

Evidence of a Novel Form of Long-term Visual Memory

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Introduction

Memory deficits play a core role in many neurodegenerative, psychiatric and traumatic disorders. Repeated training enables motor skills and associations to be maintained in memory long after learning. Here, in contrast, we demonstrate a distinct form of long-term memory that enables visual patterns to persist in memory over prolonged durations but which also functions to prevent false-positive detection by proactively inhibiting ongoing learning.

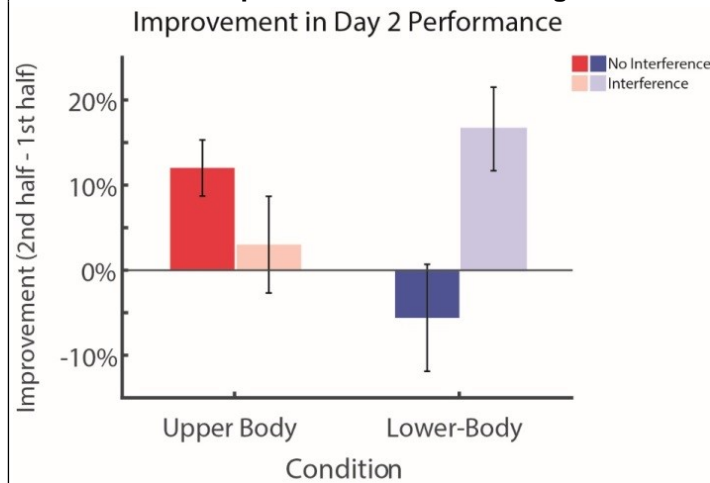
Methods

We devised a visual search paradigm that required participants to search for particular items from other similar items presented on a screen. Two orthogonal categories of items were presented: (i) summer vs. winter clothing and (ii) upper vs. lower body clothing. The subjects were always asked to identify the summer clothing item. For the first experiment subjects searched for both upper- and lower-body items on the same day. In the second experiment, subjects searched for an upper-body clothing item on the first day of testing, and on the second day searched for both upper- and lower-body items. The third experiment was identical to the second except that subjects were given an interference search task immediately following training on the first day.

Learning Objectives

- 1) Visual search is influenced by both short- and long-term memory processes.
- 2) Initial learning with one visual category leads to suppression of learning of another visual category.
- 3) Interference of initial learning prevents suppression of learning another visual category.

Figure 1. Effects of interference in long-term visual search performance and learning.



Subjects who perform the interference task (Experiment 3) demonstrate significant improvement during the course of Day 2 for the novel lower-body visual search task. In contrast, subjects who do not perform the interference task (Experiment 2) demonstrate a significant decrease in learning on the novel lower-body search task, both when compared to their own improvement on the familiar upper-body search as well as in comparison to the learning of the interference group during lower-body visual search.

Results

We found that searching for items of a particular category can improve performance in the long term. We also found that prior learning led to suppression of performance when searching for novel subordinate-level items within the same category. Introduction of an interference task following training did not lead to reduced performance for the initially trained item but rather prevented the suppression of performance improvement for the new items.

References

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