Neuromagic research

Magicians' insights could lead to breakthroughs in treating dementia and autism

By Susana Martinez-Conde, Ph.D.

WHEN I TELL PEOPLE THAT I'M A NEUROSCIENTIST, their eyes usually glaze over. But, when I tell them I work with Las Vegas magicians, they smile and say, "Wow! Tell me more."

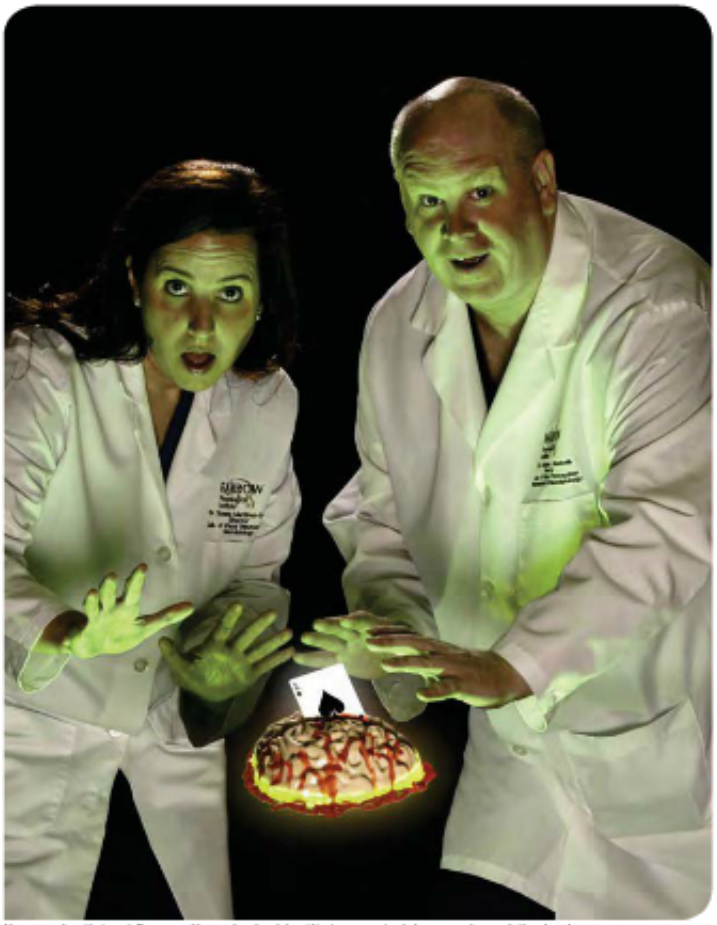
The intersection of scientific research and magic is a thrilling combination. The brain is the last frontier in science, and no one really understands how it works or why it sometimes breaks down. In my research lab at Barrow Neurological Institute, we have embraced the idea that the solutions to brain disease may never be found in traditional methods. If we are to make breakthroughs in treating terrible conditions like autism and dementia, we must think outside the box and develop unorthodox science.

That is when the magic happens.

About seven years ago, my research partner, Dr. Stephen Macknik, and I began teaming up with some of the world's greatest magicians. We recognized that these "artists of awareness" knew more about what tricks our brains than we, Harvard-educated scientists, did.

In the past several years, magicians like Penn and Teller, Mac King, the Amazing Randi and Apollo Robbins have partnered with us to examine the link between vision and the processes of the brain. The magicians are fascinated by the science, and we are fascinated by the new research discipline we have labeled "neuromagic."

By examining how the brain reacts to magic tricks like misdirection and sleight of hand, which manipulate our attention better than almost anything we can conjure up in the lab, we believe that we will understand better the neural underpinnings of perception and cognition. Before we began working with magicians, cognitive neuroscientists were, at times, re-inventing the wheel, coming up with principles that magicians had already been using for a long time.



Neuroscientists at Barrow Neurological Institute are studying magic and the brain

The human brain is not a perfect reader of reality, and it often uses shortcuts to interpret the world more quickly and efficiently. The brain's limitations

Dr. Martinez-Conde

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are at the heart of many illusions. Magicians exploit our neural shortcuts to do what seems impossible, such as when the audience's attention is drawn to a conjurer's left hand while he hides the coin in his right.

It is a misconception that the brain reconstructs reality. Rather, it constructs an unreality that we agree to live with. Magicians create illusions to exploit this mismatch. Magical methods can then be applied in the laboratory, in combination with high-technology brain-imaging and other neuroscience techniques, to study how the brain works in both normal and abnormal situations. These studies could yield insights into how to treat conditions, such as attention-deficit disorder, or to diagnose and evaluate therapy regimes in autism.

People with autism often suffer from a deficit in "joint attention," that is, the ability to pay attention to those things that other people appear to be attending to. If you have ever looked up at the ceiling when somebody else was pointing up at it, then you have exercised your joint attention. Because patients with autism spectrum disorder are less able to process the social cues that underlie joint attention, we believe that magic tricks, which often rely on the

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Internationally-renowned magicians, Mac King and the Amazing Randi, will take the stage along with neuroscientists from the Barrow Neurological Institute for an evening titled, "Magic and the Brain." The charity event, which takes place at the Phoenix Theatre on September 17, will showcase the unusual partnership between scientists at Barrow and magicians who have traveled to the Institute to help the medical researchers understand the way the brain functions and how it is tricked. Mac King, who headlines in Vegas at Harrah's, and the Amazing Randi, the world's "Elder Statesman of Magic," will perform as the researchers try to explain the unexplainable – the human brain.

magician's gaze and body language, will not work as well with them.

Since I was a young girl growing up in Spain, I have been fascinated by science and the brain. That fascination led me to Harvard and Barrow – and now to Vegas. With the help of some magic, we are on the verge of profound medical breakthroughs.

To get a close-up look at our research, join us on September 17, along with magicians Mac King and The Amazing Randi, for a unique show at the Phoenix Theatre called "Magic and the Brain." For ticket info, visit barrow50.org or call 602-406-3041. The charity event will support the Barrow Neurological Institute. ■

Dr. Susana Martinez-Conde is director of the Laboratory of Visual Neuroscience at Barrow Neurological Institute at St. Joseph's Hospital in Phoenix. She received a Bachelor of Science in Experimental Psychology from the Universidad Complutense de Madrid *and a Ph.D in Medicine and Surgery from the* Universidad de Santiago de Compostela, *in Spain. She was a postdoctoral fellow with Nobel Laureate, David Hubel, at Harvard Medical School, and then an Instructor in Neurobiology at the same institution. She was a lecturer at University College, London, from 2001 to 2003, before assuming her directorship at Barrow the following year. She is co-author of the bestselling book,* Sleights of Mind: What the Neuroscience of Magic Reveals about Everyday Deception. *She is also a regular contributor to* Scientific American.