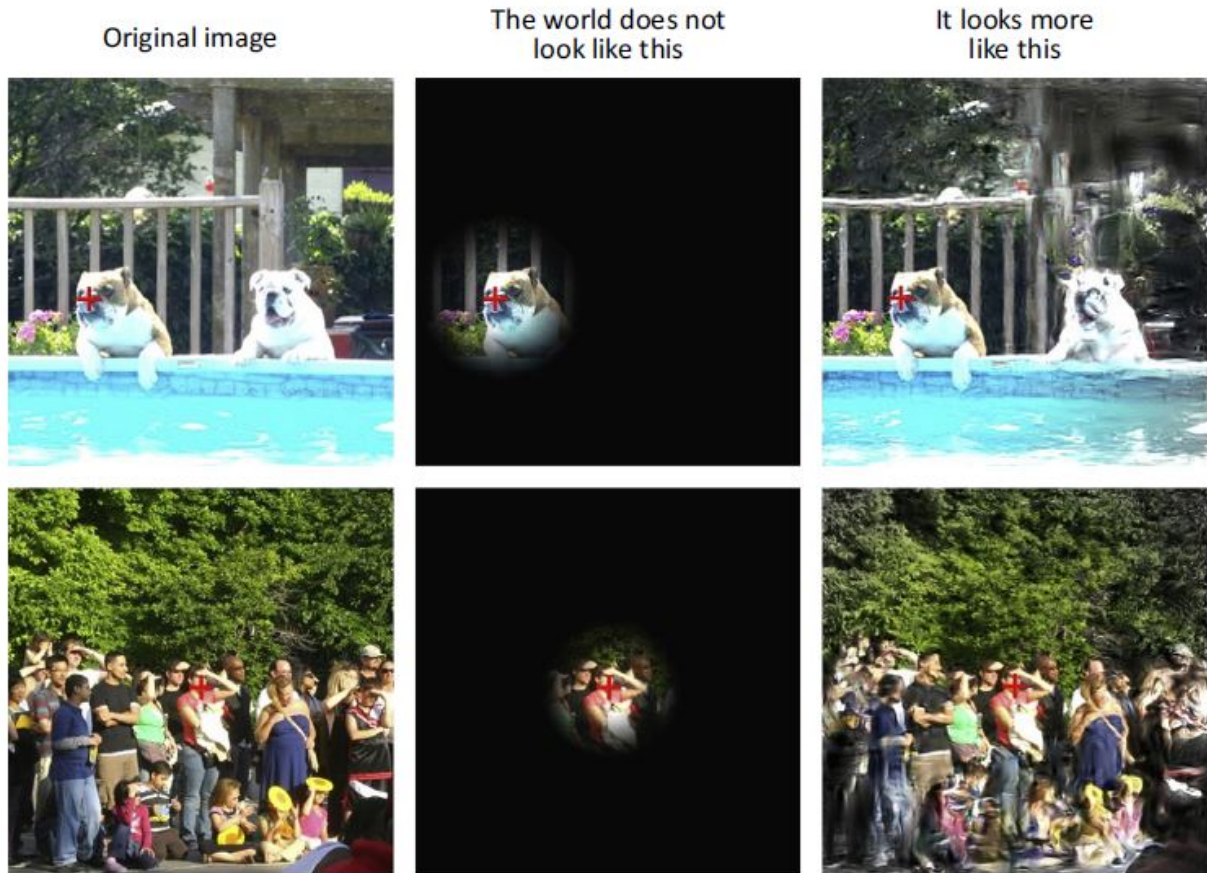


How much do we really see?

April 19 2016



In this figure, the red crosses represent the fixation spot and the focus of attention for these particular snapshots. The left column shows two images that have not been doctored in any way (left column, 'Original image'). The middle column shows how the world does not fade into darkness when it is not fixated or focally attended. Instead, the right column shows how the parts of the world that are not fixated and unattended are represented as an ensemble statistic or "gist." Credit: Cohen *et al.* / *Trends in Cognitive Sciences* 2016

Glance out the window and then close your eyes. What did you see? Maybe you noticed it's raining and there was a man carrying an umbrella. What color was it? What shape was its handle? Did you catch those details? Probably not. Some neuroscientists would say that, even though you perceived very few specifics from the window scene, your eyes still captured everything in front of you. But there are flaws to this logic, MIT researchers argue in an Opinion published April 19, 2016 in *Trends in Cognitive Sciences*. It may be that our vision only reflects the gist of what we see.

"A ton of work supports that this perception that our [visual experience](#) is so rich and vivid is just totally wrong," says first author Michael A. Cohen, a [postdoctoral fellow](#) in the Nancy Kanwisher Lab at MIT's McGovern Institute for Brain Research. "But even if we can just see a handful of items, we definitely have an understanding of the world around us—a sense of what kind of scene we're in."

A staple study researchers use to quantify our visual consciousness involves showing people flashes of different shapes or objects on a computer screen and asking how many details they can remember. In most cases, subjects report back four or five correct answers. The exception is when subjects are primed to look for something in advance, which changes what they pay attention to. This selective focus is part of why [cognitive scientists](#) can't agree on what we actually "see," because sight should not be so variable.

For Cohen, however, consciousness is a combination of several processes, including focus and memory, that helps us make decisions about future actions. He points to studies that suggest that our brains are hardwired to quickly take in large objects and scenes (e.g., a highway, a park, a store) within fractions of a second. Glimpse out that window and you take in the depth, navigability, openness, and temperature of the surroundings. The brain does capture some details—for example, you

don't just see a man and an umbrella, but that the man is carrying the umbrella. But most of our [visual perception](#) may quite literally be focused on the "big picture."

"One of the useful things about this field of study is that there are many instances in which your subjective experience is misguided and science can reveal a bunch of things about your own consciousness that you weren't necessarily aware of," Cohen says. "There are many experiments in which people are very much surprised by the limits of their own cognitive experiences."

If we see less than we think that we do, the other senses likely follow similar rules. There's evidence that audio perception also relies on gists of all of the sounds that we hear. From the window, you take in the sounds of the falling rain, singing birds, and car engines, but what you're tuning out is the hum of streetlamps or the conversation taking place on the sidewalk. Again, the ears only capture the gist of the environment.

Other researchers will likely disagree with how Cohen and co-authors—Kanwisher and Tufts University cognitive scientist Daniel Dennett—limit consciousness by the bandwidth of memory and decision making. Not to mention that they can't disprove that we don't unconsciously "see" all in view.

"It's very difficult to measure consciousness objectively without conflating reportability with subjective experience," Cohen says. "I think this paper gives us hope that we can bridge the gap between what we as scientists can quantify and the subjective impressions that people have when they open their eyes."

More information: *Trends in Cognitive Sciences*, Cohen et al.: "What is the bandwidth of perceptual experience?"

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