Brain research shows visual perception system unconsciously affects our preferences

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When grabbing a coffee mug out of a cluttered cabinet or choosing a pen to quickly sign a document, what brain processes guide your choices?

New research from Carnegie Mellon University's Center for the Neural Basis of Cognition (CNBC) shows that the brain's visual perception system automatically and unconsciously guides decision-making through valence perception. Published in the journal *Frontiers in Psychology*, the review hypothesizes that valence, which can be defined as the positive or negative information automatically perceived in the majority of visual information, integrates visual features and associations from experience with similar objects or features. In other words, it is the process that allows our brains to rapidly make choices between similar objects.

The findings offer important insights into consumer behavior in ways that traditional consumer marketing focus groups cannot address. For example, asking individuals to react to package designs, ads or logos is simply ineffective. Instead, companies can use this type of brain science to more effectively assess how unconscious visual valence perception contributes to consumer behavior.

To transfer the research's scientific application to the online video market, the CMU research team is in the process of founding the start-up company neonlabs through the support of the National Science Foundation (NSF) Innovation Corps (I-Corps).

"This basic research into how visual object recognition interacts with

and is influenced by affect paints a much richer picture of how we see objects," said Michael J. Tarr, the George A. and Helen Dunham Cowan Professor of Cognitive Neuroscience and co-director of the CNBC. "What we now know is that common, household objects carry subtle positive or negative valences and that these valences have an impact on our day-to-day behavior."

Tarr added that the NSF I-Corps program has been instrumental in helping the neonlabs' team take this basic idea and teaching them how to turn it into a viable company. "The I-Corps program gave us unprecedented access to highly successful, experienced entrepreneurs and venture capitalists who provided incredibly valuable feedback throughout the development process," he said.

NSF established I-Corps for the sole purpose of assessing the readiness of transitioning new scientific opportunities into valuable products through a public-private partnership. The CMU team of Tarr, Sophie Lebrecht, a CNBC and Tepper School of Business postdoctoral fellow, Babs Carryer, an embedded entrepreneur at CMU's Project Olympus, and Thomas Kubilius, president of Pittsburgh-based Bright Innovation and adjunct professor of design at CMU, were awarded a $50,000, six-month grant to investigate how understanding valence perception could be used to make better consumer marketing decisions. They are launching neonlabs to apply their model of visual preference to increase click rates on online videos, by identifying the most visually appealing thumbnail from a stream of video. The web-based software product selects a thumbnail based on neuroimaging data on object perception and valence, crowd sourced behavioral data and proprietary computational analyses of large amounts of video streams.

"Everything you see, you automatically dislike or like, prefer or don't prefer, in part, because of valence perception," said Lebrecht, lead author of the study and the entrepreneurial lead for the I-Corps grant.

"Valence links what we see in the world to how we make decisions."

Lebrecht continued, "Talking with companies such as YouTube and Hulu, we realized that they are looking for ways to keep users on their sites longer by clicking to watch more videos. Thumbnails are a huge problem for any online video publisher, and our research fits perfectly with this problem. Our approach streamlines the process and chooses the screenshot that is the most visually appealing based on science, which will in the end result in more user clicks."

Today (May 23), Lebrecht will join the other 23 I-Corps project teams in Palo Alto, Calif., for the final presentation of each team's I-Corps journey from basic science idea to real-world business application. She will present neonlabs' solution, outlining the customer landscape, competition and business model.

Carnegie Mellon is well known for its entrepreneurial culture. The university's Greenlighting Startups initiative, a portfolio of five business incubators, is designed to speed company creation at CMU. In the past 15 years, Carnegie Mellon faculty and students have helped to create more than 300 companies and 9,000 jobs; the university averages 15 to 20 new startups each year.

"CMU has been an amazing place to build neonlabs," Lebrecht said. "There's a great intellectual community and facilities here as well as people unbelievably experienced in tech transfer and startups who have been so incredibly generous with their time."

Provided by Carnegie Mellon University

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