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## If Your Brain Has a 'Buy Button,' What Pushes It?

By SANDRA BLAKESLEE

**K**nowing what brand you are buying can influence your preferences by commandeering brain circuits involved with memory, decision making and self-image, researchers have found.

When researchers monitored brain scans of 67 people who were given a blind taste test of Coca-Cola and Pepsi, each soft drink lit up the brain's reward system, and the participants were evenly split as to which drink they preferred. But when the same people were told what they were drinking, activity in a different set of brain regions linked to brand loyalty overrode their original preferences. Three out of four said that they preferred Coca-Cola.

The study, published in the Oct. 14 issue of the journal *Neuron*, is the first to explore how cultural messages penetrate the human brain and shape personal preferences.

Circulating in draft form over the last year, the study has been widely discussed by neuroscientists and advertisers, as well as people who worry about the power of commercials in determining consumer behavior.

At issue is whether marketers can exploit advances in brain science to make more effective commercials. Is there a "buy button" in the brain?

Some corporations have teamed up with neuroscientists to find out. Recent experiments in so-called neuromarketing have explored reactions to movie trailers, choices about automobiles, the appeal of a pretty face and gut reactions to political campaign advertising, as well as the power of brand loyalty.

But the trend also has critics. For example, Commercial Alert, a consumer group that is highly critical of neuromarketing and has called it Orwellian, said that such studies were dangerous. In a July 12 letter to the Senate Committee on Commerce, Science and Transportation, the group's executive director, Gary Ruskin, asked for an investigation of neuromarketing.

"What would happen in this country if corporate marketers and political consultants could literally peer inside our brains and chart the neural activity that leads to our selections in the supermarket and voting booth?" Mr. Ruskin wrote. "What if they then could trigger this neural activity by various means, so as

to modify our behavior to serve their own ends?"

Defenders of the studies counter that Mr. Ruskin and others who express fears about the studies are overreacting and do not understand the research.

Dr. Steven Quartz, a neuroscientist at the California Institute of Technology in Pasadena, Calif., said Mr. Ruskin's comments represented "gross misunderstandings and distortions of both the power of brain imaging technology and its use in marketing."

"It's pure fantasy to suppose that neuromarketing is about embedding subliminal messages." Dr. Quartz continued.

Companies, however, see the chance to find out what their customers really think as a great opportunity.

Corporate executives are the first to admit they do not really know how advertising works.

They spend \$117 billion a year on advertisements, but most people do not remember what product is featured in a given commercial. Four out of five new products flop. There is no conclusive evidence that advertising ever causes sales to go up. Worst of all, consumers tend to behave like finicky cats, making it difficult to fathom what they want.

Neuromarketing relies on a brain scanning device called functional magnetic resonance imaging or f.M.R.I., a machine that tracks blood flow as people perform mental tasks. Specific regions light up, showing increased blood flow when they recognize a face, hear a song, make a decision, perceive a reward, pay attention or sense deception.

In the studies, the machines are being used to shed light on brain mechanisms that play a central role in consumer behavior: circuits that underlie reward, decision making, motivation, emotions and the senses of self.

Anything that is novel, researchers have found, grabs the brain's attention system by tapping directly into reward pathways.

Being able to see how the brain responds to novelty and makes decisions is potentially a huge step forward for marketers, said Tim McPartlin, a senior vice president of Lieberman Research Worldwide in Los Angeles.

Conventional techniques for learning consumer preferences are notoriously inadequate, Mr. McPartlin said.

The traditional methods that companies use to explore consumer preferences do not always reflect actual buying patterns.

"You use surveys when you want to test something - the reaction to an ad, package, new product name, or design," he said. "You ask questions scaled to gauge the response. But the scales are a blunt tool," he said. "They cannot capture the emotional responses beneath consumer preferences."

Complicating matters further, in focus groups, some people want to please, others to dominate - urges that can influence their choices. In interviews, consumers often say what they think the interviewer wants to hear.

"You ask if they like a luxury product and their puritanical side comes out," Mr. McPartlin said. "They tell you 'I'm not interested in that' but their medial prefrontal cortex is saying they are."

Cultural differences are also a big problem. "In Latin cultures, they tell you they like everything," Mr. McPartlin said. A product rated as a 9 in Brazil gets a 6 in Germany.

Brain imaging experiments cut through these problems, Mr. McPartlin said, making it possible for companies to see more quickly and accurately what their customers want, like and feel that they need.

For example, Dr. Quartz is using f.M.R.I. to test movie trailers. Coming attractions make a big difference in getting people to buy movie tickets but movie studios need a way to tell which are most effective. It turns out, Dr. Quartz said, that a trailer's success is related to whether it engages people emotionally.

But people have trouble verbalizing their emotions. The f.M.R.I. machine detects emotional responses that are of a clear value to Hollywood.

Trailers make an ideal subject for brain imaging, Dr. Quartz said: "If I show you a commercial for a laundry detergent, I don't know if you are reacting to the product or to something funny or interesting about the commercial. But the movie trailer is the product itself. If you react well, you are reacting to the product."

Other studies have examined various types of everyday decision making. In Germany, DaimlerChrysler corporation took functional brain images of men as they looked at various kinds of cars, finding, perhaps not surprisingly, racy sports cars activated the men's reward centers. At Harvard, researchers found that in young heterosexual men a brain reward area was highly activated by beautiful female faces. Plain female faces and attractive male faces had no effect. And Dr. Gregory Berns of Emory University in Atlanta is studying how people's opinions are swayed by others. The research could shed light on products that become fads.

Dr. P. Read Montague, a neuroscientist at the Baylor College of Medicine in Houston who led the Coca-Cola versus Pepsi study, said he was fascinated by the way cultural images insinuated their way into people's choices. The study of Coke and Pepsi, financed by the National Institute on Drug Abuse and the

Kane Family Foundation, showed that two different brain systems were at play. When subjects used their sense of taste alone to choose a preferred drink, an area of the brain called the ventrolateral prefrontal cortex lit up. When told they were drinking "the real thing," as Coke is widely known, a memory region call the hippocampus and another part of the prefrontal cortex lit up.

The study showed that some people did not choose a drink based on taste alone, Dr. Montague said. They chose a drink plus what it conjured up to their medial prefrontal cortex, namely the strong brand identity of Coca-Cola, he said.

Researchers at the University of California, Los Angeles recently looked at how Democrats and Republicans differ in their neural responses to campaign commercials showing images of the Sept. 11 terrorist attacks. Democrats, they found, were more fearful.

Mr. Ruskin of Commercial Alert points to such studies as proof that they pose a threat to society.

"They are probing the human psyche for the purpose of influencing it," he said. "At its best, neuromarketing would make advertising more effective. At it worst, neuromarketing could make propaganda more effective, potentially leading to new totalitarian regimes, civil strife, wars, genocide and countless deaths."

But defenders of neuromarketing say the technology cannot force people to do something that they would not do otherwise. "If people realize they're being manipulated, they will start to question their choices," Dr. Berns said. "The more we know, the more executive control we can exert over our decisions."

Dr. Sam McClure, a postdoctoral researcher at Princeton and a co-author of the soft drink study, suggested that neuromarketing might someday even be used to protect vulnerable brains.

The prefrontal cortex, which helps mediate consumer choice, develops late in children and is impaired in older people, groups that are highly susceptible to advertising, he said. Young children are often sucked in by advertisements for sugary foods, while the elderly can fall victim to buying fake insurance policies.

"If brain imaging studies clearly showed those vulnerabilities, laws could be passed to protect people from advertising," Dr. McClure said.