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There’s a Sucker Born in Every Medial Prefrontal Cortex

By CLIVE THOMPSON

When he isn’t pondering the inner workings of the mind, Read Montague, a 43-year-old neuroscientist at Baylor College of Medicine, has been known to contemplate the other mysteries of life: for instance, the Pepsi Challenge. In the series of TV commercials from the 70’s and 80’s that pitted Coke against Pepsi in a blind taste test, Pepsi was usually the winner. So why, Montague asked himself not long ago, did Coke appeal so strongly to so many people if it didn’t taste any better?

Over several months this past summer, Montague set to work looking for a scientifically convincing answer. He assembled a group of test subjects and, while monitoring their brain activity with an M.R.I. machine, recreated the Pepsi Challenge. His results confirmed those of the TV campaign: Pepsi tended to produce a stronger response than Coke in the brain’s ventral putamen, a region thought to process feelings of reward. (Monkeys, for instance, exhibit activity in the ventral putamen when they receive food for completing a task.) Indeed, in people who preferred Pepsi, the ventral putamen was five times as active when drinking Pepsi than that of Coke fans when drinking Coke.

In the real world, of course, taste is not everything. So Montague tried to gauge the appeal of Coke’s image, its ”brand influence,” by repeating the experiment with a small variation: this time, he announced which of the sample tastes were Coke. The outcome was remarkable: almost all the subjects said they preferred Coke. What’s more, the brain activity of the subjects was now different. There was also activity in the medial prefrontal cortex, an area of the brain that scientists say governs high-level cognitive powers. Apparently, the subjects were meditating in a more sophisticated way on the taste of Coke, allowing memories and other impressions of the drink -- in a word, its brand -- to shape their preference.

Pepsi, crucially, couldn’t achieve the same effect. When Montague reversed the situation, announcing which tastes were of Pepsi, far fewer of the subjects said they preferred Pepsi. Montague was impressed: he had demonstrated, with a fair degree of neuroscientific precision, the special power of Coke’s brand to override our taste buds.

Measuring brand influence might seem like an unusual activity for a neuroscientist, but Montague is just one of a growing breed of researchers who are applying the methods of the neurology lab to the questions of the advertising world. Some of these researchers, like Montague, are purely academic in focus, studying the consumer mind out of intellectual curiosity, with no corporate support. Increasingly, though, there are others -- like several of the researchers at the Mind of the Market Laboratory at Harvard Business School -- who work as full-fledged ”neuromarketers,” conducting brain research with the help of corporate financing and sharing their results with their sponsors. This summer, when it opened its doors for business, the BrightHouse Institute for Thought Sciences in Atlanta became the first neuromarketing firm to boast a Fortune 500 consumer-products company as a client. (The client’s identity is currently a secret.) The institute will scan the brains of a representative sample of its client’s prospective customers, assess their reactions to the company’s products and advertising and tweak the corporate image accordingly.

Not long ago, M.R.I. machines were used solely for medical purposes, like diagnosing strokes or discovering tumors. But neuroscience has reached a sort of cocky adolescence; it has become routine to
read about researchers tackling every subject under the sun, placing test subjects in M.R.I. machines and analyzing their brain activity as they do everything from making moral choices to praying to appreciating beauty. Paul C. Lauterbur, a chemist who shared this year’s Nobel Prize in medicine for his contribution in the early 70’s to the invention of the M.R.I. machine, notes how novel the uses of his invention have become. ’’Things are getting a lot more subtle than we’d ever thought,’’ he says. It seems only natural that the commercial world has finally caught on. ’’You don’t have to be a genius to say, ‘My God, if you combine making the can red with making it less sweet, you can measure this in a scanner and see the result,’’’ Montague says. ’’If I were Pepsi, I’d go in there and I’d start scanning people.’’

The neuroscience wing at Emory University Hospital in Atlanta is the epicenter of the neuromarketing world. Like most medical wards, it is filled with an air of quiet, antiseptic tension. On a recent visit, in the hallway outside an M.R.I. room, a patient milled around in a light blue paper gown. A doctor on a bench flipped through a clipboard and talked in soothing tones to a man in glasses, a young woman anxiously clutching his arm.

It was not a place where you would expect to encounter slick marketing research. And when Justine Meaux, a research scientist for the BrightHouse Institute, came out to greet me, she did seem strangely out of place. Clicking along in strappy sandals, with a tight sleeveless top and purple toenail polish, she looked more like a chic TV producer than a neuroscientist, which she is. Her specialty, as she explained, is ’’the neural dynamics of the perception and production of rhythmic sensorimotor patterns’’ – though these days she spends her professional life thinking about shopping. ’’I’m really getting into reading all this business stuff now, learning about campaigns, branding,’’ she said, leading me down the hallway to the M.R.I. chamber that the Institute uses. Three years ago, after earning her Ph.D., she decided she wanted to apply brain scanning to everyday problems and was intrigued by marketing as a ’’practical application of psychology,’’ as she put it. She told me that she admired the ’’Intel Inside’’ advertising campaign, with its TV spots showing dancing men in body suits. ’’Intel actually branded the inside of a computer,’’ she marveled. ’’They took the most abstract thing you can imagine and figured out a way to make people identify with it.’’

When we reached the M.R.I. control room, Clint Kilts, the scientific director of the BrightHouse Institute, was fiddling away at a computer keyboard. A professor in the department of psychiatry and behavioral sciences at Emory, Kilts began working with Meaux in 2001. Meaux had learned that Kilts and a group of marketers were founding the BrightHouse Institute, and she joined their team, becoming perhaps the world’s first full-time neuromarketer. Kilts is confident that there will soon be room for other full-time careers in neuromarketing. ’’You will actually see this being part of the decision-making process, up and down the company,’’ he predicted. ’’You are going to see more large companies that will have neuroscience divisions.’’

The BrightHouse Institute’s techniques are based, in part, on an experiment that Kilts conducted earlier this year. He gathered a group of test subjects and asked them to look at a series of commercial products, rating how strongly they liked or disliked them. Then, while scanning their brains in an M.R.I. machine, he showed them pictures of the products again. When Kilts looked at the images of their brains, he was struck by one particular result: whenever a subject saw a product he had identified as one he truly loved -- something that might prompt him to say, ’’That’s just so me!’’ -- his brain would show increased activity in the medial prefrontal cortex.

Kilts was excited, for he knew that this region of the brain is commonly associated with our sense of self. Patients with damage in this area of the brain, for instance, often undergo drastic changes in personality; in one famous case, a mild-mannered 19th-century railworker named Phineas Gage abruptly became belligerent after an accident that destroyed his medial prefrontal cortex. More recently, M.R.I. studies have found increased activity in this region when people are asked if adjectives like ’’trustworthy’’ or ’’courageous’’ apply to them. When the medial prefrontal cortex fires, your brain seems to be engaging, in some manner, with what sort of person you are. If it fires when you see a particular product, Kilts argues, it’s most likely to be because the product clicks with your self-image.
This result provided the BrightHouse Institute with an elegant tool for testing marketing campaigns and brands. An immediate, intuitive bond between consumer and product is one that every company dreams of making. "If you like Chevy trucks, it’s because that has become the larger gestalt of who you self-attribute as," Kilts said, using psychology-speak. "You're a Chevy guy." With the help of neuromarketers, he claims, companies can now know with certainty whether their products are making that special connection.

To demonstrate their technique, Kilts and Meaux offered to stick my head in the M.R.I. machine. They laid me down headfirst in the coffinlike cylinder and scurried out to the observation room. "Here’s what I want you to do," Meaux said, her voice crackling over an intercom. "I’m going to show you a bunch of images of products and activities -- and I want you to picture yourself using them. Don’t think about whether you like them or not. Just put yourself in the scene."

I peered up into a mirror positioned over my head, and she began flashing pictures. There were images of a Hummer, a mountain bike, a can of Pepsi. Then a Lincoln Navigator, Martha Stewart, a game of basketball and dozens more snapshots of everyday consumption. I imagined piloting the Hummer off-road, playing a game of pickup basketball, swigging the Pepsi. (I was less sure what to do with Martha Stewart.)

After about 15 minutes, Kilts pulled me out, and I joined him at a bank of computers. "Look here," he said, pointing to a screen that showed an image of a brain in cross sections. He pointed to a bright yellow spot on the right side, in the somatosensory cortex, an area that shows activity when you emulate sensory experience -- as when I imagined what it would be like to drive a Hummer. If a marketer finds that his product is producing a response in this region of the brain, he can conclude that he has not made the immediate, instinctive sell: even if a consumer has a positive attitude toward the product, if he has to mentally ""try it out,"" he isn’t instantly identifying with it.

Kilts stabbed his finger at another glowing yellow dot near the top of the brain. It was the magic spot -- the medial prefrontal cortex. If that area is firing, a consumer isn’t deliberating, he said: he’s itching to buy. "At that point, it’s intuitive. You say: ‘I’m going to do it. I want it.’"

The consuming public has long had an uneasy feeling about scientists who dabble in marketing. In 1957, Vance Packard wrote "The Hidden Persuaders," a book about marketing that featured harsh criticism of ""psychology professors turned merchandisers."" Marketers, Packard worried, were using the resources of the social sciences to understand consumers’ irrational and emotional urges -- the better to trick them into increased product consumption. In rabble-rousing prose, Packard warned about subliminal advertising and cited a famous (though, it turned out, bogus) study about a movie theater that inserted into a film several split-second frames urging patrons to drink Coke.

In truth, marketers only wish they had that much control. If anything, corporations tend to look slightly askance at their admen, because there’s not much convincing evidence that advertising works as well as promised. John Wanamaker, a department-store magnate in the late 19th century, famously quipped that half the money he spent on advertising was wasted, but that he didn’t know which half. In their quest for a more respectable methodology -- or perhaps more important, the appearance of one -- admen have plundered one scientific technique after another. Demographic studies have profiled customers by analyzing their age, race or neighborhood; telephone surveys have queried semi-randomly selected strangers to see how the public at large viewed a company’s product.

Advertising’s main tool, of course, has been the focus group, a classic technique of social science. Marketers in the United States spent more than $1 billion last year on focus groups, the results of which guided about $120 billion in advertising. But focus groups are plagued by a basic flaw of human psychology: people often do not know their own minds. Joey Reiman is the C.E.O. of BrightHouse, an Atlanta marketing firm, and a founding partner in the BrightHouse Institute; over years of producing marketing concepts for companies like Coca-Cola and Red Lobster, he has come to the conclusion that focus groups are ultimately less about gathering hard data and more about pretending to have concrete justifications for a hugely expensive ad campaign. "The sad fact is, people tell you what you want to
hear, not what they really think,' he says. ''Sometimes there’s a focus-group bully, a loudmouth who’s so insistent about his opinion that it influences everyone else. This is not a science; it’s a circus.''

In contrast, M.R.I. scanning offers the promise of concrete facts -- an unbiased glimpse at a consumer’s mind in action. To an M.R.I. machine, you cannot misrepresent your responses. Your medial prefrontal cortex will start firing when you see something you adore, even if you claim not to like it. "Let’s say I show you Playboy,'" Kilts says, "and you go, 'Oh, no, no, no!' Really? We could tell you actually like it.'"

Other neuromarketers have demonstrated that we react to products in ways that we may not be entirely conscious of. This year, for instance, scientists working with DaimlerChrysler scanned the brains of a number of men as they looked at pictures of cars and rated them for attractiveness. The scientists found that the most popular vehicles -- the Porsche- and Ferrari-style sports cars -- triggered activity in a section of the brain called the fusiform face area, which governs facial recognition. "They were reminded of faces when they looked at the cars," says Henrik Walter, a psychiatrist at the University of Ulm in Germany who ran the study. "The lights of the cars look a little like eyes.'"

Neuromarketing may also be able to suss out the distinction between advertisements that people merely like and those that are actually effective -- a difference that can be hard to detect from a focus group. A neuromarketing study in Australia, for instance, demonstrated that supershort, MTV-style jump cuts -- indeed, any scenes shorter than two seconds -- aren’t as likely to enter the long-term memory of viewers, however bracing or aesthetically pleasing they may be.

Still, many scientists are skeptical of neuromarketing. The brain, critics point out, is still mostly an enigma; just because we can see neurons firing doesn’t mean we always know what the mind is doing. For all their admirable successes, neuroscientists do not yet have an agreed-upon map of the brain. "I keep joking that I could do this Gucci shoes study, where I’d show people shoes I think are beautiful, and see whether women like them," says Elizabeth Phelps, a professor of psychology at New York University. "And I’ll see activity in the brain. I definitely will. But it’s not like I’ve found 'the shoe center of the brain.'" James Twitchell, a professor of advertising at the University of Florida, wonders whether neuromarketing isn’t just the next stage of scientific pretense on the part of the advertising industry. "Remember, you have to ask the client for millions, millions of dollars," he says. "So you have to say: 'Trust me. We have data. We’ve done these neurotests. Go with us, we know what we’re doing.'" Twitchell recently attended an advertising conference where a marketer discussed neuromarketing. The entire room sat in awe as the speaker suggested that neuroscience will finally crack open the mind of the shopper. "A lot of it is just garbage," he says, "but the garbage is so powerful.'"

In response to his critics, Kilts plans to publish the BrightHouse research in an accredited academic journal. He insisted to me that his primary allegiance is to science; BrightHouse’s techniques are "'business done in the science method,’” he said, "'not science done in the business method.’" And as he sat at his computer, calling up a 3-D picture of a brain, it was hard not to be struck, at the very least, by the seriousness of his passion. There, on the screen, was the medial prefrontal cortex, juggling our conscious thinking. There was the amygdala, governing our fears, buried deep in the brain. These are sights that he said still inspire in him feelings of wonder. "When you sit down and you’re watching -- for the first time in the history of mankind -- how we process complex primary emotions like anger, it’s amazing," he said. "You’re like, there, look at that: that’s anger, that’s pleasure. When you see that roll off the workstation, you never look back.’” You just keep going, it seems, until you hit Madison Avenue.

Clive Thompson writes frequently about science and technology. His most recent article for the magazine was about the future of kitchen tools.