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Neuroscientists: Why is the brain deceived as if by magic?

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By **Mary Brophy Marcus, USA TODAY**

They seem an unlikely match, but magicians and neuroscientists are pairing up to share their knowledge and learn more about the workings of the human mind.

At the annual Society for Neuroscience meeting in Chicago on Saturday, thousands of scientists gathered to watch magicians perform and then chat about attention, memory and perception.

"There is no better way to see how the mind works than to study how we can be deceived," says Thomas Carew, president of the Society for Neuroscience.

Researchers say they hope what they glean from magicians will help them better understand, diagnose and treat certain cognitive illnesses.

"We are trying to develop with magicians an understanding of how they manipulate awareness, how they apply insights about cognition and perception to do that," says Stephen Macknik, director of the Laboratory of Behavioral Neurophysiology at Barrow Neurological Institute in Phoenix, a conference presenter on the topic. "We want to poach their powers and use them to increase brain discovery."



Enlarge By Ed Kosmicki for USA TODAY

Magicians such as Eric Mead, who is what is known in the trade as a "mind reader," are helping neuroscientists understand what happens when the brain is tricked.

Lab vs. live audiences

Macknik and co-presenter Susana Martinez-Conde, director of the Laboratory of Visual Neuroscience at Barrow, say it's challenging to conduct cognitive research because study subjects often see how the scientists are trying to fool them. Studying the audiences of illusionists is much more productive.

Magicians are able to trip up watchers without them knowing it, which the scientists say allows for purer research results.

"Magicians basically do the same things we try to do in the lab but they do it on stage for thousands of people. It's an incredibly robust version of what we're doing in the lab," Macknik says.

While magicians aim to exploit flaws of the human brain to provide entertainment, Macknik and Martinez-Conde say neuroscientists want to learn about the underlying brain-cell activity involved behind the dupe. Taking functional MRIs of brains as subjects witness an illusion could help them identify people who have attention and memory problems, Martinez-Conde says.

The clinical applications for the study of magic and neuroscience aren't yet clear, Carew says. "We're on the edge of a very nascent discipline of neuroscience," he says.

Magicians often use an array of visual tactics, props, sounds and body movements to manipulate attention and memory, the researchers say.

Believing is seeing

Apollo Robbins, whose moniker is "The Gentleman Thief," performed a pickpocket show in Las Vegas for years. He has a gift for sliding wallets and watches away from subjects without detection.

"My work is heavily focused on misdirection," says Robbins, a consultant to law enforcement agencies. Over the years, he says, he has studied the tricks of street thieves to refine his craft.

"I learned that there are movements that instinctively draw the eye away from one spot and to another," Robbins says. He says the shape a hand or arm makes — the trajectory of an arc vs. a straight-line movement, for instance — can more effectively pull awareness away from the hand that's filching a cellphone from a pocket.

Martinez-Conde says saccadic eye movements, in which the eye darts around from one point to another, can be at

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play during a deception like those in Robbins' act.

"We often look, but we don't see things. There's an association between position of gaze and location of attention. If you gaze at something and don't attend to it, it won't be processed or perceived," says Martinez-Conde, who adds that magicians have known these techniques for thousands of years, while neuroscientists have figured them out only recently.

Martinez-Conde says magicians have taught scientists that humor appears to decrease attention, too. "We didn't know before that when you laugh or are amused by something, you can't pay very good attention," she says.

"Mind reader" Eric Mead, who spoke at the conference, says he relies on the fallibility and malleability of human memory to "read minds" and create illusions. "I have techniques to change their memory," he says.

Anticipating the expected can "blind" onlookers to the unexpected, says Harvard and Massachusetts Eye and Ear Infirmary neuro-ophthalmologist Dean Cestari. It's the way the brain is hard-wired evolution-wise, he says. "That's just pattern recognition, and it's part of survival."

Why are we drawn to magic even though we know on an intellectual level we're going to be hoodwinked?

"Humans by nature like to solve puzzles and understand them," Cestari says. "Plus, there is something about magic that brings back memories of your childhood."

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