Neuroscientists have gained new insight into how the brain predicts missing visual information

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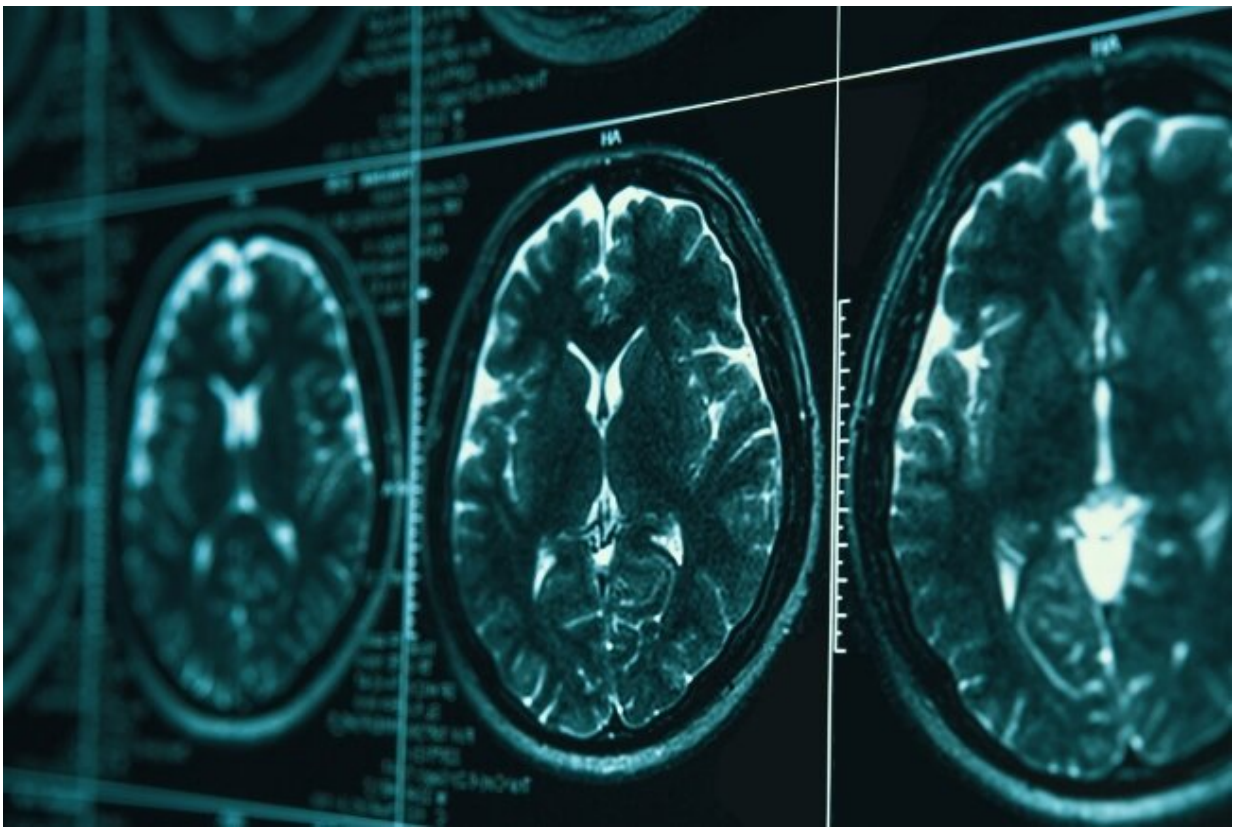

Credit: University of Glasgow

Neuroscientists at the University of Glasgow have gained new insight into how the brain predicts missing visual information when perceiving

the outside world.

The researchers, from the University's Institute of Neuroscience and Psychology, discovered that our brains "sketch out" portions of scenes that are not visible—much like how an artist sketches out a scene before filling the remaining details.

The study, published in the *Journal of Neuroscience*, reveals that the brain's early processing stages act as a sketchpad for the mind to predict missing or difficult-to-see information.

To conduct the research, the scientists looked at the visual cortex—the part of the brain that processes information acquired by our eyes, which is then transported to the brain through feedforward connections, allowing us to perceive the world around us.

However, internal connections from parts of the brain that conceptualize and contextualize are required to understand what we are seeing. Scientists have been eager to understand how these internal connections, called feedback, not only contextualize the world around us, but predict it as well.

The scientists' solution was to use recorded visual predictions from people that viewed scenes with missing visual information while in an MRI machine. They then modeled visual predictions using line drawings.

Professor Lars Muckli, from the University of Glasgow's Centre for Cognitive Neuroimaging, said: "Until now, it has proven difficult to develop models of how our brains predict objects and scenes we are not able to see, such as when objects are partially hidden or when it is difficult to see during the night.

"This knowledge brings scientists one step closer to understanding the

brain's internal predictions about the world around us."

The paper, Scene representations conveyed by cortical feedback to early visual cortex can be described by line drawings," is published in the *Journal of Neuroscience*.

More information: Andrew T. Morgan et al. Scene representations conveyed by cortical feedback to early visual cortex can be described by line drawings, *The Journal of Neuroscience* (2019). DOI: 10.1523/JNEUROSCI.0852-19.2019

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