

MemoryMonitor: A real-time neuroscientific-learning monitor that knows if you will remember something you see

Summary

We all wish that we could know if we were going to later remember something, the moment that new information enters our brain. For example, if we could predict whether our children would later remember a vocabulary word, then we could have them spend more time on the words they will not remember.

A group of neuroscientists at Vanderbilt University has developed a way of measuring and analyzing brain activity that achieves this goal of predicting later memory as we study and view new information. The procedure involves measuring brainwaves from just two electrodes on the head as people view pictures, words, or virtually any kind of information that a person hopes to remember later.

Our experiments have shown that with just these two electrodes and measuring two types of brain activity, we can determine which pieces of information will be remembered hours later, and which are likely to be forgotten. The algorithms are concise and efficient so that these measures can be analyzed real-time to alert the learner and/or put that unlearned information back into the training set.

The measures could also be used to screen large sets of marketing material to determine which will be the best remembered. These signals are independent of the nature of the to-be-remembered information, and instead purely index the quality of memory encoding independent of the brightness, color, or meaning of the piece of to-be-remembered information.

Technology Description

The group's research establishing the feasibility of this approach shows that multiple metrics of memory encoding can be measured simultaneously real-time (patent pending). By combining these measures immediately following the onset of a piece of information we can estimate the likelihood that you will remember that information hours later. These metrics are efficiently computed during the first 1.25 seconds after a to-be-remembered image is presented so that they can provide real-time feedback about learning, or be used to reinsert that piece of information back into the training set at a later time. We have recently developed a version of this system that uses a couple of electrodes that are wirelessly streamed to a laptop for analysis and integration with the presentation of the to-be-remembered information.

Needs Addressed

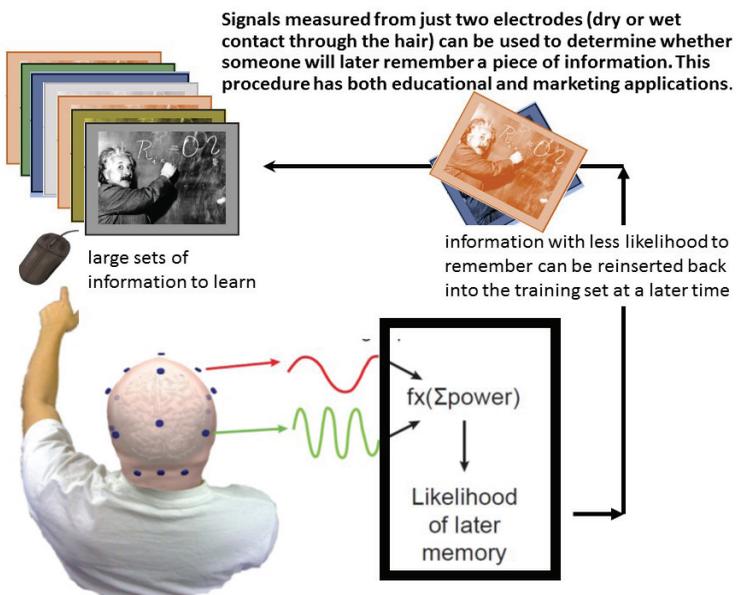
- » Allows a learner to know that they have encoded a new piece into memory that will be accessible when needed hours or even days later
- » Can provide immediate feedback about whether something is likely to be forgotten or remembered. Could also be used to compute a continuous measure of how easily remembered each piece of information will be later (i.e., for marketing purposes)
- » Easily adapted for people of any age
- » Functional using wireless data acquisition, streamed to a laptop, table, or smartphone for analyses and representation of to-be-remembered information

Technology Development Status

- » Software implemented and tested with data collected from 20 participants across 500 trials.
- » Peer reviewed publication: Predicting and Improving Recognition Memory Using Multiple Electrophysiological Signals in Real Time, Keisuke Fukuda and Geoffrey F. Woodman; Psychological Science July 2015 vol. 26 no. 7 1026-1037
- » Patent application has been filed

Partnering Opportunity

- » Vanderbilt seeks a commercial partner for transitioning this technology from the lab to the marketplace
- » Available for licensing and research collaborations
- » Visit Vanderbilt Visual Cognitive Neuroscience Lab www.psy.vanderbilt.edu/faculty/woodman/Lab.html



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Link to Vanderbilt technologies available for partnering

