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Brain imaging study reveals our brains 'divide and conquer'

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University of Queensland (UQ) researchers have found human brains 'divide and conquer' when people learn to navigate around new environments.

The research by UQ's Queensland Brain Institute (QBI) could provide hope for people with spatial memory impairments.

The study found that the mental picture people create to help navigate to a new location is split into two sections.

The size of the environment is coded by one area of the brain and its complexity is coded in another.

QBI postdoctoral research fellow and lead researcher Dr Oliver Baumann said the work shed new light on how learning the layout of a new environment, and then accessing this information from memory, was represented in the brain.

"We've known for some time that a part of the brain called the hippocampus is important for building and maintaining cognitive maps," he said.

"The results of our study have shown for the first time that different aspects of a learned environment – specifically its size and complexity – are represented by distinct areas within the hippocampus."

QBI Cognitive Neuroscience Laboratory Head Professor Jason Mattingley said the findings could have important implications for people suffering from spatial memory impairments.

"This research is important for understanding how our brain normally stores and manages spatial information," Professor Mattingley said.

"It also gives us clues as to why people with memory loss due to Alzheimer's disease often become lost in new or previously familiar surroundings."

Dr Baumann said 18 people navigated their way through three virtual mazes that differed either in the number of corridors through which they could travel or the length of the corridors.

After learning the task, the participants were asked to recall mental maps from each of the mazes while their brain activity was measured using functional magnetic resonance imaging.

"We found that one region in the hippocampus was more active when participants recalled a complex maze in which there were many corridors to choose from, irrespective of the overall size of the maze," Dr Baumann said.

"Conversely, we found that a separate area of the hippocampus was more active when the overall size of the maze increased, regardless of the number of corridors."

The study, "Dissociable representations of environmental size and complexity in the human hippocampus", is published in The *Journal of Neuroscience*.

More information: www.jneurosci.org/content/33/25/10526.abstract

Provided by University of Queensland