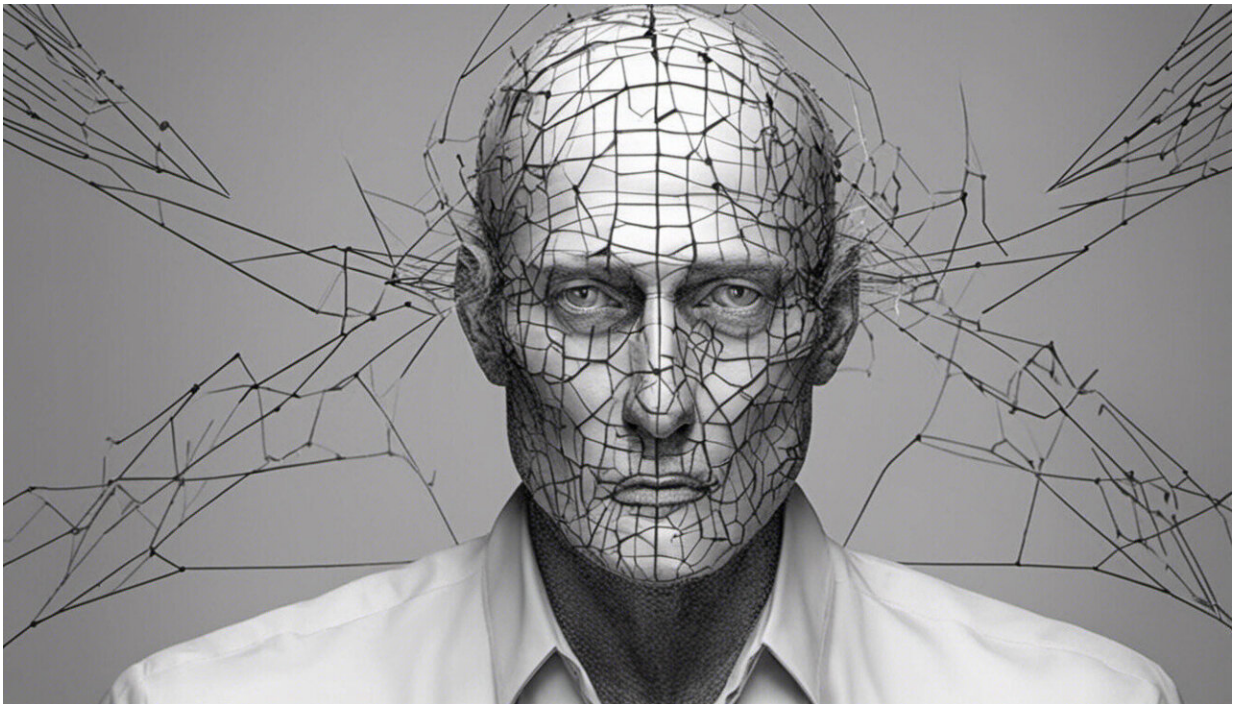


# Researchers pinpoint the regions of the brain that spark during the telling of a funny story

February 27 2017, by Michelle Boston

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Credit: AI-generated image ([disclaimer](#))

What happens in your brain when you tell a joke? Well, that appears to depend on whether you do that for a living.

Researchers in USC's Image Understanding Laboratory studied professional improvisation comedians—many from the Los Angeles

Groundlings comedy troupe—and amateur comics—in the act of coming up with a quip. Their aim: Gain a better understanding of the neural correlates of humor creativity—that is, see how the brain's physiology changes when a person tries to be funny.

For the study, both pro and amateur comedians, as well as a control group of non-comedians, viewed New Yorker cartoons without words and were asked to come up with two captions for them—one funny and one mundane.

Participants were scanned by [functional magnetic resonance](#) imaging (fMRI) machines to track their brain activity as they created the captions. Each comic scanned and an outside panel of participants rated each of the captions for humor.

## **Free associations**

The results showed that two regions of the brain were activated when the participants came up with jokes—the [medial prefrontal cortex](#) and the temporal association regions. However, the regions activated were different depending on the person's level of expertise.

"What we found is that the more experienced someone is at doing comedy, the more activation we saw in the temporal lobe," said USC doctoral student Ori Amir, who led the study with Irving Biederman, professor of psychology and computer science. The temporal lobe receives sensory information and is the region of the brain key to comprehending speech and visual cognition. It's also where abstract information, semantic information and remote associations meaningfully converge.

In contrast, the amateur comedians and non-comedians relied on their prefrontal cortex, which is responsible for executive functions like

planning complex cognitive behavior and decision-making.

"The professional improv comedians let their free associations give them solutions," Biederman said.

To put it another way, "The more experience you have doing comedy, the less you need to engage in the top-down control and the more you rely on your spontaneous associations," Amir said.

The researchers also found that funniness ratings were higher for captions created while the participants had higher activity in the temporal regions of their brain during humor creation.

Amir noted that across different studies that seek to understand the neural correlates of creativity in the brain, the medial prefrontal cortex is the one region consistently connected to creativity.

"The question is what does it do exactly? It seems like it's not the source of creativity, but rather the cognitive control top-down director of the creative process," he said. "The creativity itself appears to occur elsewhere depending on the creative task."

## **Tickling the funny bone**

In the past, scientists have studied the [neural correlates](#) of creativity with tasks such as writing a poem, improvising jazz or drawing a picture, but humor offered Amir and Biederman a unique pathway to study how the brain processes creation.

"Humor is an outstanding testbed for studying creativity," Biederman said. "It has a clear beginning, middle and end with a duration brief enough for neuroimaging. Also, the end product is easy to evaluate: Does it make you laugh? When someone creates an original composition or a

poem, assessing the quality is not as clear-cut."

## Visual recognition

The study builds on the research from Biederman's Image Understanding Laboratory, which studies the cortical basis of high-level visual recognition. The same [temporal lobe](#) regions that show high activation from humor are also activated by the aesthetic experience of appreciating a magnificent vista, for instance.

Biederman noted that the activation, and hence the pleasure, is greatly reduced by the repetition of any experience. The thrill is gone the second time we hear the joke, read the book or see a movie. Thus the pleasure isn't an end in and of itself, but it is what drives us to continually seek new and richly interpretable experiences. This then renders us, as Biederman has termed it, "infovores," meaning humans are hardwired to crave new information and experiences.

Biederman holds the Harold Dornsife Chair in Neurosciences at the USC Dornsife College of Letters, Arts and Sciences. Amir is now a postdoctoral researcher at the University of California, Santa Barbara. Their findings were published in *Frontiers in Human Neuroscience*.

**More information:** Ori Amir et al. The Neural Correlates of Humor Creativity, *Frontiers in Human Neuroscience* (2016). [DOI: 10.3389/fnhum.2016.00597](#)

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