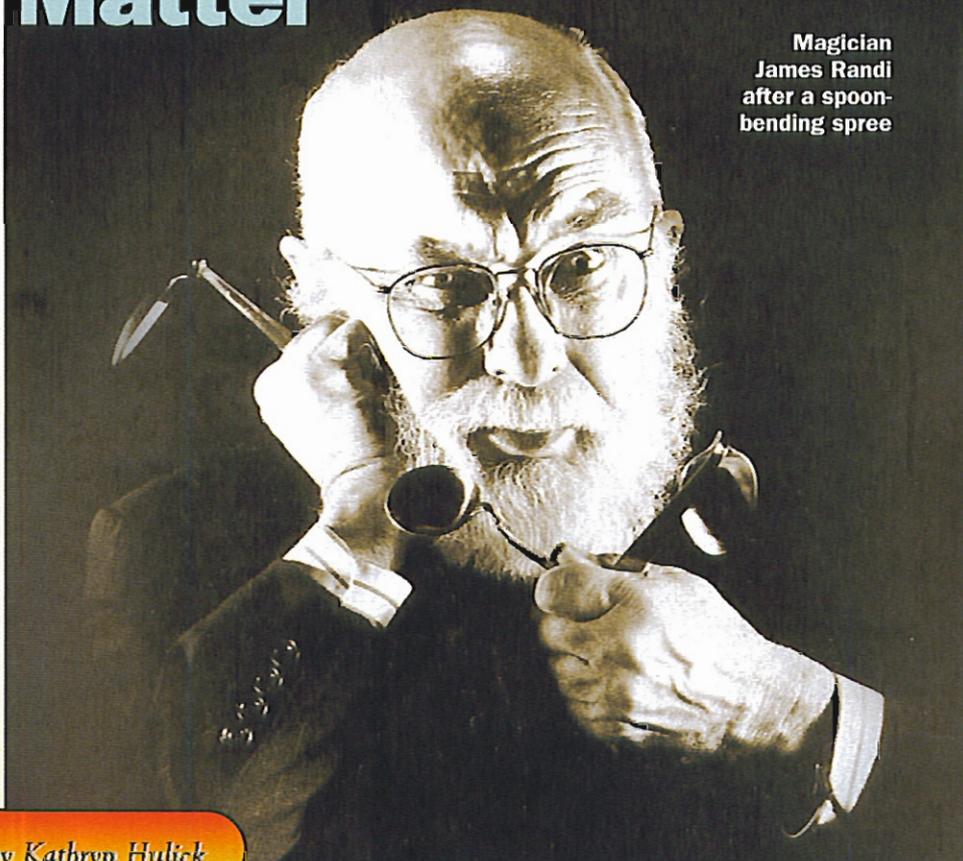


Editor's Note: This month, consulting editors Susana Martinez-Conde and Stephen L. Macknik introduce their favorite topic — MAGIC.

Mind Over Matter

A painting of a landscape is an illusion. You see mountains and clouds in the distance and a river flowing nearby, but in reality it's all just paint spread on a flat canvas. Magicians are somewhat like painters, but they manipulate our awareness and attention. Every magic show demonstrates that we may look, but often we don't see. This is fun and cool but it also helps scientists to understand how our brains work. We are neuroscientists who study the mind and its brain mechanisms, and we work with illusions because they tell us how our brains build our mind's experience of the world around us.



Magician
James Randi
after a spoon-
bending spree

SCIENCE SCOOPS by Kathryn Hulick

Abracadabra, Watch Me

How the Velvet Belly Lantern Shark Turns

You're a fish swimming in the ocean, minding your own business. Suddenly, a shadow passes overhead — a shadow much bigger than you! Swim away quickly, because that dark shape blocking the light means that something big, maybe even a shark, is on the prowl.

Yep, a shadow is a dead giveaway

in the open ocean. That's why some sharks have evolved the ability to glow — mimicking the sunlight filtering through the water. This is called *bioluminescence*. More than 10 percent of all sharks have this ability, including the Velvet Belly Lantern Shark, which is nicknamed “the phantom hunter of the fjords” for its brightly glowing belly disguise and

its home along the coast of Norway.

Just like magic, there's no shadow when a Lantern Shark swims overhead. Fish will never see this shark coming, and neither will larger predators. Many bigger, badder fish that like to snack on the 18-inch-long Lantern Shark have upward-looking eyes, so that glowing belly pays off.

Besides illusions and attention, another common interest to both neuroscientists and magicians is the principle of Occam's Razor. In the 14th century, an English philosopher named William of Ockham proposed a new principle, that when a phenomenon has many possible explanations, the simplest answer is usually the correct one. Today, most scientists adhere to Occam's Razor when they develop theories about how the world and the mind work.

Several magicians also apply Occam's Razor to demonstrate that some apparently inexplicable events have a fairly simple explanation: magic. James Randi, also known as the Amazing Randi, showed that spoon bending and other supposedly paranormal phenomena can be accomplished through standard magic techniques. Harry Houdini, the famous escapologist, started the tradition of magicians debunking

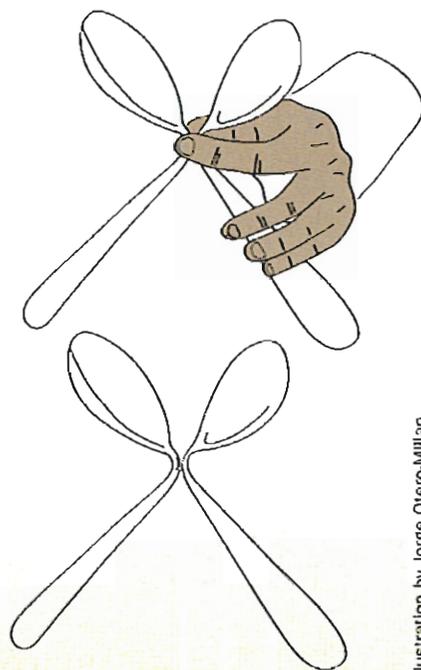


Illustration by Jorge Otero-Millian

false claims of psychic abilities by exposing their methods. Houdini at one time hoped that psychics and mediums had the real power to communicate with the dead. But that ended when he participated in a *séance* (a ceremony in which people talk to the spirits of the dead) to make "contact" with his dead mother. The *medium* (a person with mystical powers who supposedly

facilitates communication with the dead) "channeled" Houdini's mother and told him that she loved Harry very much and that she was so proud. Too bad Harry's real name was Erich (his mother never called him by his stage name of Harry), and that the medium channeled in English, whereas Houdini's mother only spoke to him in German! Disappointed, Houdini decided to expose mediums and psychics as performers of magic. The Amazing Randi and other magicians such as Penn & Teller today follow in Houdini's footsteps. For example, the James Randi Educational Foundation (www.randi.org) offers a million-dollar prize to anyone who demonstrates paranormal abilities under scientifically controlled conditions. After more than 40 years and numerous challenges, the prize remains unclaimed!

Susana Martinez-Conde
and Stephen L. Macknik

Disappear

invisible.

But how does it work? And is it only for camouflage? A team of scientists from Belgium captured several Lantern Sharks and kept them in tanks while they measured the intensity of the light coming from special organs on the sharks' bellies called *photophores*. The color and

angle of the light matched the sunlight in the fjord where they live. When the scientists adjusted the amount of light over the tanks, the sharks could adjust their camouflage only slightly to stay invisible. It was easy for the sharks to turn on and off, but not to adjust brightness.

The team thinks that the sharks may swim deeper during the bright middle of the day — since the light deeper down won't be as intense — and then higher in the evening and at night, evading enemies and catching unaware prey the whole time. That's what I call a magic trick!