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UC Berkeley scientists take a closer look at human vision



JOSH KAHEN/STAFF

A recent UC Berkeley study reveals that people's perception of an object's location and size differs from individual to individual.

BY [ANNIKA RAO](#) | STAFF

LAST UPDATED JULY 16, 2020

From dodging cyclists on the walk to class to playing Ultimate Frisbee on Memorial Glade, people rely every day on the ability to rapidly judge space — but a recent Berkeley study found that vision may not be as dependable as previously thought.



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paper's lead author and campus doctoral student, in an email. "Our study suggests that every one of us has our own unique biases that make us disagree with the location or the size of an object at a quick glance."

The spark that drove the project was Wang's love of tennis, Wang said. Having long wondered how players such as Roger Federer or Serena Williams could so rapidly pinpoint the location of an incoming ball, she decided to investigate the ability to localize objects after starting her graduate career at UC Berkeley's Whitney Laboratory.

Composed of three experiments, the study sought to quantify the concept of a unique visual "fingerprint."

In the first experiment, meant to gauge clockwise or counterclockwise distortion, the data revealed that each participant had a distinct, fairly predictable pattern of visual misjudgment.

The first experiment also mapped observer-specific regions of "expanded" and "compressed" areas in the observer's field of view, areas where objects separated by the same distance were perceived to be farther apart and closer together, respectively.

The second experiment revealed that accuracy was higher in areas of visual compression, while the third experiment showed that the perception of an object's size depended on its location in the visual field, namely whether it was in an area of expansion or compression.

The ability to localize objects is key to far more than just sports. Drivers are bombarded by rapidly changing visual data on the road, for example, and according to the study, even a minuscule shift in the location of a vehicle or a pedestrian could result in a "catastrophic collision."

Although the study's data is statistically significant, campus optometry professor Martin Banks said he is not sure how large an impact the research will have, as scientists have investigated the distortion of perceived space as far back as the 19th century.

Wang and her colleagues, however, plan to take advantage of modern brain imaging technology to discover how neural variations produce differences in visual perception.

"A lot of everyday activity depends on our ability to accurately localize objects," Wang said in the email. "Our research helps to quantify the individual visual biases and opens up the possibility to later on seek specific trainings for each individual."

Contact Annika Rao at arao@dailycal.org and follow her on Twitter at [@annikyr](https://twitter.com/annikyr).

 [David Whitney](#), [Martin Banks](#), [Memorial Glade](#), [Whitney Laboratory](#), [Zixuan Wang](#)



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