Scientists find link between clear memories, brain connectivity

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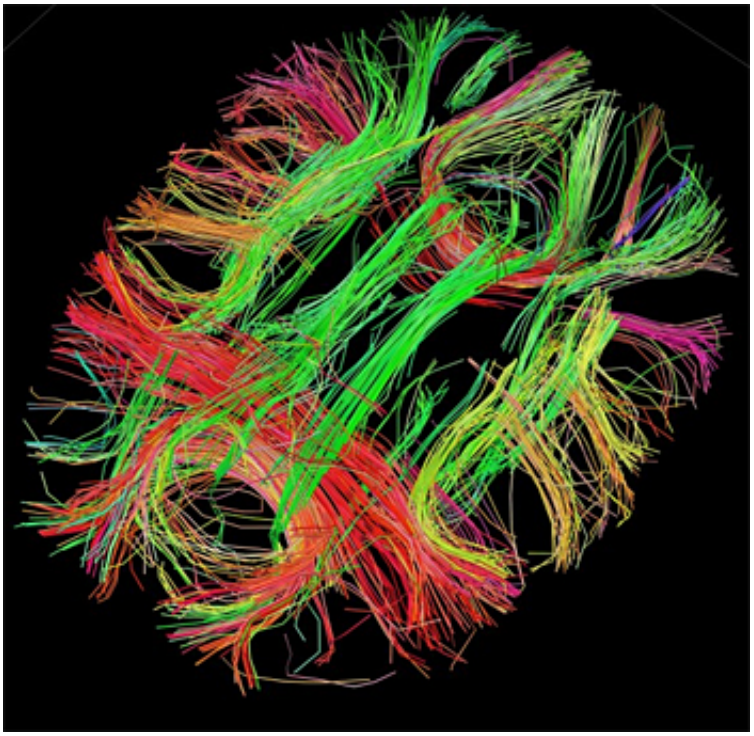

White matter fiber architecture of the brain. Credit: Human Connectome Project.

Research from the Center for Vital Longevity (CVL) at UT Dallas sheds new light on how memories are successfully recollected.

Using data from three independent experiments, the research identifies a set of regions in the brain that consistently showed increases in their

connectivity with other regions as an event was being successfully recollected. The findings were published last month by the *Journal of Neuroscience*.

"These findings identify a new and potentially important brain signature of successful recollection," said Dr. Michael D. Rugg, professor in the School of Behavioral and Brain Sciences and co-director of the CVL. "They may have important implications for the understanding of memory impairment in a number of clinical conditions, as well as age-related memory decline."

Successful recollection refers to when qualitative details of an event can be recalled, as opposed to familiarity- or gist-based recognition, which constitutes vague memories, such as feeling as if you've met someone before but not remembering where.

As participants tried to remember events, researchers measured changes in connectivity in a set of their brain regions, known as a core recollection network, with functional magnetic resonance imaging. The network comprises the left angular gyrus, the medial prefrontal cortex, the posterior cingulate cortex, the hippocampus and the middle temporal gyrus.

"We reasoned that by examining how these areas show increases in connectivity with regions throughout the rest of the brain during successful recollection compared with unsuccessful recollection, we might gain additional insight into the neural mechanisms underlying memory processes," said Dr. Danielle King, the study's lead author and a postdoctoral scientist in Rugg's lab.

Researchers first wanted to determine which brain regions showed consistent changes in activity as events were remembered. They then measured changes in connectivity between the regions and the rest of the

brain.

They found that a consistent set of brain regions, which were widespread and extended well outside the core recollection network, showed recollection-related increases in connectivity with regions in the network. In addition, individuals who showed greater memory-related increases in connectivity performed better on memory tasks.

More information: "Recollection-Related Increases in Functional Connectivity Predict Individual Differences in Memory Accuracy." *Journal of Neuroscience*, 28 January 2015, 35(4): 1763-1772; DOI: 10.1523/JNEUROSCI.3219-14.2015

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