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Introduction to Cognitive Neuroscience
Summer 2008

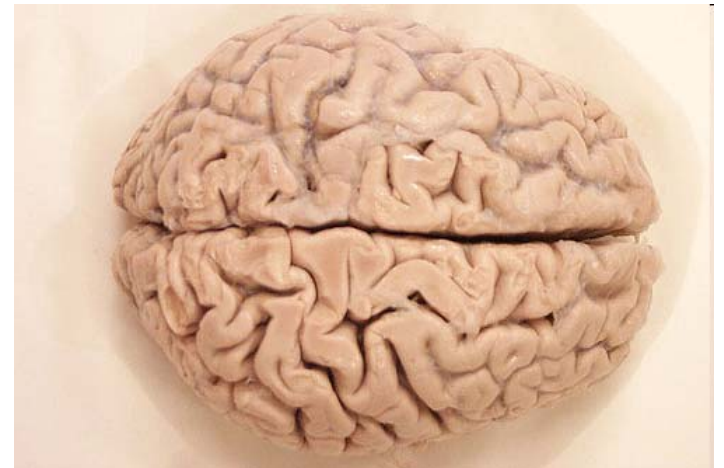
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Intro to Cognitive Neuroscience

Cognition and the study thereof: An overview

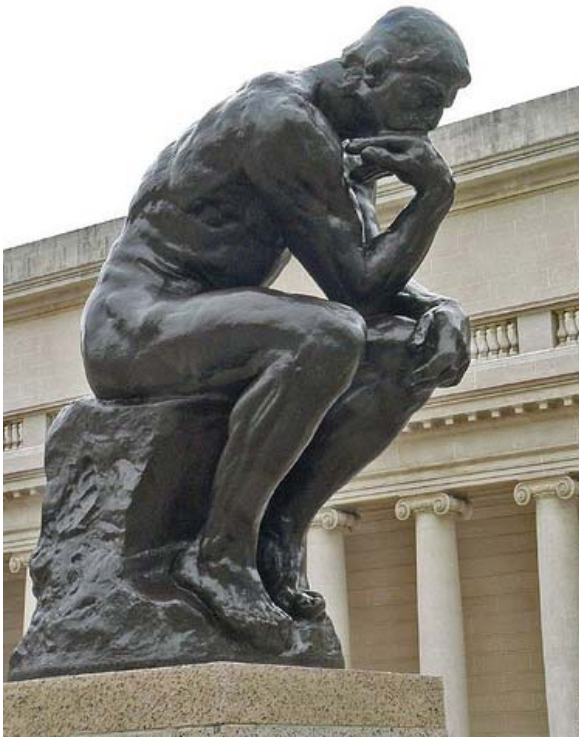
Some definitions

- Cognition - The acquisition, storage, transformation, and use of knowledge.
- Neuroscience - Study of the structure and workings of the nervous system.
- Cognitive neuroscience - Study of how cognitive processes can be explained by the structure and function of the brain.



[Image courtesy of Euskalanato](#)

Cognitive Psychology



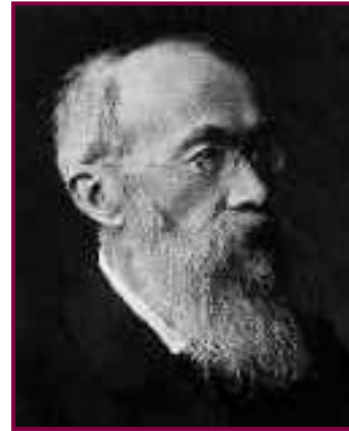
- An approach to studying and explaining behavior that emphasizes mental processes and knowledge.
- Often described as studying the “software” of the brain

The Thinker, Auguste Rodin, 1889.

[Image courtesy of mharrsch.](#)

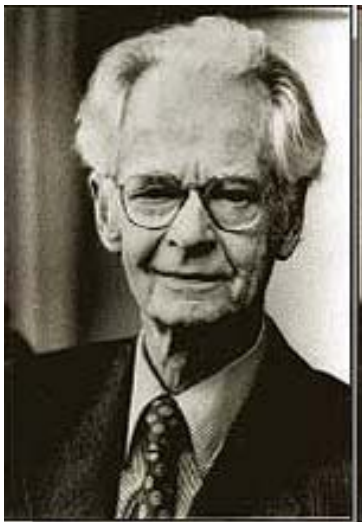
Some history

- Late 19th century, many psychologists worked by introspection



Wilhelm Wundt, 1832 - 1920. "Father of psychology."

[Image courtesy of Wikimedia Commons.](#)



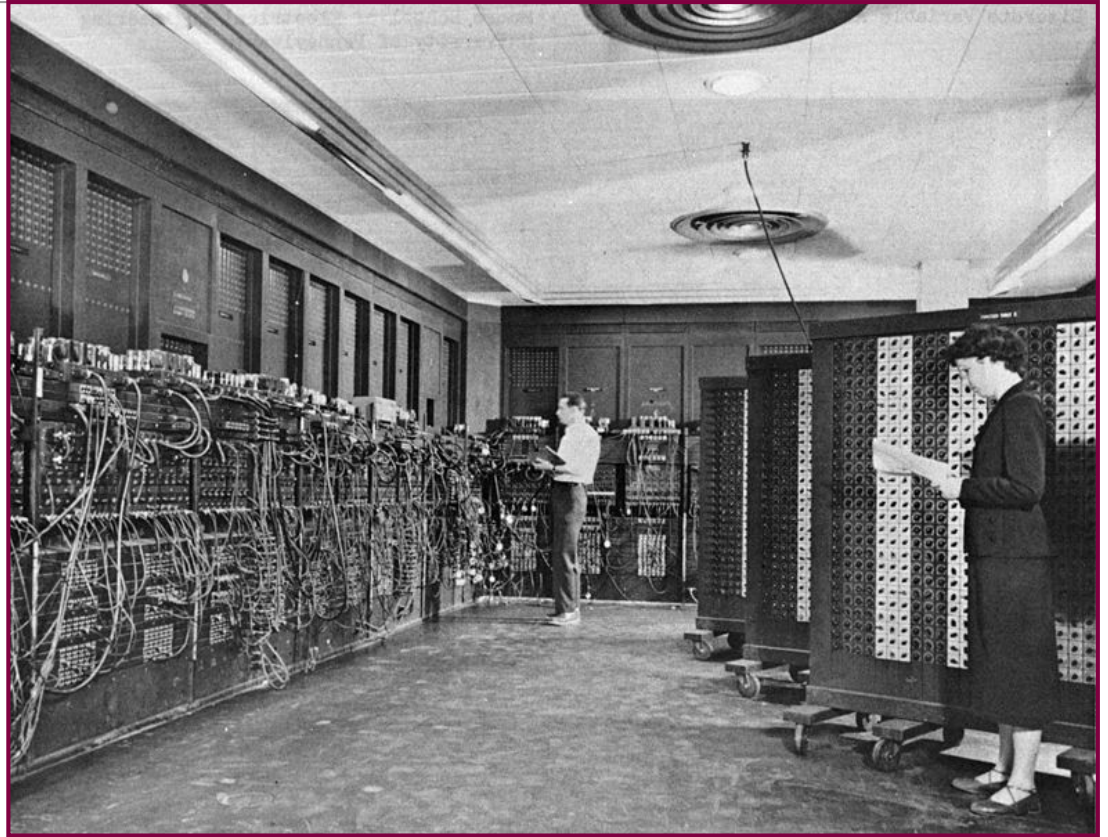
B. F. Skinner, 1904 - 1990.

[Image courtesy of lauradahl.](#)

- Early 20th century, move towards behaviorism - study of objective, observable phenomena.
- Knowledge based in empirical data, rigorous standards for definitions and experiment designs.

Some history

- Growth of computers contributed to success of information-processing approach to cognition.
- Respectable context for discussing mechanisms that produce behavior. (Like software!)



Glen Beck and Betty Snyder program ENIAC, circa 1947 - 1955. [Image courtesy of the U.S. Army.](#)

And today?

- Cognitive psychologists study
 - perception
 - language
 - imagery
 - decision-making
 - learning
 - creativity
 - attention
 - reasoning
 - meta-cognition.
- Almost all psychologists say that mental representations are important in affecting behavior.

Three themes of cognition

1. Cognitive processes are active, not passive.
2. Cognitive processes are interconnected.
3. Most cognitive capabilities use both bottom-up and top-down processing.

Bottom-up vs. top-down

- Bottom-up processing is stimulus-driven.
- Top-down processing is expectation-driven.