While a magician works, the mind does the tricks

By Brendan Carey | New York Times News Service | August 26, 2008

A decanted backyward magic show is often an exercise in deliberate chaos. Cards whipped through the air. Glasses crashing to the ground. Gags, hand-waving, loud abracadabras. Something’s bound to catch fire too, if the performer is ambitious enough—er, needs cover.

“Back in the early days, I always had a little smoke and fire, not only for misdirection but to emphasize that something magic had just happened,” said The Great K糕, a magician based in southern California who has performed professionally for more than 35 years, in venues around the world. “But as the magic and magician nature, you see that you don’t need the bigger props.”

Eye-grabbing distractions—to mask a palmed card or coin, say—are only the crudest ways to exploit brain processes that allow for more subtle manipulations, good magicians learn.

Teaming up

In a paper published recently in the journal Nature Reviews Neuroscience, a team of brain scientists and prominent magicians described how magic tricks, both simple and spectacular, take advantage of glitches in how the brain constructs a model of the outside world from moment to moment, or what we think of as objective reality.

For the magicians, including The Great K糕 (John Thompson), Mac King, James Randi, and Teller of Penn and Teller, the research was an opportunity to understand the brain’s visual tricks, and as such, a new tool for the scientists, said Martinez-Conde and Stephen Macknik of the Barrow Neurological Institute in Phoenix, to help his hope that magic could accelerate research into perception.

“It’s a marvelous paper,” Michael Bach, a vision scientist at Freiburg University in Germany who was not involved in the work, said in an e-mail message. Magicians alter what the brain perceives by manipulating how it interprets scenes, Bach said, and “a distant goal of cognitive psychology would be to numerically predict this.”

One theory of perception holds that the brain builds representations of the world, moment to moment, using the senses to provide clues that are flashed out into a mental picture based on experience and context. The brain uses neural tricks to do this: approximating, cutting corners, instantaneously and subconsciously choosing what to “see” and what to let pass, neuroscientists say. Magic exposes the insides, the neural stitching in the perceptual curtain.

Some simple magical illusions are due to relatively straightforward biological limitations. Consider spoon-bending. Any 7-year-old can be a younger brother by holding the neck of a spoon and rapidly tapping it back and forth, like a mini water-torter gone haywire. The spoon appears curved, because of cells in the visual cortex called end-stopped neurons, which perceive both motion and the boundaries of objects, the authors write. The end-stopped neurons respond differently from other motion-sensing cells, and this slight differential shapes the estimation of where the edges of the spoon are.

The visual cortex is subject to sudden changes in the environment, both when something new appears and when something disappears. Martinez-Conde said. A sudden disappearance causes what neuroscientists call an afterimage, a ghostly image of the object linger for a moment.

This illusion behind a beer trick by the Great K糕. The magician has an assistant appear onstage in a white dress and tell the audience he will magically change the color of her dress to red. He does this by shining a red light on her, an obvious play that he turns into a joke. Then the red light flicks off, the house lights go on, and the audience is completely shocked. The assistant to the split-second after the red light goes off, the red light images in the audience’s brains for about 100 milliseconds, covering the image of the woman. It’s just enough time for the woman’s white dress to be stripped away, revealing a red one underneath.

The visual cortex resolves cleanly only what is at the center of vision, the periphery is blurred, and this is likely one reason that the eyes are always in motion, to gather snapshots to construct a wider, coherent view. A similar process holds for cognition. The brain focuses conscious attention on one thing at one time, at the expense of others regardless of where the eyes are pointing. In imaging studies, neuroscientists have found evidence that the brain suppresses activity in surrounding visual areas when concentrating on a specific task. Thus preoccupied, the brain may not consciously register actions witnessed by the eyes.

Distractions

Magicians exploit this property in a variety of ways. Jokes, stagecraft and drama can hold and direct thoughts and attention away from sights of hand and other moves, performs say.

But small, apparently trivial movements can also mask maneuvers that produce breathtaking effects: In a telekinesis illusion, Teller explained how a magician might get rid of a card palmed in his right hand, by quickly searching his pockets for a pencil. “I put both pencils, find a pencil, reach suit and hand it to someone, and the whole act becomes incidental. If the audience is made to read intention—getting the pencil, in this case—the show will fall apart, and no one remembers you put your hand in your pocket.” the magician said. “You don’t really see it, because it’s not a figure anymore, it has become part of the background.”

The magician’s skill is in framing relevant maneuvers as trivial. When it’s done properly, Teller said, “the actions immediately become suspicious, and you instantly click that something’s wrong.”

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What wasn’t that card just the ace of clubs? Why is it the ring of diamonds now, even though you didn’t touch it?”

This Illusion of a Life

Lyle Borders - Exmag Staff