

Like humans, monkeys fall into the 'uncanny valley'

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Realistic-looking robots and computer avatars often spur negative responses in humans. Princeton University scientists showed monkeys these computer-generated images of monkeys and saw a similar response. Monkeys, they found, also are unsettled by images that are realistic but synthetic, a response known as the "uncanny valley" effect. Credit: Courtesy of Shawn Steckenfinger

(PhysOrg.com) -- Princeton University researchers have come up with a new twist on the mysterious visual phenomenon experienced by humans known as the "uncanny valley." The scientists have found that monkeys sense it too.

The uncanny valley, a phrase coined by a Japanese researcher nearly three decades ago, describes that disquieting feeling that occurs when viewers look at representations designed to be as human-like as possible -- whether computer animations or androids -- but somehow fall short.

Movie-goers may not be familiar with the term, but they understand that it is far easier to love the out-of-proportion cartoon figures in the "The

Incredibles," for example, than it is to embrace the more realistic-looking characters in "The Polar Express." Viewers, to many a Hollywood director's consternation, are emotionally unsettled by images of artificial humans that look both realistic and unrealistic at the same time.

In an attempt to add to the emerging scientific literature on the subject and answer deeper questions about the evolutionary basis of communication, Princeton University researchers have found that macaque monkeys also fall into the uncanny valley, exhibiting this reaction when looking at computer-generated images of monkeys that are close but less than perfect representations.

"Increased realism does not necessarily lead to increased acceptance," said Asif Ghazanfar, an assistant professor of psychology and the Princeton Neuroscience Institute, who led the research. It is the first such finding in any animal other than human. The paper, co-written by Shawn Steckenfinger, a research specialist in the Princeton's Department of Psychology, appears in the October Oct. 12 edition of the [Proceedings of the National Academy of Sciences](#).

The work, according to its authors, is significant because it indicates that there is a biological basis for the uncanny valley and supports theories that propose that the brain mechanisms underlying the uncanny valley are evolutionary adaptations. "These data demonstrate that the uncanny valley effect is not unique to humans and that evolutionary hypotheses regarding its origins are tenable," said Ghazanfar.

The uncanny valley hypothesis was introduced by the Japanese roboticist Masahiro Mori in 1970. The "valley" refers to a dip in a graph that charts a human's positive reaction in response to an image on one axis and a robot's human-likeness on another. People like to study other human faces, and they also can enjoy scrutinizing countenances that

clearly are not human, such as a doll's or a cartoon figure's. But when an image falls in between -- close to human but clearly not -- it causes a feeling of revulsion.

Experts praised the Princeton report.

"This study makes a significant contribution to existing knowledge of the uncanny valley," said Karl MacDorman, an associate professor in the School of Informatics at Indiana University, who has led important experiments in the fields of android science and computational neuroscience. "The research design is novel, the experiment is carried out with a high degree of rigor, and the results are compelling, important, newsworthy, and support the [hypothesis]."

He believes the results will be of broad interest to scientists and non-scientists, including "ethologists, animal behaviorists, cognitive psychologists of human perception, evolutionary psychologists, primate social cognitive neuroscientists, humanoid roboticists and human character animators."

In the experiments, the monkeys, which normally coo and smack their lips to engage each other, quickly avert their glances and are frightened when confronted by the close-to-real images. When asked to peer at the less close-to-real faces and real faces, however, they viewed them more often and for longer periods.

Despite the widespread acknowledgement of the uncanny valley as a valid phenomenon, there are no clear explanations for it, Ghazanfar said. One theory suggests that it is the outcome of a "disgust response" mechanism that allows humans to avoid disease. Another idea holds that the phenomenon is an indicator of humanity's highly evolved face processing abilities. Some have suggested the corpse-like appearance of some images elicits an innate fear of death. Still others have posited that

the response illustrates what is perceived as a threat to human identity.

Ghazanfar said the research is likely to point him in useful directions to further explore these theories.

Source: Princeton University

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