# Head Games

| | Limbic Cortex | Amygdala | Hippocampus | Insula | Septum |
|---|---|---|---|---|---|
| Voting | ✕ | ○ | ○ | ○ | ○ |
| Marketing | | | | ○ | ○ |
| Addiction | ○ | ○ | ○ | ✕ | ○ |
| Social Connections | ○ | ✕ | ○ | ○ | ○ |
| Fear | ○ | ○ | | | |
| Weight Loss | ○ | ○ | | | |
| Optimism | ○ | ○ | ✕ | ○ | ○ |

From the votes we cast to the brands we buy and even our personal habits — or vices — the way our brain is wired has much to do with the choices we make. Now neuroscientists are opening a window into just why we do what we do. The implications for fields ranging from marketing to public health and politics are, well, mind-boggling.

By Dan Gordon ’85
Illustrations by Patrick Leger

**In the 1952 science-fiction classic *Space Merchants*,** authors Frederik Pohl and Cyril M. Kornbluth depicted an unsettling future dominated by corporate consumerism, with advertisers so versed in the science of how people formed preferences that they could program anyone to buy anything, from soup to nuts to political candidates or even immigrating to Venus.

Nearly 60 years later, advertising continues to operate as a sometimes uneasy mix of art and science. But what if there were a tool that could provide marketers with definitive evidence about which message would produce the desired effect — whether the aim was to persuade consumers to buy a brand of soap, win voters over to a candidate for office, or compel smokers to take the first step toward quitting? What if the creative types could somehow peer into your brain to access thoughts and emotional responses you didn't even know you had?

Recent advances in neuroscience — including seminal work at UCLA — suggest this may not be the stuff of fiction for much longer. For the last decade, social cognitive neuroscientists have been using a potent tool, functional magnetic resonance imaging (fMRI), to learn what it means when certain parts of the brain are activated in response to specific messages. And they're finding that these fMRI studies can provide a much more accurate account of what people are thinking than the participants are able to offer on their own.

The science is young, but the potential for impact runs far and wide. It's not just product marketers of all types, but also political consultants, public health professionals and even educators who could reap the benefits of a science that delves into our thought processes in unprecedented ways. At the same time, the prospect that those with sinister motives might exploit the technology — if not the very idea of strangers accessing our subconscious thoughts — ensures that ethics and policy will be an important part of this burgeoning field.

## A Mind of Their Own

The 20 study participants who consented to having their brains scanned at UCLA's Ahmanson-Lovelace Brain Mapping Center, most of them UCLA students, admitted to not being regular users of sunscreen. Lying in an fMRI machine, they saw and heard a series of public service announcements on sunscreen's importance. They were then asked how the PSAs affected their intentions to lather up in the days ahead.

A week later, fewer than half had correctly predicted whether they would apply sunscreen more frequently. The fMRI data proved far more prescient: By simply looking at which participants showed increased activity in a region of the brain known as the medial prefrontal cortex as subjects were exposed to the PSAs, the researchers could accurately predict in three-fourths of the cases whether participants would increase their sunscreen use beyond what they predicted. Put another way, the neural data did twice as well as people's stated intentions.

Published last June in the *Journal of Neuroscience*, the study represented a landmark: the first demonstration that neuroimaging could successfully predict real-world behavior change. "There's a 70-year history of research showing that people say one thing and do another," says Matthew Lieberman, UCLA professor of psychology and of psychiatry and biobehavioral sciences, who headed the study along with his former doctoral student, Emily Falk M.A. '07, Ph.D. '10. "Rather than trying to figure out the right question to ask people, we decided to see what their brains would tell us. And to our surprise, their brains told a much more coherent, consistent story than what people were saying themselves."

More recently, Lieberman and his team raised the ante. Beyond predicting individual behavior, could results from a focus group be used to project what would occur at a population level? For this study, smokers were shown three television advertising campaigns urging them to call the National Cancer Institute's hotline as a first step toward quitting. Which did they find most persuasive?

The study participants chose Campaign B, with A placing second and C viewed as least effective. Industry experts who were involved in creating the ads concurred. But the scans of the participants as they watched the ads suggested something entirely different. Campaign C, disdained in the self-reports, activated the medial prefrontal cortex — the same region associated with increased sunscreen use — to a greater extent than the other two. And when the three campaigns were rolled out in separate media markets, Campaign C triggered the largest increase in call volume to the quit line.

For public health, where efforts to encourage people to make better choices on everything from diet and exercise to avoidance of tobacco and drugs have historically produced mixed results, such a study doesn't go unnoticed. "Changing individual behavior is one important link to improving health," says Linda Rosenstock, dean of the UCLA School of Public Health. "The better the information we have about what works, the more effective our interventions can be."

## Getting Into Our Heads

It's been barely 20 years since it became possible to view the workings of the brain in real time, and only in the last decade has fMRI emerged as a pivotal technology for social cognitive neuroscientists. As subjects are asked to perform a particular mental task or to respond to stimuli, the scanner measures the blood flowing to different parts of the brain. By detecting where the activity is occurring, neuroscientists can draw conclusions based on what they know about the functions of various brain regions. In 2001, Lieberman's group wrote the first scientific paper coining the phrase "social cognitive neuroscience" to describe a multidisciplinary approach to understanding human behavior from the perspective of the brain. That year, UCLA hosted the new field's first professional conference.

"Neuroscience gives us a completely new perspective," says Marco Iacoboni, UCLA professor of psychiatry and biobehavioral sciences. "For millennia we've relied on people's words. Neuroscience uncovers the things that people don't say — and often *can't* say, because there is a lot that goes on in our brain that is difficult to verbalize, or that we aren't even aware of."

Iacoboni is a pioneer in the study of mirror neurons — "smart" cells that play a key role in our ability to empathize with others. Because of their amped-up activity when people are making connections, the cells can serve as a proxy for the effectiveness of ads, Iacoboni suspects. In 2006, he conducted a small experiment using fMRI to study consumers' responses as they watched commercials during the Super Bowl. "As soon as the Super Bowl ends, there are all these rankings among marketing specialists and people getting polled on the street to determine which were the most effective ads," Iacoboni says. "It turned out that the brain responses produced very different rankings than when you asked consumers and experts."

For example, a Federal Express ad that rated high in surveys for its humor showed a caveman walking out of his home, only to get crushed by a dinosaur. The scans showed activation in the amygdala — known as the brain's "threat detector" — as the caveman was meeting his demise and the Fed-Ex logo was being presented. "I don't think you want people associating fear with your logo," Iacoboni says.

On the other hand, the Disney-NFL "I'm going to Disney World/Land" ad elicited strong responses in two brain regions associated with processing of rewards, as well as robust activity in mirror neuron areas. "What is quite surprising," Iacoboni concluded at the time, "is the strong disconnect that can be seen between what people say and what their brain activity seems to suggest."

That comes as no surprise to marketing experts such as Sanjay Sood, a professor in UCLA's Anderson School of Management who specializes in advertising and consumer behavior. "Sometimes when we ask people directly how much they like one product over another, we don't get answers that correlate well with behavior," Sood notes.

For much of the last decade, marketers have been tantalized by the prospect that neuroscience might be used to reach the parts of the brain responsible for buying decisions — perhaps even revealing a "purchase button." Much of the initial excitement over the field known as neuromarketing stemmed from a 2004 article in the scientific journal *Neuron*. Participants' brains were scanned as they received the "Pepsi Challenge" — the famous taste test between Coke and Pepsi. The study found that when the subjects were unaware of which brand they were consuming, their brain responses to the two drinks were virtually identical; on the other hand, when self-identified Coke drinkers were told they were about to drink Coke, the emotional centers of their brains were activated.

For much of the last decade, marketers have been tantalized by the prospect that neuroscience might be used to reach the parts of the brain responsible for buying decisions.

At this point, Sood says, a combination of the expense of neuroimaging research and the limited understanding of what the results might mean has prevented neuromarketing from becoming a major industry tool. Most of the studies that have taken place have looked at responses to ads. "The

CONTINUED ON PAGE 60

CONTINUED FROM PAGE 31

real power of neuromarketing would be to analyze how customers might react to new products and then come up with solutions that are likely to be better received in the marketplace," Sood asserts. "There is the potential that using fMRI or associated technologies can unlock something hidden inside the consumer's decision-making process, but we're finding that the way people reach these decisions is complicated."

## Your Brain on Politics

Even if neuroimaging doesn't ever become the dominant research method for marketers, Sood suspects it will play a larger role as costs come down and the science matures. The same is likely true in politics, where the currency is ideas and personalities rather than consumer products, but the principles of persuasion are largely the same.

Political focus groups are a notoriously crude methodology, according to Franklin D. Gilliam Jr., dean of UCLA's School of Public Affairs. "At best, they give you some early ideas about how people are thinking," Gilliam says. "But neuroimaging has the capacity to be confirmatory."

There is a growing interest, Gilliam explains, not just in what people think, but in *how* they think — and particularly how new information interacts with their worldview. "It would be helpful to better understand what kinds of language produce particular patterns of thinking," Gilliam says. That's the logic behind the growing use of dial testing to measure voters' real-time responses during political speeches and debates. Such a technique represents a "poor man's neuroimaging," Gilliam observes.

Given that mirror neurons fire up when people are making social connections, Iacoboni decided as early as 2004 to see how that activity applied to people's responses to political figures. During that year's presidential campaign, Iacoboni and a political scientist scanned the brains of a group of active Republicans and Democrats to capture their responses to various pictures of the three major presidential candidates: George W. Bush, John Kerry and Ralph Nader.

Iacoboni found little increase in mirror neuron activity when the subjects saw the candidate they supported — perhaps, he suspects, because the study was conducted in the heat of an intensely negative campaign. On the other hand, when the subjects were shown a picture of the candidate that they opposed, there was increased activity in the insula — the region of the brain associated with contempt.

"Neuroscience is providing evidence that political decisions we think should be rational are, in fact, mostly driven by emotions," Iacoboni explains. "Simply viewing the face of the opposing candidate almost automatically produced a negative response."

Lieberman sees many other potential applications for the science, some of which he has already begun to explore. One approach involves analyzing brain activity as people are first exposed to a new concept in order to predict which ideas will spread most successfully.

Lieberman recently scanned participants as they saw descriptions of TV pilots, then recorded them explaining the shows for people whose exposure to the pilots would come only through these reviews. The study suggested it was possible to predict, based on the recorded brain responses during the pilot viewing, which shows would create the most buzz.

"That's how information spreads," Lieberman says. "If we think about modern social media, we tend to be influenced more by the endorsement of someone we trust than by the original advertising."

What about other social phenomena in which psychology plays an integral role? The stock market, for example, is supposed to be a reflection of business fundamentals, but it's no secret that mass psychology plays a significant role in its fluctuations. One of the more intriguing possibilities is that neuro focus groups might produce insights that could help forecasters better predict the reactions of the markets to various types of events.

In the TV-pilot study, Lieberman's group was able to see indicators on the scans of who was best at selling the ideas they found most compelling. That got him thinking about the potential impact of these neuroimaging studies on K-12 education.

"We don't think about teachers being salespeople, but they're the ones who have to convince students that something is important to know," Lieberman says.

## Things to Think About

But could those who want to sell us something that might harm us — junk food, alcohol, politically dangerous ideas — exploit neuroscience to learn how to push the brain's persuasive buttons, unbeknownst to the target audience?

"It's a natural question," says Lieberman, "and my response is always to ask what people think about the ethics of advertisers using what psychologists already know, because they've been doing that for years. Looking at the brain is potentially just another complementary tool."

"There has always been concern that advertisers are successful manipulators — look at *Mad Men*," agrees Shelley Taylor, a UCLA psychology professor considered a pioneer in the field of health psychology. "But that's only true to a point. To be persuaded, people have to collaborate in the process."

With any powerful technology comes concern about misuse. But Taylor, who has used fMRI to discover how factors such as social relationships and optimism protect against the mental and physical health consequences of stress, sees few downsides to the science. "Understanding how people are persuaded is enormously important," she says. "The more we learn about the unconscious aspects of persuasion, the better off we'll be in helping people to practice healthier behaviors."

Revolutionary though the technology may be, we still have a ways to go before we get to *Space Merchants* scenarios. For one thing, the cost of $500-$600 per subject hour makes access to fMRI an issue. And although it is safe — no radiation is involved — the requirement that subjects lie in a machine during the studies raises the concern that their discomfort could taint the results.

There are potentially cheaper technologies in the pipeline, including "functional near-infrared spectroscopy," a wireless brain-scanning device that would measure participants' brain responses in real-life situations. But more important, because the ability to peer inside the living brain is so new, neuroscientists' understanding of brain functions remains limited. Indeed, much of the fMRI research by social cognitive neuroscientists has so far aimed to build a database of general observations that will eventually enable more targeted studies.

"What we already know is exciting, but we have a lot more to learn about how the brain works," says Iacoboni. "Neuroscience can help us get there."