Brain mechanism that links memory and location now proven

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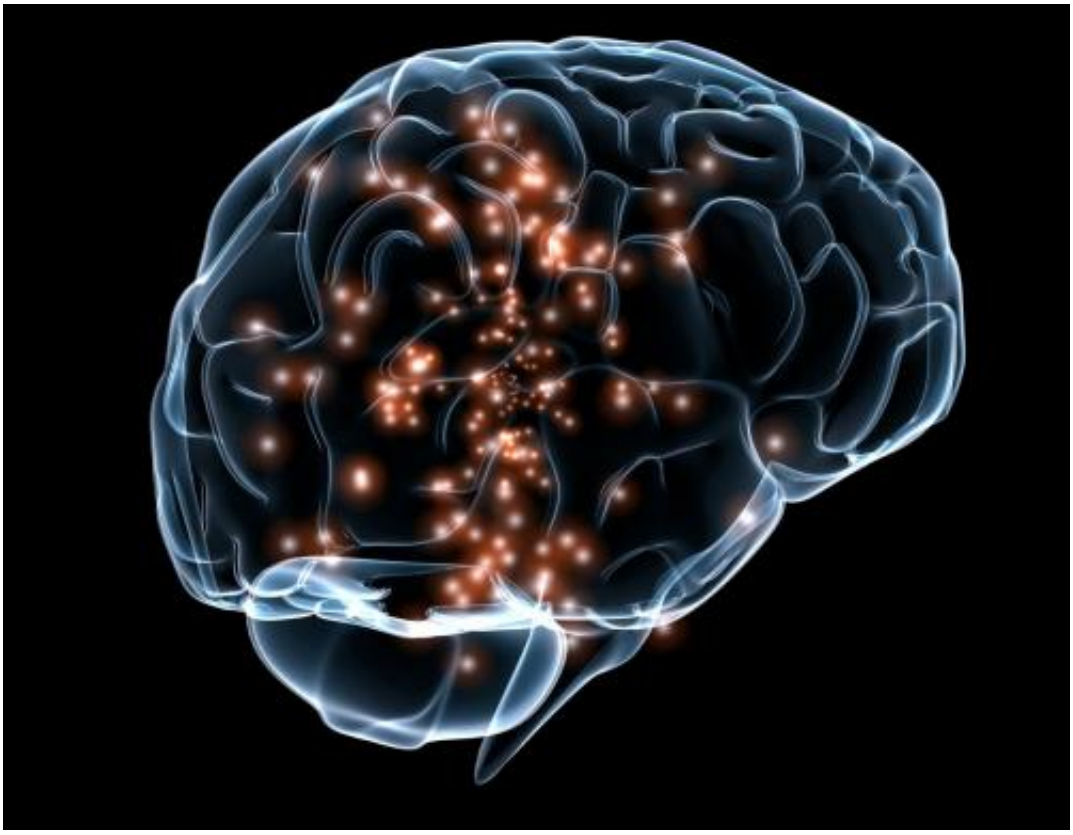

Credit: Wikimedia Commons

You arrive at a certain location and you suddenly remember what you were doing when you were there years ago. Memory and location are closely linked. Researchers at Radboud University's Donders Institute have revealed the brain mechanism that makes this link. The *Current*

Biology journal published their results on June 24.

In 2005, neuroscientists discovered how special brain cells in rodents react to locations and their context. These so called place cells are located in the hippocampus, a brain area closely linked to memory and spatial navigation. Computational models suggest that hippocampal memories are retrieved when a given input is sufficiently similar to a 'stored' state. Only when the new input fits an existing one, the accompanying memories are retrieved. The current research led by Christian Doeller at the Donders Institute is the first to demonstrate this mechanism in humans.

Slight differences in virtual reality

Twenty test subjects walked through different virtual reality environments while lying in the MRI scanner, where they had to memorise the location of certain objects. Some environments showed slight differences, while others were very distinct (see Figure 1). Although the visual system recognised and reacted to all differences, the hippocampus only responded when two environments were different enough: there was a threshold.

Why is that? "Where small details and differences are of great interest and importance to our visual system, the hippocampus needs to focus on the bigger picture and integrate information from many different sources" says neuroscientist and collaborator of the publication Tobias Navarro Schröder. "That is probably the reason why cells in the hippocampus react differently to small differences in our surroundings than cells in the visual cortex."

"Especially the link between behaviour and brain activation patterns is very important in our current study. Fundamental knowledge on this process is relevant for neuroscientific research on decision making, and

in the context of psychotherapy for instance, to unlearn undesirable associations."

More information: Ben Steemers et al. Hippocampal Attractor Dynamics Predict Memory-Based Decision Making, *Current Biology* (2016). DOI: 10.1016/j.cub.2016.04.063