

# Eyes in the back of the head

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Experimental setup to investigate implicit learning of surroundings. Credit: Tohoku University

Spatial representations of surroundings, including those outside the visual field, are crucial for guiding movement in a three-dimensional world. The visual system appears to provide sufficient information for movement despite our visual field being limited to the frontal region. However, this theory had not been scientifically tested until now.

A group led by Professor Satoshi Shioiri from the Research Institute of Electrical Communication at Tohoku University in Japan, used a visual search experiment to demonstrate that the human visual system indeed has the ability to perceive things beyond the limits of the [visual field](#). The team designed a 6-panel-display which covered the 360-degree area surrounding the viewer. On each panel display, six letters appeared at the same time.

The viewer was asked to find a particular letter and the time it took to find the target was recorded. After repeated exposure to the same spatial layouts surrounding the viewer, locating the target object became faster even if the viewer had no [explicit knowledge](#) of the repetition. This happened even when the target object was located in the rear, which shows that visual processing is not limited to the visual [field](#), but extends to a wider field around the viewer.

The results indicate that representations of surroundings exist in the brain that can be used to "look back" without the need for turning, perhaps for smooth and efficient movement. In other words, our brain constructs a 360-degree world even though visually we are usually only aware of the area in front of us.

This is the first study that has scientifically sought to demonstrate this [spatial ability](#). It is an important step for revealing the brain function which links perception and movement.

**More information:** Satoshi Shioiri et al. Spatial representations of the viewer's surroundings, *Scientific Reports* (2018). [DOI: 10.1038/s41598-018-25433-5](#)

Provided by Tohoku University

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