Try not to forget this one

This study uses visual experiences and an instruction to disregard them in order to activate memory processing.

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This experiment was done in order to test and observe what regions of the brain are activated or inhibited in intentional forgetting and how the brain would respond to the instruction of either remembering or forgetting a visual presentation. An enhancement of memory processing in the sensory cortex is necessary in order to intentionally forget recent visual occurrences. In a recent study, Wang, Placek, and Lewis-Peacock pursued an experiment to test the activation of the ventral temporal cortex when subjects were instructed to deliberately forget a visual representation and whether or not the instruction would cause memories to weaken and be forgotten. An enhancement of memory processing in the sensory cortex is observed when participants are told to forget a visual experience rather than when they are instructed to remember it. The results of this experiment display an increase in memory processing after a TBF (to be forgotten) item compared to a TBR (to be remembered) item.

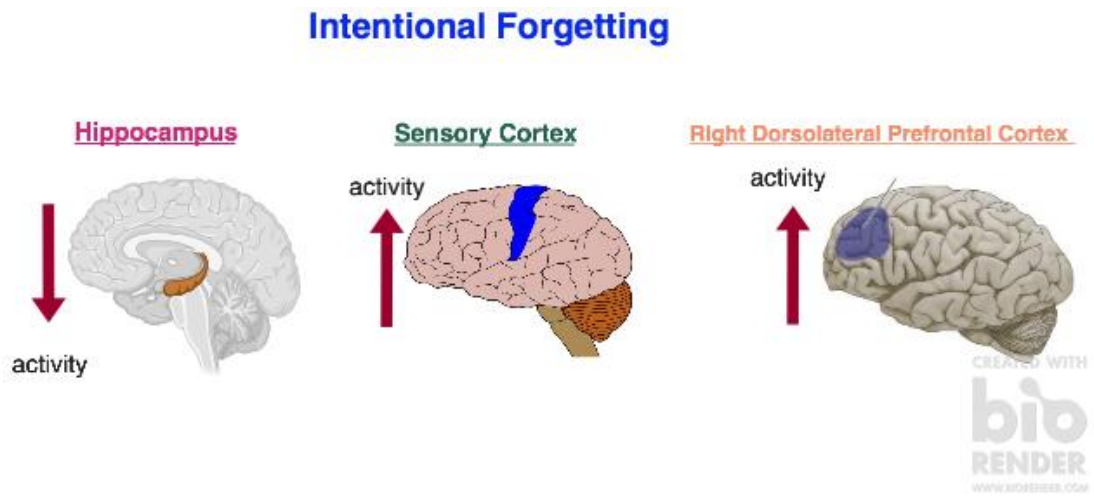

Figure 1. To intentionally forget a visual experience, memory processing in the sensory cortex must be enhanced, along with an increase in the activity of the right dorsolateral prefrontal cortex and a decrease in activity in the hippocampus.

Forgetting is a feature of the mind in which information that is not relevant, or that is no longer needed is removed – allowing one to retain necessary and important information[2]. The brain is capable of automatically erasing unnecessary information, but people can also do this voluntarily[3]. Inhibitory processes in the frontal region of the brain allow for suppression of such memories. In

other terms, in order to successfully forget new memories, an increase in activity in the right dorsolateral prefrontal cortex and a decrease in the activity of the hippocampus is needed (Figure 1).

Functional magnetic resonance imaging (fMRI) was used to collect data from an experiment in which twenty-four male and female participants looked at various images (faces, and scenes) and were told to either remember (TBR) or to forget (TBF) the given image. Pattern classifiers were used to decode the human fMRI. Three phases were conducted for each of the participants in order to complete the experiment. The first two, which were done in the MRI scanner were the localizer phase, and the encoding phase. The third phase – recognition – was performed away from the scanner. In the first phase, subjects were presented with various images and were instructed to respond whether each image had previously been shown or not. In the encoding phase, subjects were presented with images and instructed to either remember or to forget them. A total of 252 items were presented. In the third phase, and additional 252 images were added to the list and subjects were given a recognition memory task in which they had to give confident judgements of 'definitely old, probably old, probably new and definitely new' to the images presented. A 'definitely old, probably old' response meant that the image was previously seen by the given subject[1].

When accounting for the results of the given experiment, the focus remained on the activity in the ventral temporal cortex – an input to convergence zones responsible for long-term memory storage. Higher levels of memory processing were observed in the ventral temporal cortex when participants were told to forget the visual experience. Identification of images followed by a TBF instruction was high for faces, and for scenes (97.7% and 98.0%, respectively). An increase in the activity of the dorsolateral prefrontal cortex, posterior cingulate and precuneus was observed when images were successfully forgotten. These results were consistent with previous studies done by Wyile and Rizio and in conjunction with the notion that intentional forgetting involves a certain amount of memory activation which helps in forgetting. The data collected also revealed that forgetting was most successful when moderate levels of memory activation were heightened. When mental representation of a visual experience is boosted, the result is memory weakening through local inhibitory processes in neural activity and its homeostatic regulation.

This study shows that memory was retained more after a TBF instruction rather than a TBR instruction, which indicates that increased memory processing was involved in TBF items. Since forgetting requires more memory processing, the 'forgotten' items became more distinct when shown again. These results have been predicted by other research – such as the NMPH – but also present intentional forgetting as an effortful cognitive process[1]. Altogether, this study showed that in order to forget an item, or to weaken an unwanted memory, its level of activation should be raised rather than lowered. The results of this study are somewhat significant. Even though the results of this experiment have already been shown in previous studies – such as the one done by the NMPH – they help to concrete findings of how memory is processed and retained. One weakness seen in this study is that the TBR items might not have been remembered as well due to the large amount of TBR items that were displayed to the participants – one after another[1]. Disregarding such weaknesses, what stood out in this experiment is how memory was retained based on given instructions and how much more memory activation is needed in the TBF instruction.

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