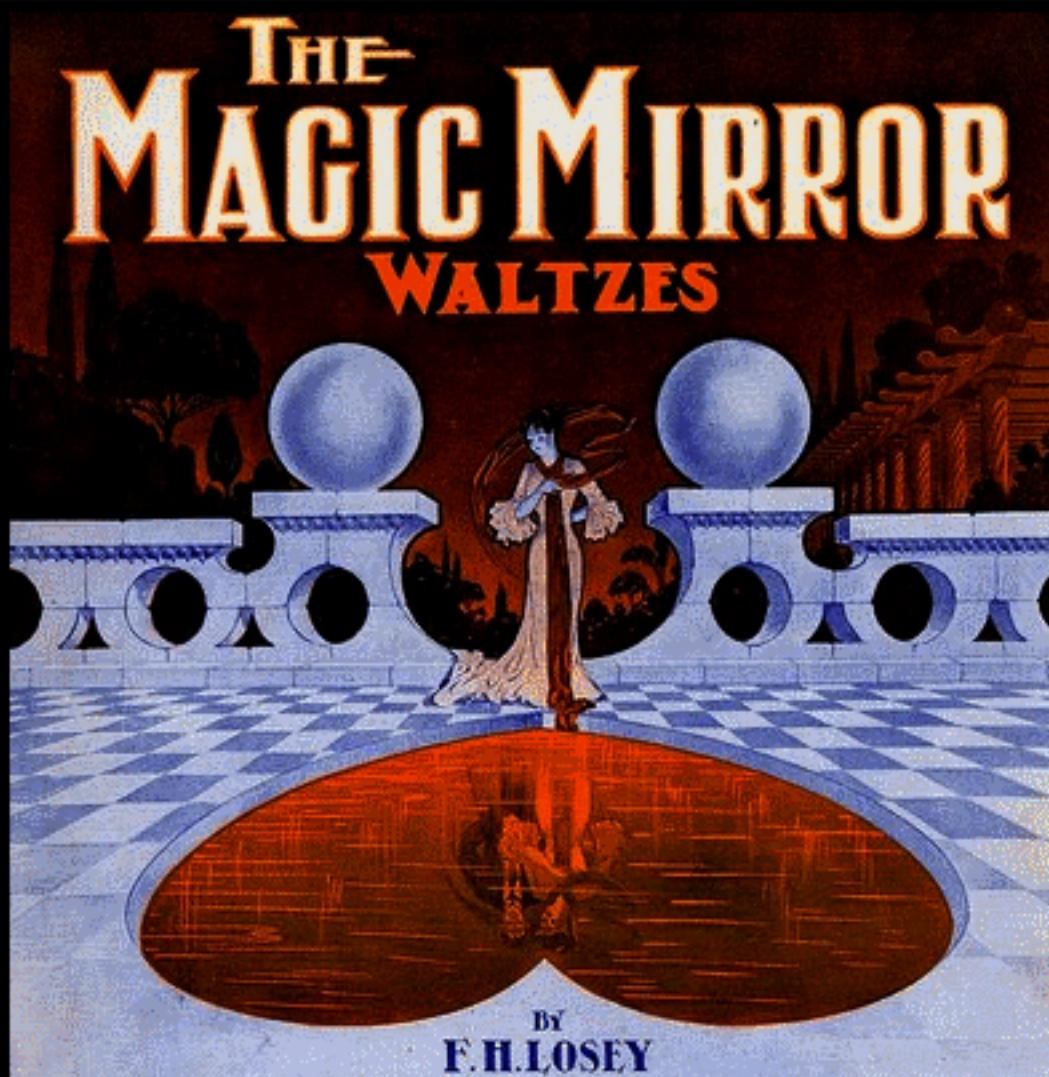


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## Intelligent Hallucinations &amp; Other Masterpieces Of Misdirection...



In the past year, though, a few researchers have begun to realize that magic represents something more: a deep and untapped store of knowledge about the human mind.

At a major conference last year in Las Vegas, in a scientific paper published last week and another due out this week, psychologists have argued that magicians, in their age-old quest for better ways to fool people, have been engaging in cutting-edge, if informal, research into how we see and comprehend the world around us. Just as studying the mechanisms of disease reveals the workings of our body's defenses, these psychologists believe that studying the ways a talented magician can short-circuit our perceptual system will allow us to better grasp how the system is put together.

"I think magicians and cognitive neuroscientists are getting at similar questions, but while neuroscientists have been looking at this for a few decades, magicians have been looking at this for centuries, millennia probably," says Susana Martinez-Conde, a neuroscientist at the Barrow Neurological Institute.

As magicians have long known and neuroscientists are increasingly discovering, *human perception is a jury-rigged apparatus*, full of gaps and easily manipulated. The collaboration between science and magic is still young, and the findings preliminary, but interest among scholars is only growing.

A great deal of the success of a piece of magic is simply getting the audience's attention and sending it to the wrong place - to a right hand flourishing a wand while the left secrets a ball away in a pocket or plucks a card from a sleeve. Magic shows are masterpieces of misdirection.

For years, cognitive scientists thought of perception as like a movie camera, something that reproduced the world in its panoply of detail. Over the past decade, though, that model has been increasingly questioned. For one thing, people have a pronounced tendency to miss things that are happening right in front of them. Daniel Simons, a psychologist at the University of Illinois, did a series of now-famous studies in the late 1990s that showed the extent of this *cognitive blindness*. In one, people were approached by someone asking them for directions, only to have, in the middle of the conversation, that person replaced by another. Only half noticed the change.

In another study, people were shown a movie clip of two teams, one in black shirts and one in white, each passing a basketball around. The subjects were asked to count the number of passes one of the teams made. Half said afterward that they hadn't noticed the woman in a gorilla suit who, midway through the clip, strolled through, paused, and beat her chest.

Because of work like this, a new model has arisen over the past decade, in which visual cognition is understood not as a camera but something more like a flashlight beam sweeping a twilight landscape. At any particular instant, we can only see detail and color in the small patch we are concentrating on. The rest we fill in through a combination of memory, prediction and a crude peripheral sight. *We don't take in our surroundings so much as actively and constantly construct them.*

"Our picture of the world is kind of a virtual reality," says Ronald A. Rensink, a professor of computer science and psychology at the University of British Columbia.

"It's a form of intelligent hallucination."

The benefit of these sorts of cognitive shortcuts is that they allow us to create a remarkably rich image of our environment despite the fact that our two optic nerves have roughly the resolution of cell-phone cameras. We don't have to waste time making out every car on the highway to understand that they are, indeed, cars, and to make sense of how they are moving - our minds can simply approximate from the thousands of cars we have already seen in our lives.

But because this method relies so heavily on expectation - not only to fill in the backdrop around us but to determine where to send what psychologists call our "*attentional spotlight*" - we are especially vulnerable to someone who knows our expectations and can manipulate them, someone like a magician.

Misdirection is, in a sense, the conjurer's tool that is easiest to understand - we miss things simply because we aren't looking at them. Other effects, though, are more befuddling. Often eye-tracking studies show that subjects can be looking right at an object without seeing it - car accident survivors report a similar paradox. Or, with just a little encouragement, a person can be made to see something where there's nothing.

The vanishing ball illusion is one of the most basic tricks a magician can learn: a ball is thrown repeatedly into the air and caught. Then, on the final throw, it disappears in midair. In fact, the magician has merely mimed the last throw, following the ball's imagined upward trajectory with his eyes while keeping it hidden in his hand.


But if the technique is easily explained, the phenomenon itself is not. If done right, the trick actually makes observers see the ball rising into the air on the last toss and vanishing at its apex. As Rensink points out, this is something more powerful than merely getting someone to look in the wrong direction - it's a demonstration of how easy it is to nudge the brain into *the realm of actual hallucination*. And cognitive scientists still don't know exactly what's causing it to happen.

There's a value in simply coming to grips with the gaps and limits in our awareness. Like Robert-Houdin's audience, awed by a magnet, we are more easily manipulated and more likely to put ourselves in compromising situations if we don't know what we don't know. The main thing is knowing that you've got limitations.

"The fundamental thing we do every day is ascertain what is reality, it's this diagnosis of what the signals coming into our eyes are supposed to mean," Teller says. "We say, 'That's a fence, I must not walk into it,' or, 'Is that a car coming around the corner? How much can I see of it? Oh, no, it's only a bicycle.'"

What draws people to magic, he believes, is an appreciation of how slippery that seemingly simple diagnosis can be. "They realize that the best way to grasp the power of deception is to do it themselves."

-Drake Bennett, "How Magicians Control Your Mind," Boston Globe, 8.3.08. Image: " Magic Mirror; Op. 255" Sheet Music Collection, Rare Book, Manuscript & Special Collections Library, Duke University, 1910).

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