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News

'Eye flicker' explains optical illusion

by Brooke Borel

Cosmos Online

Thursday, 2 October 2008

NEW YORK: Tiny eye movements may be responsible for the optical illusion of a famous artwork. The discovery hints at how we are fooled by other illusions too.

The painting, called 'Enigma', is a visual illusion created by artist Isia Leviant in 1981. It consists of concentric circles and radiating black and white lines. When looking at Enigma (see image), most people see what appears to be a flowing movement around the circles.

Conflicting theories

This kind of optical illusion had been of interest to neuroscientists for many years. Conflicting theories regarding the explanation go back at least two centuries, with experts disputing whether the explanation lies in the eyes or the brain.

Now, researchers at the Barrow Neurological Institute in Arizona, U.S., say they've settled the controversy: tiny eye movements called 'microsaccades', which occur one to two times per second when the eye's gaze is fixated, produce at least part of the illusion.

This is "first time that a direct correlation was drawn between Enigma and any physiological precursor," said Susana Martinez-Conde, lead researcher behind the study. Her team's results are published in the U.S. journal the *Proceedings of the National Academy of Sciences*.

Previous work by the researchers revealed that the illusion of motion speeds up when the eyes are loosely fixated on the center of Enigma, and slows down or even stops when precisely fixated on the center (*try it by looking at the image on the right*).

For the new study, Martinez-Conde's team showed test subjects simplified versions of Enigma, and asked them to fixate their gaze while reporting their perception of the illusion. Subjects recorded whether the perceived motion was decreasing or speeding up by pressing and releasing a button.

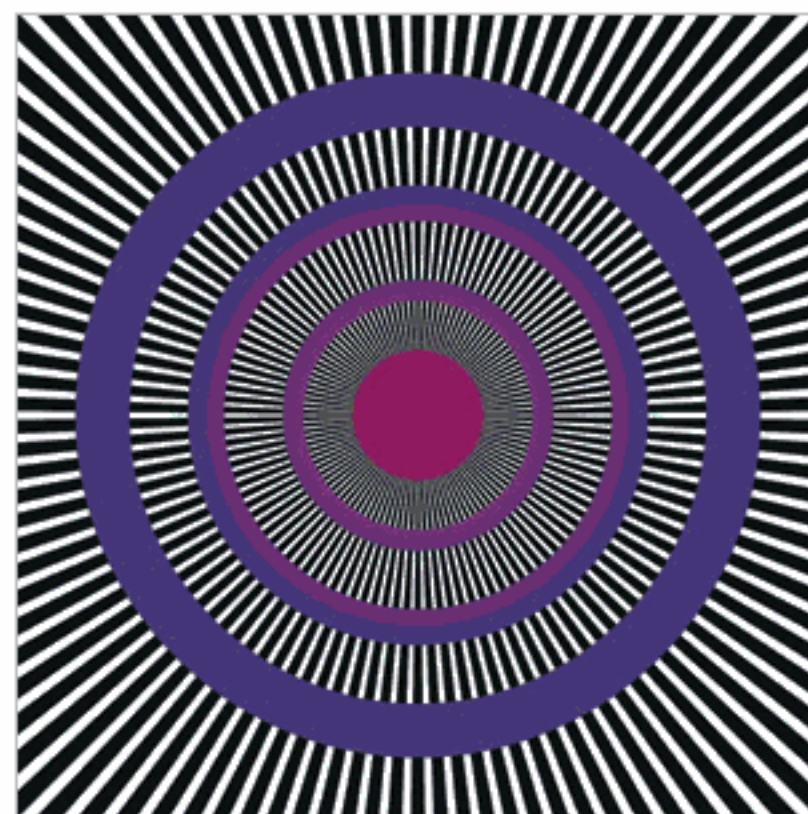
"Milestone" study

This time the test subjects were simultaneously recorded with high-speed video cameras, which measured their eye movements. The results revealed a correlation between eye flicker and the perceived motion: as eye flicker increased, so did the perceived motion, and when eye flicker decreased, the perceived motion also decreased or stopped.

Simone Gori, a psychologist at the University of Trieste in Italy, whose work involves the Enigma illusion, told *Cosmos Online* that the new research was "a milestone" which "makes the debate [over the illusion] lively and challenging again."

Gori added that while flickering eye movements may not explain the entire phenomenon, the study proves that they are necessary to see the illusion.

Martinez-Conde said that she would be surprised if this was an isolated case, and that it's likely that flickering eyes could be part of the explanation for illusory motion in many other paintings too. Her future research will focus on the precise brain mechanism that links eye movements to the perception of an illusion.



It's all in the eyes: Isia Leviant's 'Enigma' creates an illusion of motion.

Credit: Isia Leviant

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