless of the type of dance viewed. (6)

Glaser and colleagues reasoned that the mirror neurons located in the pre-motor cortex form a "mirror system" that is specially modified to resonate with the movements and physical skills particular to each person. In the
case of the ballet dancers, for example, they responded the most when viewing ballet moves because they themselves could perform the performed skills. The non-experts were unskilled in both arts. Therefore, their mirror systems did not resonate with either form of dance, which were similarly foreign to non-expert brains. Glaser reasons that the mirror system is important because it constructs a framework through which the brain can interpret information in the world. In the case of the dancers, their brains responded most to movements they themselves could perform and, thus, for which they have developed neuron pathways. These results imply that athletes and dancers can "practice" their respective skill even while physically injured. (3) Because actual movement is not required to simulate the skill in the pre-motor cortex, mentally imagining and practicing the physical movement can build neuron pathways that will enhance physical performance.

Interestingly, the mirror neuron system may also offer a greater understanding of how the brain effects social interactions. As mentioned earlier, distinct deficits in communication and social skills often characterize autism, a neurodevelopmental disorder. (6) Dr. Temple Grandin's anecdote provides one perspective of how the autistic brain does not perceive and recognize certain behaviors the same way a non-autistic brain does. In fact, researchers at UCLA medical school conducted an experiment in which test subjects were shown photographs of dinner place settings. Each photograph included a human hand, but in some photos it was obvious that the hand was clearing the place setting from a messy dinner, while in other photos it was ambiguous whether the hand was setting or clearing the place setting and if eating was just starting or ending. Brain scans of the subjects showed that mirror neurons increased activity 40 percent when the context of the image viewed was obvious (i.e. the hand was clearly cleaning the table.) Researchers speculated that in addition to recognizing actions, mirror neurons appear to play a role in understanding the intention of others. Dr. Marco Iacoboni of UCLA conducted another study in which subjects were asked to complete a psychological questionnaire while viewing images of people demonstrating various emotional states. Iacoboni observed that individuals characterized as having high levels of empathy experienced greater mirror neuron activity when viewing people in various emotional states. By contrast, subjects considered less empathetic fired fewer mirror neurons when viewing the same images. (1) Thus, in the less empathetic people, seeing expressions of motion did not resonate within their own brains; they did not "feel" as the people upon which they gazed felt.

When put through similar exercises, autistic individuals exhibit significantly different results. Hugo Théoret of the University of Montreal and Harvard Medical School and Alvaro Pascual-Leone of Harvard Medical School studied how the brains of autistic and non-autistic individuals respond to viewing hand movements. They discovered that while the pre-motor cortexes of non-autistic individuals fire more electrical signals while viewing hand movements, the mirror neurons located in the same areas in autistic individuals do not experience heightened activity. These findings suggest that autistic individuals' social deficits can be explained in part by neural—specifically mirror neuron—differences. These differences reduce an autistic individual's ability to reciprocate social behaviors, which in turn can impede the normal development of empathy. (6) Researchers attribute this difference to a dysfunctional mirror neuron system. In a study conducted by researchers at the University of San Diego, researchers found that while viewing performed movements, the brains of autistic individuals responded only to their own movement. (8)

Dr. Grandin's anecdote about how she processes external social information offers hope that therapy and treatments can be developed to teach autistic individuals how to react to certain social behaviors. Such programs would stimulate mirror neurons, thus helping autistic individuals understand the intentions of others and empathize with their thoughts and feelings, a skill essential to social behavior. (7) However, a few remaining issues that imitation treatments may not address include helping autistic individuals recognize signs that may predict behavior. Given the role played by mirror neurons in recognizing action and intention, therapies should be developed to enhance a patient's ability to read components of social situations both before and after a behavior is expressed. Furthermore, Dr. Grandin herself admits that she never "understands" because she just doesn't know what it feels like. Interestingly, one must pose the question, "Is true empathy
really something that can be scripted?" Where is the actual feeling that substantiates the appropriate empathetic action?

Indubitably, men and women think differently, but a key distinction that repeats itself across cultures and time is that women generally tend to be more sensitive to emotion when making a decision. Considering how mirror neurons effect one's ability to understand intention and empathy, it would be interesting to study how the activity of these neurons may differ across genders. Furthermore, much of the research on mirror neurons has facilitated discussions regarding their evolutionary origins and functions. Some claim that it is this mirror neuron system that sets human kinds from the apes. Similarly, much of the discussion regarding women and their roles as caretakers refers to females' evolutionary roles. It would be interesting to study how mirror neurons fit into or conflict with that theory.

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