

## History & Research Methods in Memory & Cognition

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## Phineas Gage

Foreman on a railroad crew working on a line near Cavendish, VT

September 14, 1848

Daguerreotype image of Phineas Gage (owned by Jack and Beverly Wilgus) holding the tamping iron that inflicted his head injury. The tamping iron is now in the Warren Anatomical Museum the Medical School of Harvard University. The life cast (left) and skull (right) are also housed in the Warren Anatomical Museum. Phineas Gage died in 1860 in California at the age of 36 following a series of convulsions. (Epilepsy is a common sequela of an injury to the brain.)

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**Psychology has a short past but a long history.**

*Hermann Ebbinghaus, cited in Boring (1950)*

**Early Contributions to Cognitive Psychology**

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**Understanding the Relation between the Brain and Cognition**

**Paul Broca**

**Carl Wernicke**

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**Speculation about the relation between the brain and cognitive ability**

**Franz Joseph Gall**

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**Who is this man?**  
**Why is he important for cognition?**

H. M. (1926 – 2008)  
Born February 26, 1926  
Died December 2, 2008  
Hippocampus removed 1953  
1962 Milner publication on H.M.'s amnesia  
Photo Credit: New York Times obituary (published December 5, 2008)

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### Location of Hippocampal Lesion in Henry M.

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### Images from the Brain Observatory

Top left image is HM's brain in gelatin prior to freezing.

Other photos are the brain undergoing dissection in the Brain Observatory laboratory.

Visit the Brain Observatory for more information about this research project and to view a short video depicting the sectioning process.

<http://thebrainobservatory.ucsd.edu/content/120209>

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### Studying the Mind: Early Research

Donders (1868) Published research on time required to make different types of decisions

Ebbinghaus (1885) Published book describing research on the time course of forgetting

Wundt – Structuralism and analytic introspection (established first laboratory for psychological research in 1879)

William James (1890) *Principles of Psychology*

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**Early Researchers in Perception**

**Gustav Fechner**      **Wilhelm Wundt**

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**Early Researchers in Perception  
Cognition**

**Donders**                      **Hermann Ebbinghaus**

**William James**              **Mary Whiton Calkins**

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**Ebbinghaus Forgetting Curve**

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### Hard times for studying the mind: Behaviorism

Reaction against the failure of introspection

Redefined psychology as the *study of behavior*

Imposed a methodological rigor on research: *methodological behaviorism*

Constrained the topics of acceptable research

**J. B. Watson**

**Ivan Pavlov**

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### Two faces of behaviorism in the study of operant learning

**B.F. Skinner**

**Edward Tolman**

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### Cognitive Maps

**Tolman's research question:**

Do rats learn to *make a response* or do they learn to *go to a particular place*?

**Research question:**

Do rats learn to make specific responses to stimuli or do they learn the layout of the maze (a cognitive map) and use this knowledge to select efficient routes to food?

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## Psychology in the U.S.

Established first experimental laboratory in Psychology in the U.S.

*The Principles of Psychology* (1890)

- first text book for psychology in the U.S.

**William James**

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## Using our whole brain for processing

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## Cognitive Neuroscience

### Brain lesions

- H.M.
- Aphasias & Amnesias

Link to a digital reconstruction of the brain of HM created from MRI scans.

### Brain Imaging

- PET scan
- MRI

### Functional Imaging

- fMRI
- Event-Related Potentials
- Single-unit recording

<http://thebrainobservatory.ucsd.edu/content/3d-reconstruction-brain-mri-data>

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