

Age-old magic tricks can provide clues for modern science

July 23 2008

Revealing the science behind age-old magic tricks will help us better understand how humans see, think, and act, according to researchers at the University of British Columbia and Durham University in the U.K.

Their study in the current online issue of the journal *Trends in Cognitive Sciences* concludes that elements of human cognition and perception not yet fully understood by scientists may be clarified by analysing tricks and techniques used by magicians over thousands of years.

The investigators explored several of the key techniques of the magic trade – categorised as "misdirection, illusion and forcing" – which have only recently been formally identified by scientists and taken seriously as a valid research area.

An example of "misdirection" would be the cigarette and lighter trick the researchers used in one of their vision experiments:

http://www.dur.ac.uk/gustav.kuhn/Kuhn_et_al_2007/material.htm

For related work on "looking but not seeing" go to:

<http://www.psych.ubc.ca/~rensink/flicker/>

"Although a few attempts have been made in the past to draw links between magic and human cognition, the knowledge obtained by magicians has been largely ignored by modern psychology," says Ronald Rensink, an associate professor who specializes in vision and cognition and teaches in the departments of Psychology and Computer Science at

UBC.

Study co-authors are Gustav Kuhn from Durham University's Psychology Department and Aym Amlani, a recent BSc graduate of UBC's Cognitive Systems Program, which integrates computer science, psychology, philosophy and linguistics. Both Kuhn and Amlani are practising magicians who argue that conjurers are "miles ahead" of scientists.

"Imagine someone who makes an object disappear or successfully predicts what you will do next," says Kuhn. "These tricks may seem like they defy the laws of physics and logic, but they are actually created through a combination of skill and a deep knowledge of human psychology."

For example, the vanishing ball illusion indicates that anticipation plays a factor in what we see – our minds tend to fill in the blanks. In this trick, the magician tosses a red ball in the air two times and on the third throw will palm the ball. However, study participants will report seeing the magician toss the ball in the air three times.

The researchers say their work has long-term implications for human-computer interfaces – from online training films and computer graphics to video games and animation. These activities require increasingly sophisticated software capable of grabbing and holding the viewer's attention.

They developed various magic tricks and experiments to test recent findings in vision science, which shows that only a small part of information that enters our eyes actually enters our conscious awareness. One particular finding shows a distinction between where you look and what you see.

This was evident in an experiment that recorded volunteers' eye movements with a tracking device while they watched a video of a "misdirection" trick. The magician goes to light a cigarette, but subtly drops both cigarette and lighter into his lap.

By directing the audience's attention first to his right hand, which is empty, and then to the left hand, also empty, he makes watchers believe both items have simply disappeared.

The researchers asked the volunteers to detect how the magic trick was performed. More than half of the 46 participants did not see the cigarette being dropped although this happened in full view. Further, the eye movement records for this group of volunteers showed that at least two of them were looking directly at the cigarette.

"The critical factor is not where someone directs their eyes, but where they are sending their attention," explains Rensink. "If they didn't attend to the manipulation behind the trick, they simply weren't able to see how the trick was done."

Source: University of British Columbia

Citation: Age-old magic tricks can provide clues for modern science (2008, July 23) retrieved 3 May 2024 from <https://medicalxpress.com/news/2008-07-age-old-magic-clues-modern-science.html>

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