

UPDATE YOUR DRIVERS
[LEARN MORE](#)

**DETECT AND CORRECT
 OUT-OF-DATE DRIVERS AND
 SOFTWARE AUTOMATICALLY**

versiontracker pro
 A NEW CNET SERVICE **cnet**

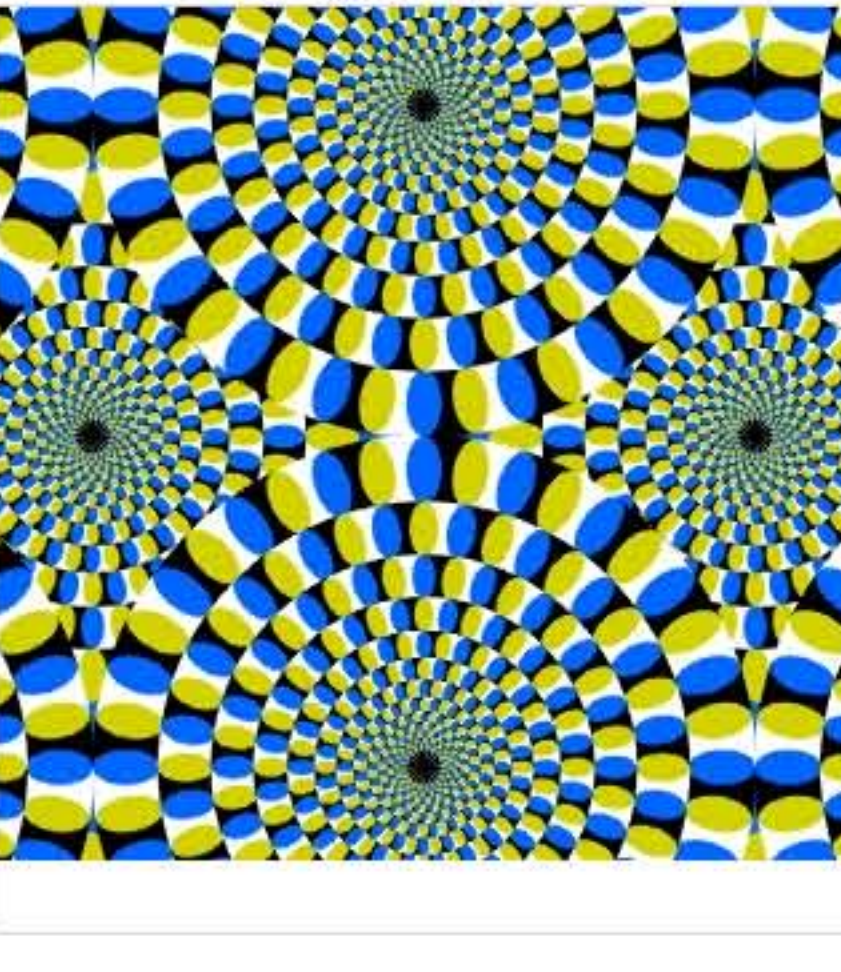
SciAm.com > Mind Matters > Mind & Brain > The Senses

May 28, 2008 in Mind & Brain | 12 comments | Post a comment

The Neuroscience of Illusion

How tricking the eye reveals the inner workings of the brain
 By Susana Martinez-Conde and Stephen L. Macknik

SHARE 12 diggs digg it NT f m f 10 points EMAIL PRINT TEXT SIZE: - +



The Neural Correlate Society recently announced the winners of its annual Best Visual Illusion contest. To celebrate the event, Mind Matters invited Susana Martinez-Conde and Stephen L. Macknik, two neuroscientists who specialize in visual perception, to explain the scientific value of visual illusions. This article is the first in a new Mind Matters series on the neuroscience of illusions.

[View a slide show of illusions](#)

It's a fact of neuroscience that everything we experience is actually a figment of our imagination. Although our sensations feel accurate and truthful, they do not necessarily reproduce the physical reality of the outside world. Of course, many experiences in daily life reflect the physical stimuli that enter the brain. But the same neural machinery that interprets actual sensory inputs is also responsible for our dreams, delusions and failings of memory. In other words, the real and the imagined share a physical source in the brain. So take a lesson from Socrates: "All I know is that I know nothing."

One of the most important tools used by neuroscientists to understand how the brain creates its sense of reality is the visual illusion. Historically, visual artists as well as illusionists have used visual illusions to develop deep insights into the inner workings of the visual system. Long before scientists were studying the properties of neurons, artists had devised a series of techniques to "trick" the brain into thinking that a flat canvas was three-dimensional, or that a series of brushstrokes was actually a still life.

Visual illusions are defined by the dissociation between the physical reality and the subjective perception of an object or event. When we experience a visual illusion, we may see something that is not there, or fail to see something that is there, or even see something different from what is there. Because of this disconnect between perception and reality, visual illusions demonstrate the ways in which the brain can fail to recreate the physical world. By studying these failings, we can learn about the computational methods used by the brain to construct visual experience.

In the accompanying slide show, we will showcase several basic categories of visual illusions and what they can teach us about the brain.

[View a slide show of illusions](#)

Mind Matters is edited by *Jonah Lehrer*, the science writer behind the blog *The Frontal Cortex* and the book *Proust was a Neuroscientist*.

ABOUT THE AUTHOR(S)

Susana Martinez-Conde is director of the Laboratory of Visual Neuroscience at the Barrow Neurological Institute in Phoenix. She holds a Ph.D. in medicine and surgery from the University of Santiago de Compostela in Spain. Stephen L. Macknik is director of the Laboratory of Behavioral Neurophysiology at the Barrow Neurological Institute and earned a Ph.D. in neurobiology from Harvard University.

FURTHER READING

[View a slide show of illusions](#) [Scientific American Reports: 105 Mind-Bending Illusions](#)

YOU MIGHT ALSO LIKE

- Letters
- News Scan Briefs
- The Quest to Find Consciousness
- Wireless Device Helps Illuminate the Role of Light on Human Health
- Quantum Spookiness Spans the Canary Islands
- Brain Stains
- Sputnik and the Start of the Space Age
- Fact or Fiction?: Waking a Sleepwalker May Kill Them

DISCUSS THIS ARTICLE

12 Comments

[Click here](#) to submit your comment.

VIEW: Page 1 | 2

IRENEALHANATI at 12:26 AM on 5/30/08

Illusionism and perception have always played a very important role in ethe visual arts, from Classical Greece (with the Parthenon) to the present.. with the movies. IRENEALHANATI [Reply](#) | [Report Abuse](#)

Frank23 at 12:03 PM on 5/30/08

For starters, one thing that has scratched my brain since I was about 10 is that, if it is a certainty that our perception isn't an accurate representation of reality (beyond the veil of maya), how do we know that the instruments we use to interpret information outside of our perceptive range are themselves interpreting "true" reality; are we blind-folk poking an elephant with a stick and calling it a wall? [Reply](#) | [Report Abuse](#)

Frank23 at 12:11 PM on 5/30/08

Secondly, with regards to the slides, a similar one to slide 4 can be seen at http://visualfunhouse.com/hidden_images/lady-in-the-tree-optical-illusion.html From what I'm told, most children don't see the naked woman. & slide 3 I find Similar to the feeling you get when you're on a stationary train and the one next to you sets off; I usually experience the whole physical lunge effect as if it's the train I'm sat on that is setting off. Another simple mental illusion I've found is lying or sitting in a familiar room with your eyes closed, then convincing yourself that you're laid/sat the other way round; when I've done this I've actually felt the dimensions of the room change to fit my perception; then get a mild feeling of nausea when I open my eyes and the room's the wrong way round! +1 final illusion; when you stare at a ceiling fan and relax your eyes (in the right kind of way), it appears to speed up, before switching into reverse... doesn't do your eyes much good tho' [Reply](#) | [Report Abuse](#)

wisheywish at 12:35 AM on 6/02/08

Ambiguous figures: "You can see one of two possible images, but never both of them at the same time." Uh yes I can. It's pretty easy actually. [Reply](#) | [Report Abuse](#)

wisheywish at 12:41 AM on 6/02/08

That's true... we don't see all the invisible aliens running around here. [Reply](#) | [Report Abuse](#)

bucketofsquid at 9:11 PM on 6/03/08

As an invisible alien I object to wishywish talking about me as if I'm not here! Also, what is up with your advertisers trying to download malware onto my machine lately? I mean really, don't you vet this junk before putting your site endorsement on it? [Reply](#) | [Report Abuse](#)

3.141592654 at 5:53 PM on 6/10/08

In the SHAPE DISTORTION ILLUSION (2/5) If you tilt your head to the sides all those square wont be distorted anymore [Reply](#) | [Report Abuse](#)

Eye Illusions at 3:05 PM on 7/12/08

cool [Reply](#) | [Report Abuse](#)

Eye Illusions at 3:06 PM on 7/12/08

cool [Reply](#) | [Report Abuse](#)

Eye Illusions at 3:08 PM on 7/12/08

cool [Reply](#) | [Report Abuse](#)

Page 1 | 2

You will be asked to [sign in](#) or [register](#) as a SciAm.com member when you click submit.

Enter Your Comment Here.

2,573 characters remaining

Email me when someone responds to this discussion.

ALSO ON SCIENTIFIC AMERICAN

A Natural Log: Our Innate Sense of Numbers is Logarithmic, Not Linear

Apple disses hackers' Black Hat convention

The Price of Gas in China

Rest Assured: The Brain Practices the Day's Lessons as We Sleep

China, the Olympics, and the Environment

INFORMATION	PUBLICATIONS	SERVICES
About Us Advertising Policy Privacy Policy Terms of Use Special Ad Sections	GoingGreen Conference Site Map Contact Us Products & Services SciAm Marketplace	Scientific American Scientific American Mind Scientific American Digital Special Editions and Reports International Editions
		Subscribe Renew Subscriber Service Gifts Subscriptions Order Back Issues

SUBSCRIPTION CENTER

SCIENTIFIC AMERICAN | SCIENTIFIC AMERICAN MIND | SCIAM DIGITAL

SCIENTIFIC AMERICAN MAGAZINE
 Save 58% off the cover price
 Plus FREE GIFT!
[SUBSCRIBE NOW](#)

ADVERTISEMENT

One full year for just **\$14.95**

Atlantic
 THE SKY IS FALLING
[click here to subscribe!](#)
THE Atlantic

LATEST STORIES

- [Magnifying Taste: New Chemicals Trick the Brain into Eating Less](#)
10 hours ago
- [Scientists Create a Map of Smell Similarity based on Neural Activity](#)
10 hours ago
- [Squeaky Mice Reveal Emotion, Self-Expression in the Brain](#)
10 hours ago
- [NASA Says Perchlorate Does Not Rule Out Life on Mars](#)
15 hours ago
- [Congresswoman Slams Religious Right's Assault on Science's "Edgier" Side](#)
20 hours ago

LATEST VIDEOS

- [14 arrests in Asia over rare remains](#)
10 hours ago
- [Germany's answer to Stonehenge](#)
10 hours ago
- [Gorilla population doubles](#)
8/6/08

POPULAR STORIES

FROM OUR PARTNERS

- [WHO publishes how-to guide on fighting AIDS](#)
Reuters | 1 hour ago
- [New Nissan technology deters drivers from danger](#)
Reuters | 4 hours ago
- [New Google box for offices can search 10 million files](#)
Reuters | 5 hours ago
- [Americans protest in Games city against Chinese abortions](#)
Reuters | 8 hours ago
- [Britain clears first oral antibiotic for OTC sale](#)
Reuters | 8 hours ago

[VIEW ALL](#)

ADVERTISEMENT

UPDATE YOUR DRIVERS
 DETECT AND CORRECT
 OUT-OF-DATE DRIVERS AND
 SOFTWARE AUTOMATICALLY
[LEARN MORE](#)

versiontracker pro
 A NEW CNET SERVICE **cnet**

ADVERTISEMENT

Get the insight you need on today's hot topics
[Subscribe to SciAm NEWSLETTERS](#) →

Scientific American
[Topic RSS feeds](#)