Why it doesn't get dark when you blink

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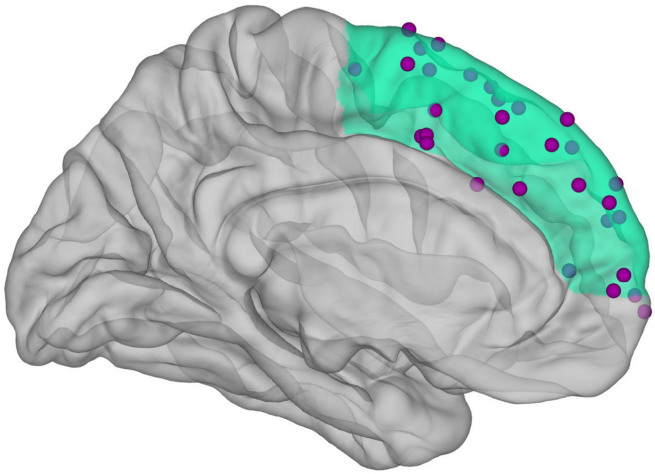

Graphical representation of the human brain. The medial prefrontal cortex is highlighted in green. It shows the places where brain activity was measured. Credit: Caspar M. Schwiedrzik

People blink every five seconds. During this brief moment, no light falls on the retina, yet people continue to observe a stable picture of the environment with no intervals of darkness. Caspar Schwiedrzik and Sandrin Sudmann, neuroscientists at the German Primate Center and the University Medical Center Göttingen and colleagues from the United States have performed studies on epilepsy patients to determine where this perceptual memory is situated in the brain, and how it works. They have identified a brain area that plays a crucial role in perceptual memory. This finding enables a better understanding of the interaction of perception and memory. The study is published in*Current Biology*.

Despite blinking, people still see the world as a stable, unified whole. It must therefore be possible for the brain to retain visual information for a short period of time and then put it together to form a conclusive image without interruptions. Caspar Schwiedrzik and his team of neuroscientists suspected that the medial prefrontal cortex, which plays an important role in short-term memory and decision-making, may be a key player in this process.

At New York University, scientists had the opportunity to study this region of the brain in patients with epilepsy. To treat the disease, electrodes were temporarily implanted in the brains of these patients. Subjects were shown a dot lattice on a screen and were asked to indicate their perception of the vertical or horizontal orientation of the points. They were then shown a second dot lattice and were asked to indicate the orientation of the points. If both orientations were the same, this was interpreted as an indication that the subjects used the information from the first round to establish a conclusive percept in the second round. While the subjects performed the task, neural activity in the prefrontal cortex was recorded. In one of the subjects, a section of the superior frontal gyrus was removed due to an earlier illness, and she was unable to store the visual information.

"Our research shows that the medial prefrontal cortex calibrates current visual information with previously obtained information, and thus enables us to perceive the world with more stability, even when we briefly close our eyes to blink," says Caspar Schwiedrzik, first author of the study and scientists at the German Primate Center and at the University Medical Center Göttingen. This is not only true for blinking, but also for higher cognitive functions. "Even when we see a facial expression, this information influences the perception of the expression on the next face that we look at," says Schwiedrzik.

"We were able to show that the prefrontal cortex plays an important role in perception and in context-dependent behavior," says Schwiedrzik, summarizing the findings of the study. In further studies, the researchers want to investigate, among other things, the role that confidence in one's own perception plays in perceptual memory.

More information: Caspar M. Schwiedrzik et al.

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