

What the brain values may not be what it buys

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It's no wonder attractive human faces are everywhere in media and advertising - when we see those faces, our brains are constantly computing how much the experiences are worth to us. New brain-imaging research shows it's even possible to predict how much people might be willing to pay for a particular face.

Researchers at Duke University Medical Center found that as participants were watching a sequence of faces, their brains were simultaneously evaluating those faces in two distinct ways: for the quality of the viewing experience and for what they would trade to see the face again.

The work was published in the *Journal of Neuroscience* online on Feb. 16.

They showed college-aged men a parade of female faces, intermixed with images of money, while measuring [brain](#) activation using [functional magnetic resonance imaging \(fMRI\)](#). In a later experiment, the same participants could pay more or less money to view more or less attractive faces.

"One part of the frontal cortex of our participants' brains increased in activation to more attractive faces, as if it computed those faces' hedonic (quality of the experience) value," said senior author Scott Huettel, Ph.D., an associate professor of psychology & neuroscience who directs the Center for Neuroeconomic Studies at Duke. "A nearby brain region's

activation also predicted those faces' economic value - specifically, how much money that person would be willing to trade to see another face of similar attractiveness."

During the fMRI experiment, heterosexual men viewed a set of female faces that had previously been rated for attractiveness by peers. Interspersed with the face pictures were pictures of money, shown in several denominations, which indicated real monetary gains or losses that the participant could later spend during the next phase of the experiment. The participants made a series of economic decisions: Should they spend more of their money to see a more attractive face, or spend less money but see a less attractive face? Each participant made about one hundred of these decisions, spending from 1 to 12 cents each time.

The researchers measured fMRI activation while the participants viewed the faces and money. In a region near the front of the brain, the anterior ventromedial prefrontal cortex (VMPFC), there was increased activation when participants saw a more attractive face or saw a picture of a larger amount of money. That pattern of [brain activation](#) was relatively stable across participants in the study. Yet, slightly farther back in the brain, within posterior VMPFC, the researchers also could see the relative activation to the faces compared to money, which strongly predicted how each person would later spend to see a more attractive face.

Huettel said that findings from neuroscience might lead to new directions in marketing. "People often respond to images in a very idiosyncratic fashion," he said. "While we can't use neuroscience to identify the best images for every person's brain, we could identify types of images that tend to modulate the right sorts of value signals - those that predict future purchases for a market segment."

Lead author David V. Smith, a graduate student in psychology &

neuroscience, explained further: "Previous studies have shown that active decisions about the value of real goods, such as candy or consumer products, evoke activation in the VMPFC. Our study demonstrates that the VMPFC actually contains two signals for value: one that indicates how much value we are currently experiencing, and another that indicates how much we'd be willing to pay to have that experience again later."

Why were all subjects male? "For this new study, we built on prior work from colleagues who showed that young adult males not only value the experience of seeing a female face, but will treat that experience like an economic good - they will trade experience for [money](#) in a predictable manner," Huettel said. "We expect that the functioning of the brain's reward system is essentially similar between males and females. However, what sorts of stimuli seem attractive - whether an image of a face or some other social cue - may differ between the genders."

Smith added that they plan to continue the research with other kinds of rewards, including different types of pictures. "A key issue in future research will be examining how different value signals are communicated between different parts of the brain to produce our decisions," Smith said.

Provided by Duke University

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