

# Scientists discover speed of visual perception ranges widely in humans

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Using a blink-and-you'll-miss-it experiment, researchers from Trinity College Dublin have discovered that individuals differ widely in the rate at which they perceive visual signals. Some people perceive a rapidly changing visual cue at frequencies that others cannot, which means some access more visual information per timeframe than others.

This discovery suggests some people have an innate advantage in certain settings where response time is crucial, such as in ball sports, or in competitive gaming.

The rate with which we perceive the world is known as our "temporal resolution," and in many ways it is similar to the refresh rate of a computer monitor.

The researchers, from the Department of Zoology in the School of Natural Sciences and the Trinity College Institute of Neuroscience, found that there is considerable variation among people in their temporal resolution, meaning some people effectively see more "images per second" than others.

To quantify this, the scientists used the "critical flicker fusion threshold," a measure for the maximum frequency at which an individual can perceive a flickering light source.

If the light source flickers above a person's threshold, they will not be able to see that it is flickering, and instead see the light as steady. Some participants in the experiment indicated they saw the light as completely still when it was in fact flashing about 35 times per second, while others were still able to perceive the flashing at rates of over 60 times per second.

Clinton Haarlem, Ph.D. Candidate in the School of Natural Sciences, is the first author of the article that has been published in *PLOS ONE*. He said, "We also measured temporal resolution on multiple occasions in the same participants and found that even though there is significant variation among individuals, the trait appears to be quite stable over time 'within' individuals."

Though our visual temporal resolution is quite stable from day to day in

general, a post-hoc analysis did suggest that there may be slightly more variation over time within females than within males.

"We don't yet know how this variation in visual [temporal resolution](#) might affect our day-to-day lives, but we believe that [individual differences](#) in perception speed might become apparent in high-speed situations where one might need to locate or track fast-moving objects, such as in ball sports, or in situations where visual scenes change rapidly, such as in competitive gaming," added Clinton Haarlem.

"This suggests that some people may have an advantage over others before they have even picked up a racquet and hit a tennis ball, or grabbed a controller and jumped into some fantasy world online."

Andrew Jackson, Professor in Zoology in Trinity's School of Natural Sciences, said, "What I think is really interesting about this project is how a zoologist, a geneticist and a psychologist can all find different angles to this work. For me as a zoologist the consequences of variation in [visual perception](#) likely has [profound implications](#) for how predators and prey interact, with various arms-races existing for investment in brain processing power and clever strategies to exploit weaknesses in one's enemy."

Kevin Mitchell, Associate Professor in Developmental Neurobiology in Trinity's School of Genetics and Microbiology, and the Trinity College Institute of Neuroscience, added, "Because we only have access to our own subjective experience, we might naively expect that everyone else perceives the world in the same way we do. Examples like color blindness show that isn't always true, but there are many less well known ways that perception can vary too.

"This study characterizes one such difference—in the 'frame rate' of our visual systems. Some people really do seem to see the world faster than

others."

**More information:** *PLoS ONE* (2024). [DOI: 10.1371/journal.pone.0298007](https://doi.org/10.1371/journal.pone.0298007)

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