

# Barrow researchers use magic for discoveries

May 22 2012

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Researchers at Barrow Neurological Institute at St. Joseph's Hospital and Medical Center have unveiled how and why the public perceives some magic tricks in recent studies that could have real-world implications in military tactics, marketing and sports.

Susana Martinez-Conde, PhD, of Barrow's Laboratory of Visual Neuroscience, and Stephen Macknik, PhD, of Barrow's Laboratory of Behavioral [Neurophysiology](#) are well known for their research into [magic](#) and illusions. Their most recent original research projects, published in *Frontiers in Human Neuroscience*, offer additional insight into perception and cognition.

One of the studies was initiated by professional magician Apollo Robbins, who believed that audience members directed their attention differently depending on the type of hand [motion](#) used. Robbins believed that if he moved his hand in a straight line while performing a trick the audience would focus on the beginning and end points of the motion, but not in between. In contrast, he believed if he moved his hand in a curved motion the audience would follow his hand's [trajectory](#) from beginning to end.

By studying the eye movements of individuals as they watched Robbins perform, Barrow researchers confirmed Robbins' theory. Perhaps more importantly, they also found that the different types of hand motion triggered two different types of eye movement. The researchers discovered that curved motion engaged smooth pursuit eye movements (in which the eye follows a moving object smoothly), whereas straight

motion led to saccadic [eye movements](#) (in which the eye jumps from one point of interest to another).

"Not only is this discovery important for [magicians](#), but the knowledge that curved motion attracts attention differently from straight motion could have wide-reaching implications – for example, in predator-prey evasion techniques in the natural world, military tactics, sports strategies and marketing," says Martinez-Conde. This finding is believed to be the first discovery in the neuroscientific literature initiated by a magician, rather than a scientist.

In another study, the researchers worked with professional magician Mac King to investigate magicians' use of social cues – like the position of their gaze – to misdirect observers.

They studied a popular coin-vanishing trick, in which King tosses a coin up and down in his right hand before "tossing" it to his left hand, where it subsequently disappears. In reality, the magician only simulates tossing the coin to the left [hand](#), an implied motion that essentially tricks the neurons into responding as they would have if the coin had actually been thrown.

The Barrow researchers discovered that social misdirection does not always help magic. By presenting two different videos of King – one in which the audience could see his face and another in which his face was hidden – they found that social misdirection did not play a role in this particular trick.

"We wondered if the observer's perception of magic was going to be different if they could see the magician's head and eye position. To our surprise, it didn't matter," says Martinez-Conde. "This indicates that social misdirection in magic is more complicated than previously believed, and not necessary for the perception of all [magic tricks](#)."

Provided by St. Joseph's Hospital and Medical Center

Citation: Barrow researchers use magic for discoveries (2012, May 22) retrieved 26 April 2024 from <https://medicalxpress.com/news/2012-05-barrow-magic-discoveries.html>

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