



MYSTERIES OF THE MIND

Your unconscious is making your everyday decisions

BY MARIANNE SZEGEDY-MASZAK

The snap judgment. The song that constantly runs through your head whenever you close your office door. The desire to drink Coke rather than Pepsi or to drive a Mustang rather than a Prius. The expression on your spouse's face that inexplicably makes you feel either amorous or enraged. Or how about the now incomprehensible reasons you married your spouse in the first place?

Welcome to evidence of your robust unconscious at work.

While these events are all superficially unrelated, each reveals an aspect of a rich inner life that is not a part of conscious, much less rational, thought. Today, long after Sigmund Freud introduced the world to the fact that much of what we do is determined by mysterious memories and emotional forces, the depths of the mind and the brain are being explored anew. "Most of what we do every minute of every day is unconscious," says University of Wisconsin neuroscientist Paul Whelan. "Life would be chaos if everything were on the forefront of our consciousness."

Fueled by powerful neuroimaging technology, questions about how we make snap decisions, why we feel uncomfortable without any obvious causes, what motivates us, and what satisfies us are being answered not through lying on a couch and exploring individual childhood miseries

but by looking at neurons firing in particular parts of our brains. Hardly a week passes without the release of the results of a new study on these kinds of processes. And popular culture is so fascinated by neuroscience that *Blink*, journalist Malcolm Gladwell's exploration of "thinking without thinking," has remained on the bestseller lists for four weeks.

Most of us can appreciate the fact that we make up our minds about things based on thinking that takes place somewhere just out of our reach. But today, scientists are finding neural correlates to those processes, parts of the brain that we never gave their due, communicating with other parts, triggering neurotransmitters, and driving our actions. Says Clinton Kilts, a professor in the department of psychiatry and behavioral sciences at Emory, "There is nothing that you do, there is no thought that you have, there is no awareness, there is no lack of awareness, there is nothing that marks your daily existence that doesn't have a neural code. The greatest challenge for us is to figure out how to design the study that will reveal these codes."

Burgeoning understanding of our unconscious has deeply personal and also fascinating medical implications. The realization that our actions may not be the pristine results of our high-level reasoning can shake our faith in the strength of such cherished values as free will, a capac-

ity to choose, and a sense of responsibility over those choices. We will never be able to control the rhythm of our heartbeats or the choreography of our limbic system. And yet, Gladwell writes that “our snap judgments and first impressions can be educated and controlled . . . [and] the task of making sense of ourselves and our behavior requires that we acknowledge there can be as much value in the blink of an eye as in months of rational analysis.”

Mental health. But unconscious processing is not just the stuff of compelling personal insight. For those with emotional disorders like anxiety, bipolar disorder, and schizophrenia, and others who suffer from traumatic brain injuries either from a stroke

or an accident, peeling away the behavioral layers of their dysfunction has revealed fascinating activity out of conscious awareness that may eventually provide clues to more effective treatments. Recent research on minimally conscious patients, for example, shows language centers on fire when they hear personal stories recounted by a family member. Research on schizophrenia reveals that most who are afflicted have an impaired ability to smell, which researchers think may provide some clue to understanding why they have such difficulty perceiving social cues. Or consider the case of Sarah Scantlin, who was hit by a drunk driver and lay mute at the Golden Plains Health Care Center in Hutchinson, Kan., for 20 years.

After the Sept. 22, 1984, crash, the doctor told her parents that it was a miracle she was even alive but that she would never talk or move again on her own. Last month she began to speak—a simple “OK” at first, then more words, even short sentences.

How does this happen? What was going on all that time? How do we get some access to this thing called the unconscious?

According to cognitive neuroscientists, we are conscious of only about 5 percent of our cognitive activity, so most of our decisions, actions, emotions, and behavior depends on the 95 percent of brain activity that goes beyond our conscious awareness. From the beating of our hearts to pushing the grocery cart and not smashing into the

FROM TOP: RENDERING BY ASTORINO; COLLAGES COURTESY OLSON ZALTMAN ©



UNCONSCIOUS DESIGN. Parents, patients, and staff from Children’s Hospital of Pittsburgh created collages (below) of their associations with the hospital, and the theme of transformation emerged. Designers incorporated butterflies, the most positive symbol of transformation, as part of the new entrance (above.)

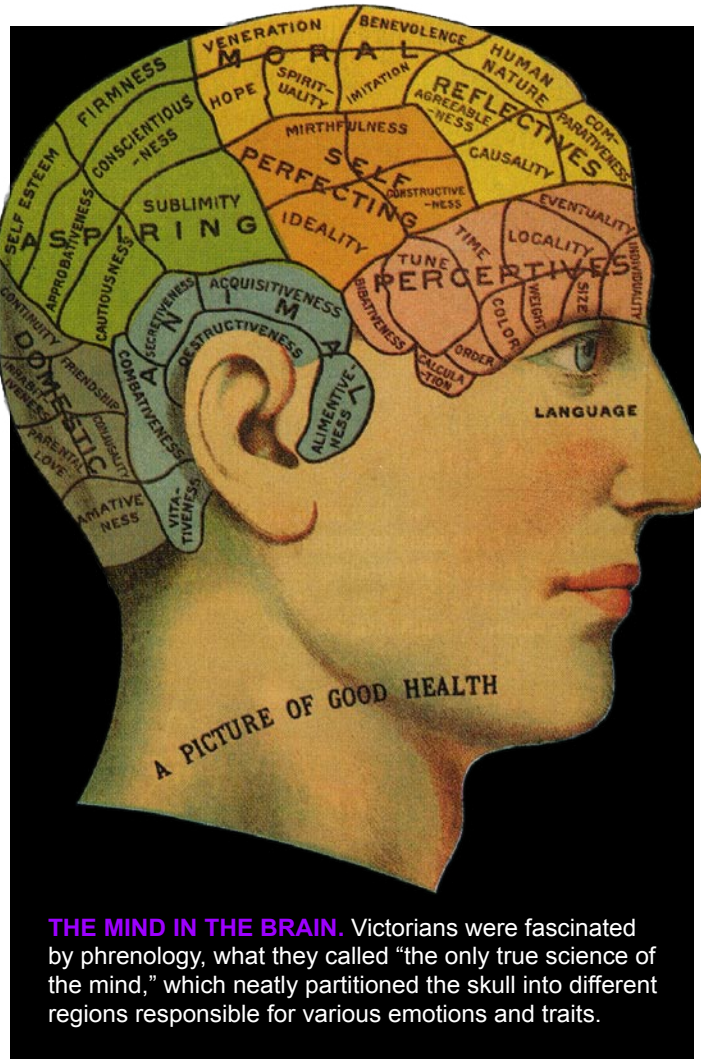


kitty litter, we rely on something that is called the adaptive unconscious, which is all the ways that our brains understand the world that the mind and the body must negotiate. The adaptive unconscious makes it possible for us to, say, turn a corner in our car without having to go through elaborate calculations to determine the precise angle of the turn, the velocity of the automobile, the steering radius of the car. It is what can make us understand the correct meaning of statements like “prostitutes appeal to pope” or “children make nourishing snacks” without believing that they mean that the pope has an illicit life and cannibals are munching on children.

Consuming thoughts.

Gerald Zaltman uses examples like these in many of his conversations. He may be an emeritus professor from the Harvard Business School, but he thinks about layers of consciousness like a neuroscientist. He is also a founding partner in Olson Zaltman Associates, a consulting firm that provides guidance to businesses seeking to better understand the minds—and in this case it is quite literally the minds—of consumers. As a professor of marketing, Zaltman obviously was very interested in figuring out what made people buy one thing and not the other. In the world of neuroscience, this goes to the heart of the profound questions of motivation. In the world of business, this goes to the bottom line.

When trying to probe the minds of consumers, Zaltman wondered if there was



THE MIND IN THE BRAIN. Victorians were fascinated by phrenology, what they called “the only true science of the mind,” which neatly partitioned the skull into different regions responsible for various emotions and traits.

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5,436,830, also known as the Zaltman Metaphor Elicitation Technique, which is, according to the patent, “a technique for eliciting interconnected constructs that influence thought and behavior.” From Hallmark cards to Broadway plays, from Nestlé’s Crunch bars to the design for the new Children’s Hospital of Pittsburgh, ZMET has been used to figure out how

feeling or place.

Language is limited, Zaltman says, “and it can’t be confused with the thought itself.” Images, however, move a bit closer to capturing fragments of the rich and contradictory areas of unconscious feelings. Participants in his studies cut out pictures that represent their thoughts and feelings about a particular subject, even if they can’t explain why. He discovered that when people do this, they often discover “a core, a deep metaphor simultaneously embedded in a unique setting.” They are drawn to seasonal or heroic myths, for example, or images like blood and fire and mother. They are also drawn into deep concepts like journey and transformation. His work around the world has convinced him that the menu of these unconscious metaphors is limited and universal, in the manner of human emotions like hope and grief.

And Zaltman has found that even grand metaphors have their practical applications. The architectural firm Astorino and the design firm Fathom asked Zaltman for help in designing a new children’s hospital that would make a difficult experience somehow easier for children, their parents, and the people who work there. With the classic ZMET technique, children, parents, and staff members cut out pictures they somehow associated with the hospital and were then interviewed for nearly two hours about these pictures, exploring the thoughts, feelings, and associations that they triggered. A stream of metaphors emerged in the conversation. A child brought in a picture of a mournful-looking pug, which she colored blue “because he’s kind of sad, and that’s the way I feel when I’m in the ICU or just can’t get out of my room.”

After each picture was thoroughly analyzed by the participants, the images were scanned, and another interviewer with a computer and a talent for the Photoshop program sat with the parent, child, or staff member and created a collage, a personal

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a way to move beyond the often-unreliable focus group to get at the true desires of consumers, unencumbered by other noise, which would finally result in more effective sales and marketing.

His solution became U.S. Patent No.

to craft a message so that consumers will respond with the important 95 percent of their brains that motivates many of their choices. How? Through accessing the deep metaphors that people, even without knowing it, associate with a particular product or

Rorschach test of the images (box, Page 60). This snapshot of the participant's unconscious associations with the hospital was then enlarged to include personal narratives using the collage. The process is painstaking, but after the transcripts of these sessions are reviewed, even in all the enormous variety of human expression and emotion, core themes emerge. In the case of Children's Hospital, says Christine Astorino Del Sole of the Fathom firm, "the main metaphor was transformation, and the supporting metaphors were control, connection, and energy."

So how does that translate into the physical space? When patients and their families walk into the new hospital, which will be completed in 2008, they will be surrounded by images of butterflies, the ultimate symbol of transformation. Patient rooms will be more like home, and children will be able to exercise some control over their personal space. A huge garden, embodying transformation as well as energy and connection, will be visible from all rooms and accessible to children and their families. "Before, design was a guessing game; it was hit or miss," says Del Sole. "But we know now that at the deepest level this hospital has to be about transformation." So when a sick child, or a worried parent, or a harassed nurse walks into this hospital, a deep and reassuring recognition of the potential beauties of transformation will resonate unconsciously.

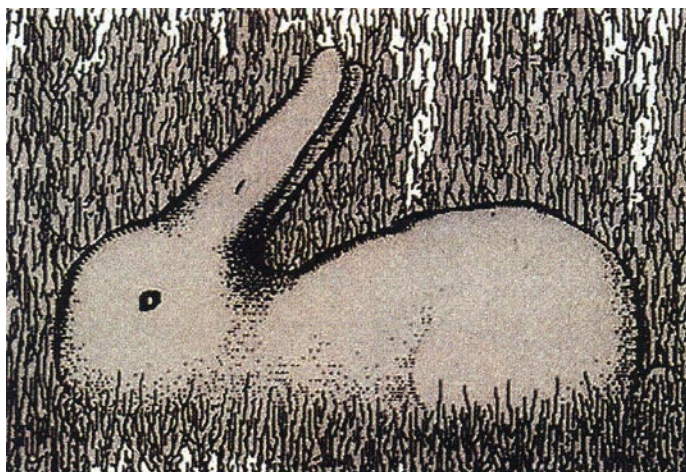
Waves of cola. Zaltman, obvi-

Brain "scanning" show that there is a life of the mind beyond what is apparent Does this mean that they are seeing words?

ously, is not the only person peering into the mind of the consumer. In a neuroscientific take on the time-honored blind taste test, Coke and Pepsi once again squared off. In *Blink*, Gladwell describes how the Coca-Cola Co. made a costly mistake in using

data from blind taste tests between Coke and Pepsi—in which Pepsi was emphatically preferred by most cola drinkers—to change the recipe and create the marketing debacle that was New Coke. Still, even with a less preferred taste, Coke remains No. 1 in the soft-drink world. More recent research that

was published after Gladwell's book was finished may explain why. Researchers at Baylor College of Medicine offered 67 committed Coke and Pepsi drinkers a choice, and in blind testing, they preferred Pepsi. When they were shown



WHAT DO YOU SEE? Is it a rabbit or a duck? Why do people prefer Coke even though most blind tasters say Pepsi tastes better? Researchers are proving that unexpected parts of our brains, regions that have nothing to do with vision, respond to images.



JEAN CLAUDE MOSCHETTI - REA/REDUX

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the company logos before they drank, however, 3 out of 4 preferred Coke. The researchers scanned the brains of the participants during the test and discovered that the Coke label created wild activity in the part of the brain associated with memories and self-image, while Pepsi, though tasting better to most, did little to these feel-good centers in the brain. P. Reed Montague, director of the Brown Foundation Human Neuroimaging laboratory at Baylor, explained when the study was released last October: "There's a huge effect of the Coke label on brain activity related to the control of actions, the dredging up of memories and self-image." The mere red-and-white image of Coke made the hippocampus, our brain's vault of memories, and the dorsolateral prefrontal cortex, which is responsible for many of our higher human brain functions like working memory and what is called executive function or control of behavior, light up. The point, says Montague, is that "there is a response in the brain which leads to a behavioral effect." And curiously, it has nothing to do with conscious preference.

The dog comes up and begins to sniff. If it remembers you, and you were a nice person, then instantly it wags its tail, perhaps even deigns to lick your wrist. It may avoid you. It may associate you with food or with a swift kick. And all those images, all those associations are evoked by one healthy whiff.

Aside from the basic inhibition against walking up to someone and sniffing, humans are no different. "An odor is not just a name—it is a whole context," says psychiatrist Dolores Malaspina of the New York State Psychiatric Institute and the Columbia

University Medical Center. Olfactory information is "privileged," Malaspina explains, since it is the only one of our five senses that does not make a brief stop at the brain's relay station, the thalamus, before going to the ever so intellectual prefrontal cortex. Smell

is unmediated, unfiltered, and it hits the prefrontal cortex with a wallop of intensity. Researchers have found that smell plays a strong role in our mating choices, even without our knowing it. And when female roommates synchronize their menstrual cycles, it is because the unconscious perception of odor sets off the endocrine system. Our brains, says Malaspina, “beginning

be controlled often through medication, these basic social impairments cause far more difficulty in dealing with the daily demands of life.

Research has shown that many people with schizophrenia can also suffer from “clinically meaningful olfactory impairment,” which includes dysfunction in higher brain centers such as the parietal

throughout the world, thousands of times every day. A brain-damaged father or mother or child lies in bed, not completely unconscious, not in a coma, but demonstrating only flickering consciousness, small behaviors that show there is some evidence of the person who once was there, some evidence that this person perhaps knows friends and family members are near by. Medically,

these patients are categorized as existing in a minimally conscious state of awareness; it is estimated that there are 100,000 to 300,000 Americans in such a state right now. Sometimes these patients are able to actually utter the name of an object

The adaptive unconscious helps us to understand the correct meaning of a statement like “prostitutes appeal to pope.”

with fetal development, are laid out to give precedence to olfactory perception.”

But what happens if olfactory perception doesn't work properly? Malaspina and other researchers are looking at the olfactory sense in emotional disorders and have found some intriguing results. While schizophrenia is seen as a disorder of hallucinations and delusions, a more compelling and disruptive element of the disorder is social impairment. Some people with schizophrenia can't seem to read social cues, or manage social relationships, or summon a social context for whatever encounter they are experiencing. And while hallucinations and delusions can

lobes—the part of the brain that's responsible for integrating sensory output so as to understand something, like reading social cues or contextualizing those cues. Just as a smell can elicit an immediate image of a particular time and place, lacking that ability can deprive someone of a basic social and emotional anchor in life. “What we are learning is that smell is a good window into the unconscious basis for sociability and social interest,” says Malaspina. “There is a tremendous explosion of interest in this forgotten sense. And it was under our noses all the time.”

The scenario occurs in hospital rooms

or to follow a very simple command. But for friends and family, they are no longer themselves. And because they find language so difficult, it is also assumed that they are unlikely to follow conversations.

The eye of the mind? But in a stunning study published this month in the journal *Neurology*, researchers used functional magnetic resonance imaging to study the brains of two minimally conscious patients and compared them with the brains of seven healthy men and woman. The scans revealed that the minimally conscious patients had less than half of the brain activity of the others. But then all the subjects

MAKING THOSE CHOICES ABOUT RIGHT AND WRONG

If asked if it would ever be OK to kill your own child, you don't have to think very hard before answering, “No.” And no matter what arguments someone offered, you would probably wince at the idea that even consensual, safe sex between siblings is anything but bad.

Jonathan Haidt, a psychology professor at the University of Virginia, believes these initial reactions are based on five intuitions, deep-wired in the brain by eons of evolution. Cultural norms and practices are based on these instincts, he says, much as cuisines are built on the five taste recep-

tors.

Haidt believes that moral judgment begins with these intuitions and that only later do we search for a reason to justify our reactions. That doesn't mean we can't change our minds or that we're trapped by our primitive instincts; reasons given by other people and unspoken social pressure can change our minds. “It's just very hard for people to challenge their gut feelings by themselves,” he says. “Once they have a feeling about an issue, people are bad at looking for reasons to oppose it. And when feelings are strong, it

almost hurts to think about things from your opponent's point of view.”

Haidt isn't saying you ought to follow your gut—only that people generally do. What happens when we try to decide? Go back to the idea that you should never kill your child. A group of researchers at Princeton University gave research subjects this dilemma: Enemy soldiers have taken over your village and will kill civilians they find. You are hiding in the cellar of a house with a group of townspeople, and you hear the soldiers enter the house. Your baby starts to cry, and the only way to quiet him is to hold your hand over his mouth and, eventually, smother him. But if the baby keeps crying, the

soldiers will discover your group and kill everyone, the baby included. What should you do?

Emotional brain. The subjects were about equally divided on whether to kill the baby. More interesting was what their brains were doing—measured by functional magnetic resonance imaging, or fMRI, during the decision process. Obviously, this scenario appeals to emotion, so it's not surprising that parts of the brain involving emotion showed activity. But so did an area involved in monitoring conflict and another involved with abstract reasoning and cognitive control. In research published last fall in *Neuron*, the researchers hypothesized that these findings suggest a conflict between the emo-

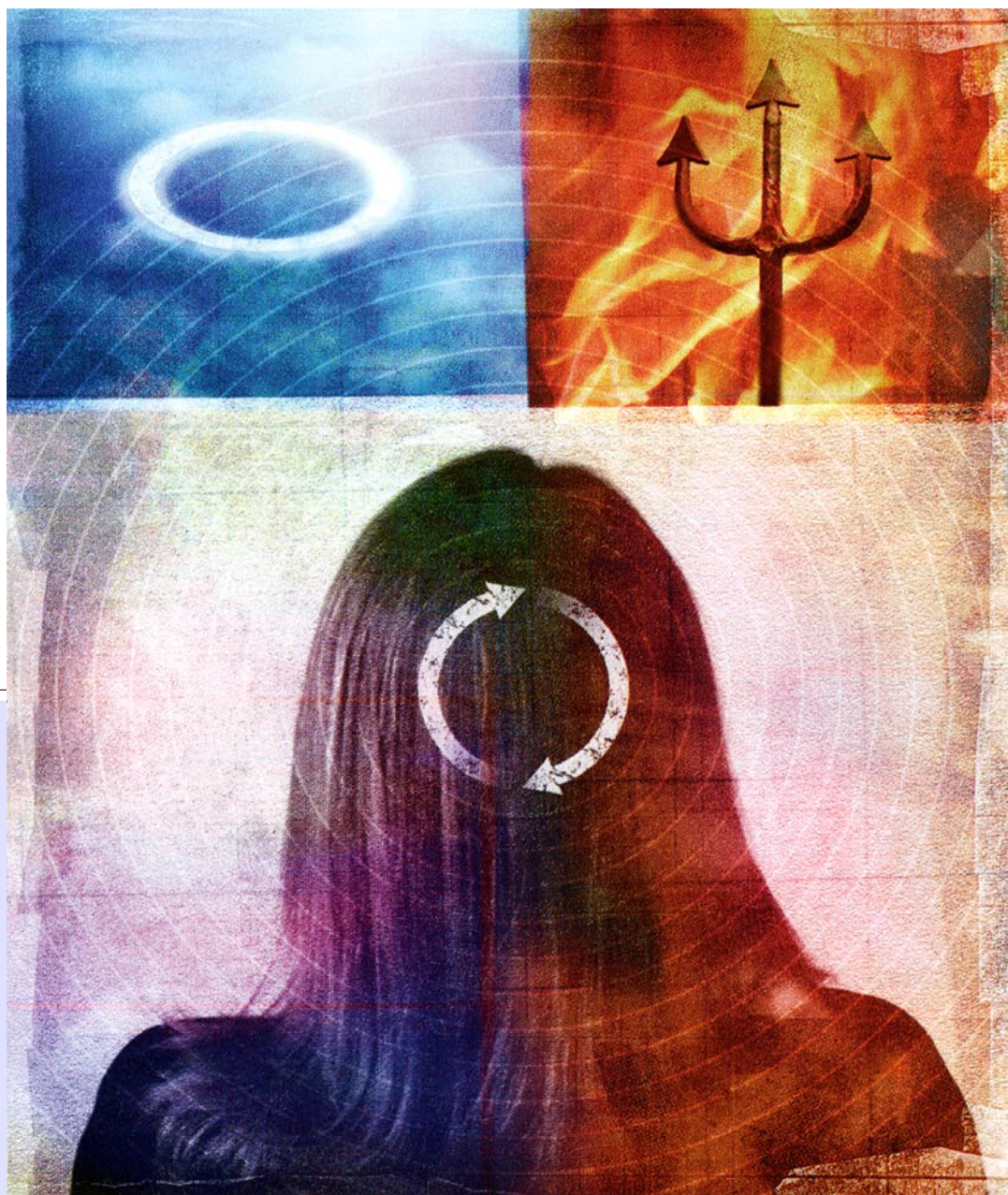
were played a tape made by a family member or friend, recounting happy memories and shared experiences. One minimally conscious man listened to his sister reminiscing about her wedding and about the toast that he made. The result was astonishing: All those who were scanned, including the minimally conscious patients, shared similar brain activity, some with activation

in the visual cortex. "This shows that there is a life of the mind beyond what is apparent," says Joseph Fins, chief of the medical ethics division of New York-Presbyterian Hospital-Weill Cornell Medical Center. But Fins, who was not involved in the study, points out that philosophical questions also emerge. "Does this mean that they are seeing words? Visualizing semantic concepts? Does this in some way

conceptualize consciousness?" As Zaltman points out, language is only the narrowest determination of our thoughts. This study shows that our brains, even damaged brains, are exquisitely attuned to that fact.

For the brain damaged and for the healthy, despite the evidence of the prevalence of the unconscious in our daily lives, even as fervent a believer as Zaltman urges

a bit of caution. "I don't think we know what the batting average is for purely rational reasons or reasons dressed up that way, or reasons dressed up as purely intuition. Both can get us into trouble--often do. And both serve us well." It is that great tension between the two, the intermingling of the known and the unknown, the conscious and the unconscious, the 5 percent and the 95 percent, that the pioneers exploring this vast and intricate universe of our minds will continue to probe. But there will most likely never be a complete understanding. After all, the enigmas of the mind, and the mechanics of the brain, will forever define the ultimate mystery of simply being human. •



tional responses and higher cognitive processing. When a tough moral question is posed, the reasoning processes of the brain conflict with the more automatic emotional response, and the decision takes longer (as

opposed to a faster response to a more straightforward question, like "Is murder wrong?").

Like Haidt, the authors speculate that this conflict has evolutionary roots. The more abstract reasoning

goes on in the more recently evolved parts of the brain. The "gut" response isn't always the wrong one, but it's not automatically right because it "feels good" either. Conditions have changed since we auto-

matically followed our more primitive brains. Perhaps we were hard-wired to feel this genetic sympathy for close relatives but not for people living thousands of miles away (our ancestors didn't even know they existed).

Joshua Greene of the Princeton team proposes that a moral judgment is ultimately a balance of several different considerations--the initial, primal reaction; empathy; cultural or religious norms; and individual reasoning. Sometimes these will all be in line and make the decision an easy one, but often they will conflict. It makes for exciting science (and philosophy), even if it doesn't offer easy answers to the toughest questions of how to live.

-Katherine Hobson