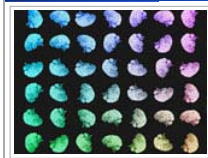


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Sci-Tech



The truth in illusions: How the human brain works

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Jonathan Fahey, Forbes.com

Now you see him--now you don't. When the pickpocket and performer Apollo Robbins snatches a mark's wallet, he may well be exploiting a loophole in the way the human visual system and brain interact. In other words, he's literally robbing you blind.

As Robbins moves his hand in a specific way--say, making a smooth curve or a sharp quick line--he may be doing more than just diverting his mark's attention. "We think he makes you blind," says Susana Martinez-Conde, director of the Laboratory of Visual Neuroscience at Barrow Neurological Institute in Phoenix--at least blind for that split second he needs to lighten your load.



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Magic and illusions are not just fun and games. Martinez-Conde and her frequent collaborator at Barrow, Stephen Macknik, think that understanding how such deceptions trick the brain can tell us a lot about how our brains--and even some neurological diseases--function.

"Cognitive neuroscience would have advanced faster if we would have paid attention to magicians," says Martinez-Conde. "They are artful manipulators of awareness and consciousness."

By studying what happens when the brain looks at an illusion--or is tricked by a magician--the researchers can separate what the eye itself picks up from the brain's interpretation of what is going on.

"When perception doesn't match physical reality, it allows you to isolate and understand the actual brain process," says Macknik, who directs the Laboratory of Behavioral Neurophysiology at Barrow.

Macknik believes that these brain processes reveal nothing less than clues to human consciousness. "Those circuits [that interpret visual stimuli] include the neurons that comprise consciousness," says Macknik. "If we understand these circuits and understand their neural underpinnings, we will learn the circuits that make consciousness."

Understanding the essence of consciousness may be an unfathomable problem, but Macknik is making interesting progress. In 2005, he published a study that aimed to show where visual awareness happens in the brain by using illusions to mask a target that was in plain sight.

Now he is now trying to pinpoint those circuits more precisely. Ultimately, Macknik would like to know the neural circuits well enough to test them during brain surgeries, and even help direct microsurgeries designed to relieve symptoms in patients with brain conditions like epilepsy.

Vegas a hotspot for researchers

Last year, Martinez-Conde and Macknik, who had been devoting their time to visual illusions, were planning a conference in Las Vegas when they decided to ask a few magicians to perform, mostly to liven up their presentation.

But as they watched the tricks, the researchers realized that magicians rely on illusions of a different kind--so-called cognitive illusions--that could also help illuminate the processes of the brain.

For example, John Thomson, the magician known as the Great Tomsoni, spoke about how he uses humor to trick people. "When people are laughing, time stops, and the magician can do anything," Thomson says.

With that juicy clue, Martinez-Conde plans to set up an experiment to probe whether and how laughter suppresses attention. If she can understand the mechanism behind how laughter suppresses attention, she reasons, "then we can ask if those neurons are affected by neurodegeneration"--and, finally, probe whether neurodegeneration in diseases like Alzheimer's suppresses attention in the same way.

Right now Martinez-Conde is working on an experiment with pickpocket Robbins. She wants to know if Robbins' hand movements exploit tiny involuntary eye movements called microsaccades that help us see or if he is exploiting the tendency in our brain to pay more attention to certain types of motion than others.

Unfortunately, understanding the mysteries of magic and illusions is one thing and defending ourselves is another. No matter what Macknik and Martinez-Conde discover, if Apollo Robbins wants your wallet, he's going to



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