

# Making Memories: Brain Activity that Predicts How Well Visual Experience Will Be Remembered

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Brewer, J. B., Zhao, Z., Desmond, J. E., Glover, G. H., & Gabrieli, J. D. (1998). Making memories: brain activity that predicts how well visual experience will be remembered. *Science*, 281(5380), 1185–1187.

## Question

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**What was the broad question being asked by this research project?**

- Why are some things remembered and some things forgotten?

**What was the specific question being asked by this research project?**

- What are the neural determinants of remembering/forgetting?

## Alternatives

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**What was the author's hypothesis?**

- **H1:** Activity in the medial temporal lobe (MTL) during encoding will predict later memory.

**What were the alternative hypotheses?**

- **H2:** Activity in the frontal lobes during encoding will predict remembering versus forgetting.

## Logic

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**What was the logic of the hypotheses?**

**If the author's hypothesis is true, what should happen?**

- **If H1, then** there will be more activity in the MTL during memory encoding for items later remembered versus forgotten. That is, activity will be correlated with later memory.
- **If H2, then** there will be more activity in the frontal lobes during memory encoding for items later remembered versus forgotten. That is, activity will be correlated with later memory.

## Methods

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### What were the methods?

6 subjects participated in the fMRI study. In the scanner participants were shown pictures and asked to judge whether each picture depicted an indoor or outdoor scene (memory encoding phase). After scanning, they were given a surprise recognition test. They were shown 96 old and 32 new images and judged whether they had seen the image before. If judged as previously seen, they were also asked whether the judgment was based on a distinct recollection (“remember”) or a less certain feeling of familiarity (“know”).

The encoding data was sorted based on performance on the recognition test to compare subsequently remembered, familiar, and forgotten trials.

## Results

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### What were the important results?

There was greater activity in the left and right parahippocampal cortex and right dorsolateral prefrontal cortex (DLPFC) during the memory encoding phase for images later remembered as compared to images later forgotten. That is, activity in both these brain regions were correlated with later memory for images.

## Inferences

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### What inferences about the hypotheses and questions can be made based on the results?

**Summary:** The results of the experiment are partially consistent with both hypotheses. The results showed regions in both the frontal lobes and medial temporal lobe were correlated with later memory for images. However, more specifically the left and right parahippocampal cortex (in the MTL) and only the right DLPFC showed higher activation. This suggests that these brain regions may interact to form memories during encoding. Furthermore, the lateralized activity (right DLPFC) may be specific to visuospatial images.

**Thinking critically:** If the right DLPFC is activated during successful memory encoding of images (visual stimuli), would we expect the left DLPFC would correlate with later memory for verbal materials?