Decodability of Short-term and Long-term Visual Memory Categories Using fMRI

Hyerin Lim¹, Jung Hwa Lee², Dae-Shik Kim¹
¹Dept. of Electrical Engineering, KAIST
²School of Arts and Social Science, University of Sydney
E-mail: hyerinlim@kaist.ac.kr, jennifer@arnoldbolingbroke.com.au, dskim@ee.kaist.ac.kr

Abstract:
How does the brain discriminate between perceived and memorized categorical information? In the present study we used fMRI based decoding technique to compare the decodability of re-imagined visual object categories in the absence of visual stimuli. To this end, visual short-term memory (vSTM) denotes the activity elicited in the brain immediately following the presentation of visual stimuli. In contrast, visual long-term memory (vLTM) indicates the activity of the brain retrieved from the long LTM. We investigated whether categorical information can be obtained from vLTM and whether brain representations of vSTM and vLTM are different using multi-voxel pattern analysis (MVPA). In conclusion, the present study shows that the category information was poorly decoded for imagined objects from LTM in the ventral-temporal cortex in contrast with vSTM. However, identification accuracy within vLTM was higher in the hippocampus and superior parietal lobe which are known to participate in episodic memory compared to the visual area.

Keyword: long-term memory, short-term memory, MVPA