What magic can teach us about our brains

By Linda Rodriguez McRobbie | SEPTEMBER 02, 2016

MY CARD — the jack of diamonds, the one with my name scrawled on it twice in green Sharpie — is in the right pocket of Gustav Kuhn’s jeans. Just a second ago it was on the top of the deck, and less than a second before that it was in the middle.

“You don’t believe me? I’ll do it again. It’s in the middle of the deck, and then it comes riffling through the air,” Kuhn says, whistling as the card makes its
my green name clearly visible. Then, in a flash of showmanship, he produces the card in his hand — and the rest of the deck is now in his pocket.

It’s a basic but astounding trick, not the least because of what happens in my brain to enable me to experience it. It’s impossible for a card to dematerialize and reappear somewhere else. I know this. Anyone who’s ever seen a magic show knows this. But what our eyes tell us and what we experience create different narratives — I never saw him put the card in his pocket, or nestle it in the deck, because he was directing my attention elsewhere — and point to the quirks of human cognition. That we greet the evidence of these quirks, the magical effect, with delight, awe, and even wonder is all part of magic’s peculiar charm.

“Magicians are trying to find loopholes in cognition, and they’re trying to exploit those loopholes to create their illusions,” explains Kuhn, who is a senior lecturer in psychology at Goldsmiths, University of London and a parlor magician. He and a growing cohort of scientists from multiple disciplines are trying to identify those loopholes and figure out how they work and what they tell us about human experience, perception, and cognition. They want to build a science of magic.

“We believe that magic can be used in different ways. We can study magic tricks and understand why these tricks work. That can give us interesting insights into limitations in cognition,” says Kuhn. “Magic is unique, really, in that it allows us to experience the impossible — and by doing so, it creates a conflict between the things that we think are possible and our actual experience.”

One reason magic is so well-suited to explore human cognition and perception comes down to one of the weirder facts of being human: Every experience we have in the world — everything we can see and hear and taste and feel, and everything we remember about it afterward — is in some ways virtual. Our perception is created in the cognitive interpretation, how we sort through crowded fields of data to understand what’s happening to us. So, as Kuhn puts it, “magic happens to us all the time — our whole experience is a massive illusion, we’re just not aware of it.”
Kuhn came to psychology through magic. As a teenager in his native Switzerland, he’d wanted to become a professional magician. After that proved harder than he thought, he turned to psychology. “It was always pretty obvious to me that if you want to perfect your magic,” he said, “you have to understand how people think, and so for me, the link between magic and psychology was always very obvious.” Anecdotally, it is to other scientists as well. Some, especially psychologists, already use magic to investigate principals of human experience. Developmental psychologists use basic magic tricks, like making an object appear and then disappear, to study how infants develop their understanding of object permanence. Others examine magical thinking, where there is a disconnect between a person’s strongly held belief and what logic dictates to be true; superstition is a kind of magical thinking. Kuhn wants to bring these areas of research together, as well as encourage other scientists to use magic in their investigations.

Though this line of inquiry is still in the early stages, it seems to be building real momentum. In the 15 years since he began using magic to investigate attention and misdirection, Kuhn says he’s seen an almost exponential increase in the number of papers that incorporate magic. A quick search unearths papers on what magic tricks can show us about problem-solving, how the ways children and adults explain magic tricks reveal stages in cognition development, and uses of the neuro-imaging technology fMRI to investigate how magic tricks exploit powerful principles of causal expectation. Psychology textbooks on attention now even talk about misdirection and point to studies that use magic tricks, something that has the added benefit of showing the next generation of psychologists that it’s possible to use magic in a scientific context. It’s working: Kuhn is guiding the research of graduate students in Colombia, Finland, and Switzerland.

In February 2016, Goldsmiths hosted the first-ever Science of Magic workshop, bringing together international researchers from disparate disciplines: computer science, philosophy, parapsychology. It also coincided with publication of a special edition of the journal Frontiers in Psychology dedicated to magic research, coedited
Ron Rensink, a professor in the computer science and psychology departments at the University of British Columbia, is Kuhn’s partner in pushing the science of magic forward. Rensink doesn’t have a background in magic; his work is particularly concerned with visual systems. He was part of a team of researchers who made several surprising findings about change blindness, the strange yet common perceptual phenomenon in which people fail to register major changes in their visual fields. (Think of those “spot the difference” games in children’s activity books — except people routinely don’t spot the difference in everyday situations.)

In February 2015, he and Kuhn published their framework for a science of magic in Frontiers in Psychology, outlining four areas where magic can be used to investigate human perception and cognition: using magic tricks to investigate current research questions, including about memory distortion, prediction, free will, and consciousness; investigating the effects of those tricks, such as the conflict inherent in watching the impossible apparently happen; studying magic tricks to explain their neural, functional, and psychological components; and trying to perceive large-scale patterns across different magic tricks.

Rensink believes that identifying a big question that magic could potentially answer is integral to building a science of magic. He and Kuhn think this question could be about wonder — why we experience it, what it’s good for, what it means. “Wonder is a fundamental part of life, this is one of the main things that drive you to find out, to discover. . . . From a purely functional point of view, if we didn’t have ancestors that had [wonder], then we wouldn’t be here,” Rensink says. By using magic that elicits a sense of wonder, perhaps we can find out why we wonder.

Rensink, Kuhn, and their colleagues are not the first scientists to explore what magic can teach us about human cognition, though they might be the first to consider wonder as a central point of investigation. As early as 1894, Alfred Binet, one of the fathers of modern psychology, used a chronophotographic gun to record a
and-wife neuroscientists Stephen Macknik and Susana Martinez-Conde declared a new discipline they called neuromagic, using neuroscience to explore the neural correlates of magic tricks and how magicians exploit perception. Their book, “Sleights of Mind: What the Neuroscience of Magic Reveals About Our Everyday Deceptions,” written with New York Times science writer Sandra Blakeslee, garnered a lot of media interest but left some in the scientific and magic communities underwhelmed. Kuhn and Rensink believe that neuroscience must be an element of an overarching science of magic, but neuromagic is an incomplete approach, too narrowly focused and light on substantiating academic work. Moreover, Rensink explains, understanding the neural circuitry of an experience doesn’t entirely explain that experience; psychology offers a link between our experience and what’s happening in the brain as it happens.

Kuhn’s and Rensink’s enthusiasm for the science of magic is infectious. But Peter Lamont, a professor of the history of psychology and parapsychology at the University of Edinburgh and an accomplished magician himself, sounds a note of caution. In several essays he has suggested that magic is so dependent on how it’s being performed, and for whom, that developing scientifically valid ways to study it is nearly impossible. Lamont believes magic can be used to investigate human cognition and supports the interdisciplinary dialogue that Rensink and Kuhn want to foster. But he draws the line at an academic framework supporting a scientific theory of magic, or trying to develop a comprehensive taxonomy of magic tricks’ effects and methods.

And while science might have something to learn from magic, Lamont says, it remains to be seen whether magic has anything to learn from science. “It’s very trendy these days to think of everything being located in the brain, but it’s a very narrow view. It’s reductionist. It reduces human things to neurological things. Magic is not simply something that happens in the brain, it’s something that happens between people, it’s learned from people interacting with each other.”

Will Houstoun, a professional magician who holds a PhD in the history of magic.
of applied psychology in concert with other things to see if people are deceived,” he says. But magicians know what they know through trial and error, through the experience of performing magic before an audience, he says.

Kuhn and Rensink see that as a fair point, but they argue that the science of magic is still in its infancy and it’ll take some time before it affects magic performance. Their hope is that a science of magic will bring more rigor to how magicians perfect their illusions, and that studying how humans think could enable magicians to craft better, more complex, more wondrous effects. Rensink points to a 2014 paper for which researchers from Queen Mary University of London used artificial intelligence to design a card trick. Rensink, who reviewed the paper, acknowledged that the trick wasn’t necessarily better than what a human could produce, but he saw it as early evidence that science could help magic. For now, it’s at least a valuable step to connect magic to mainstream science.

Magic is enjoying an upswing in interest right now, with a new generation of name-brand magicians like Derren Brown plying their trade — and even sometimes acknowledging the psychological principles at work while they perform. And as Houstoun said, “Magic and magicians are sexier than lab rats. It’s something very hooky and sounds quite buzzy and quite exciting . . . that’s why various people have been interested in it historically as well.”

In the short term, however, the biggest threat to a science of magic isn’t so much doubt as it is a lack of funding: No matter how sexy magic might be, “blue sky” science like this has a tough time winning grants. “It comes down to, in part, faith, if you like,” say Rensink. “I tend to believe that we’re on a good path here, we’re discovering things, and other people will always go, ‘No, you’ll fall off the edge of the earth,’ and for all I know they’re right . . . but I prefer to proceed optimistically.”

That sounds a bit like the sort of magical thinking — and thinking about magic — that does lead to real breakthroughs. And that could be their most impressive trick.
THE WORD

A needless layer of butter to the toast

“As it were” is an awful modifier. MORE...

Q&A

Vote all you want. The secret government won’t change.

The people we elect aren’t the ones calling the shots, says Tufts University’s Michael Glennon. MORE...

Taking notes? Bring a pen, skip the computer

A little “desirable difficulty” is good for memory, a new study suggests. MORE...

The great historic house museum debate

Do we have too many? The surprising fight over a quirky, dusty, and endangered American institution. MORE...

GLOBE SPECIAL REPORT

True Crime: Crime’s slang lexicon

Read More

You're reading 1 of 5 free articles. Get UNLIMITED access for only 99¢ per week. Subscribe now
Why fiction is good for you

The beautiful lies of novels, movies, and TV stories have surprisingly powerful effects — and may even help make society tick. MORE...

The power of rituals

New research suggests that anyone can benefit from routines. MORE...

Same-sex marriage in the 19th century

Sylvia Drake and Charity Bryant were a married couple living in Vermont in 1807. MORE...

For pregnant women, two sets of rights in one body

A new wave of fetal-protection measures creates a collision in American law — and exposes a moral conundrum. MORE...

Linguists are like, ‘Get used to it!’

Why a new way to quote people has taken English by storm. MORE...

Why alien abductions are down dramatically

We still believe, we just don’t talk about it anymore. MORE...

Virtue signaling and other inane platitudes

Thoughts and prayers for those who engage in the self-glorifying behavior rampant on social media. MORE...
Is crime genetic? Scientists don’t know because they’re afraid to ask
Despite how uncomfortable it might be to admit, genes may make some folks more likely to break the law than others. MORE...

Who will fight the beauty bias?
It’s deep, unconscious, and surprisingly universal—and means beautiful people get a much better deal. But righting injustice isn’t easy when no one wants to call themselves plain. MORE...

True Crime: Murder in the combat zone
Read More

Why Donald Trump trumps Donald Drumpf
The Trump family’s name change could be an asset for the Republican front-runner. MORE...

Why Mass. should defect from its time zone
Sunset before 4:15? It doesn’t have to be this way. MORE...

How to market a nation
Being a country with little worldwide attention can have ramifications beyond...
Incurious George finds a safe space

The beloved children’s character turns 75 and has stopped taking so many risks.