

**Cognition
Psychology 215
Emory University
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**Topic 4: Episodic Memory
Lecture 4a: Memory Systems**

Video

In this video, get a sense of the nature and extent of Clive's impairment.

Preface to the next assignment

Imagine what it would be like to be an amnesic. Specifically, imagine that you have lived in the same small town for all 40 years of your life, and that you just became amnesic recently. As is common in amnesia, your amnesia is specific to explicit memory (i.e. your implicit memory has not been affected). Further imagine that you do the following things over the course of a particular day:

- 1. Have breakfast with your family.**
- 2. Go to church after breakfast.**
- 3. Go to a popular neighborhood restaurant for lunch.**
- 4. Play with your children in the park.**
- 5. Receive a phone call from an old friend you knew in school but whom you haven't seen for many years.**
- 6. Write in your diary.**

You do not have to include all of the activities listed above, but do include at least three.

Describe in detail your experiences, including any incidents that occur, thoughts you have, challenges and problems you face, and so forth. You can take either one of two points of view:

- (1) the amnesic (first person)
- (2) a neuropsychologist who is spending the day with the amnesic to help develop treatment (third person)

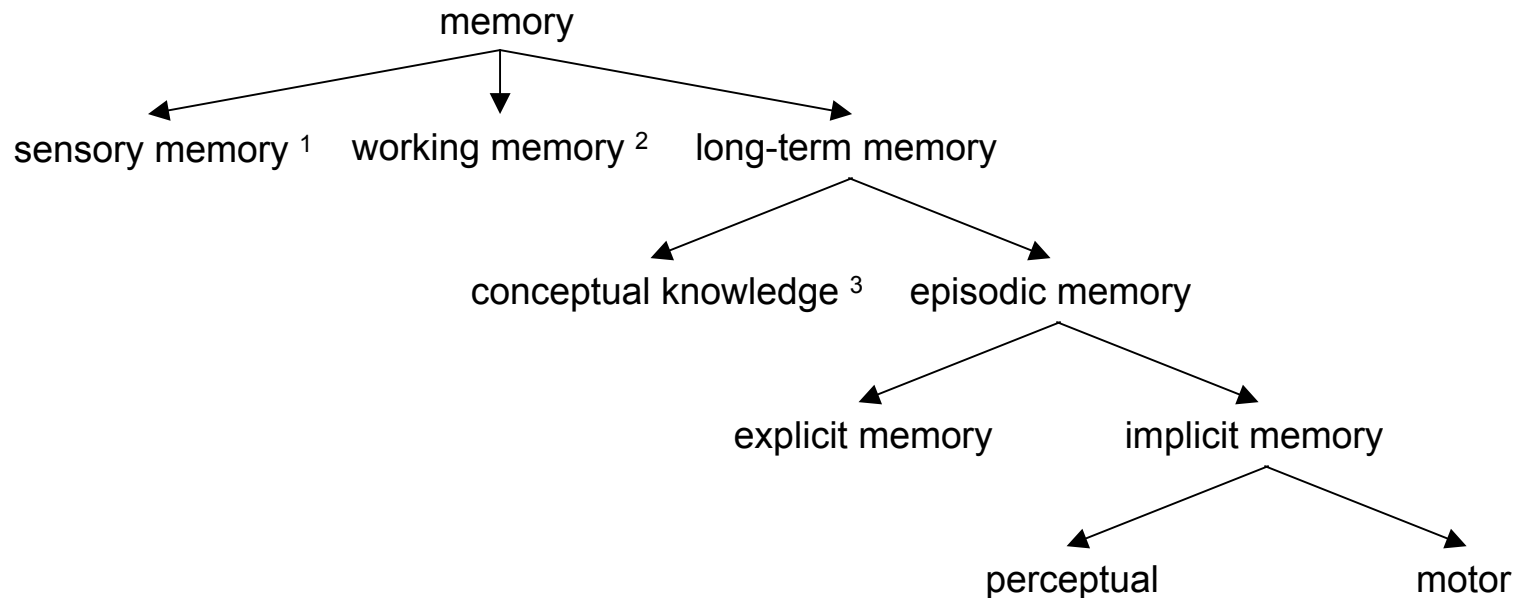
In other words, write your assignment as if you were either the amnesic or the neuropsychologist.

Memory Systems

- **amnesic patients' ability to function results from the fact that the brain contains somewhat separable memory systems**
- **to understand such patients and others, we need to understand the nature of these systems**
 - **this is the topic of this lecture**
- **after going through the various memory systems, we'll show how this overall system leads to other types of memory deficits besides amnesia**

Memory systems Overview

- **functional analyses of memory systems**
 - **distinguishing memory systems by the type of memory (what they do)**
- **neural mechanisms underlying memory systems**
- **localizing a memory system in the brain**



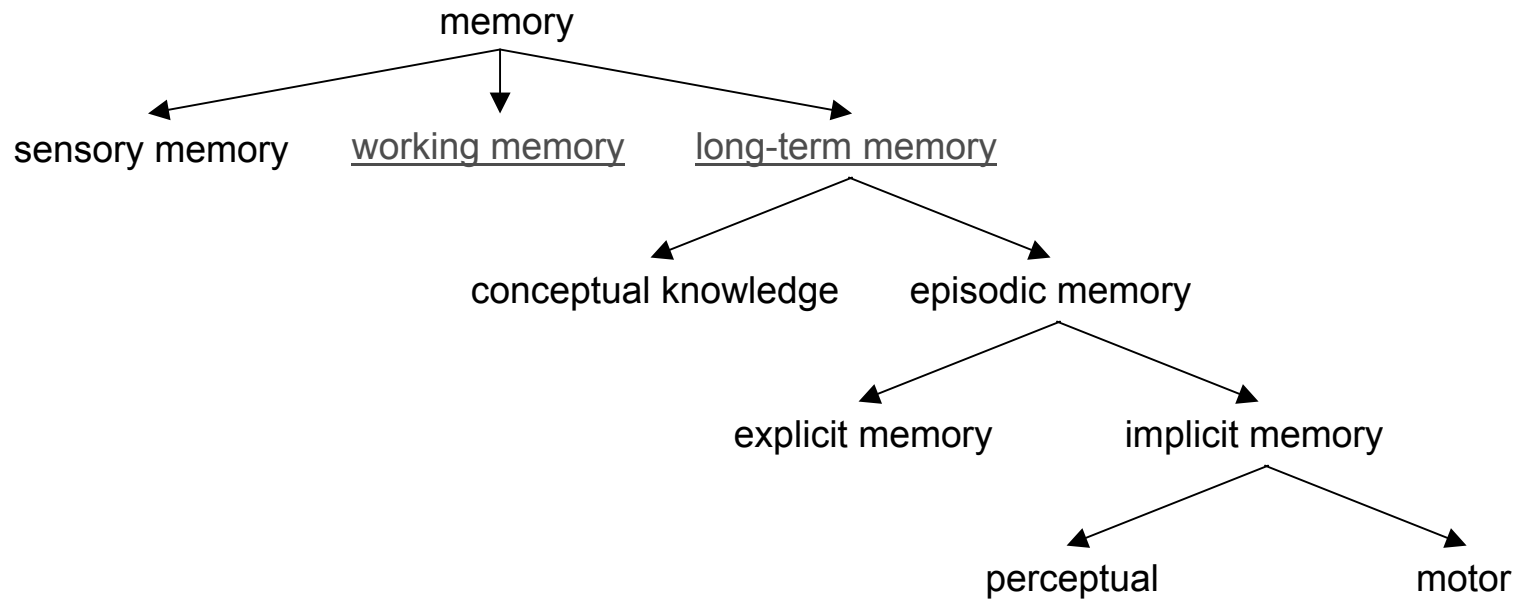
¹ not considered here further; see texts

² also called “short-term memory”

³ also called “semantic memory”

Working memory vs. long-term memory

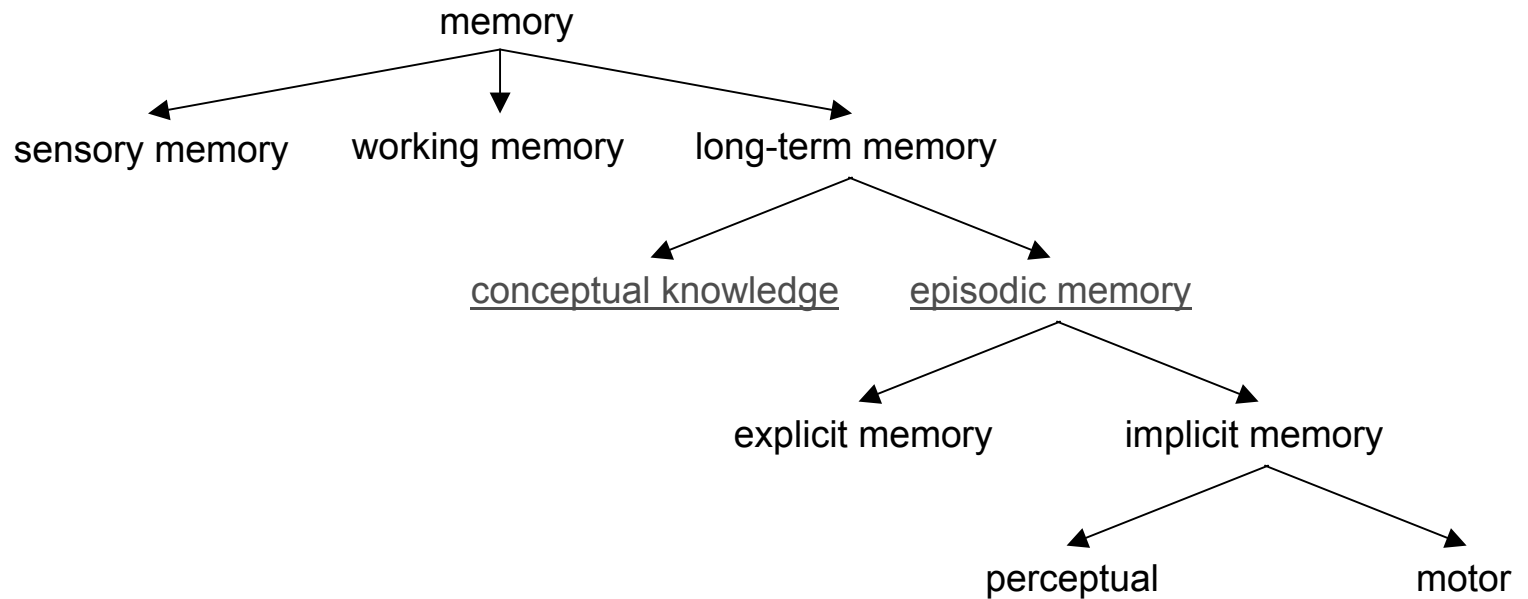
- working memory (Lectures 5a and 5b)
- long-term memory (Lectures 4a and 4b)



Conceptual knowledge versus episodic memory

- **conceptual knowledge (Lectures 7a and 7b)**

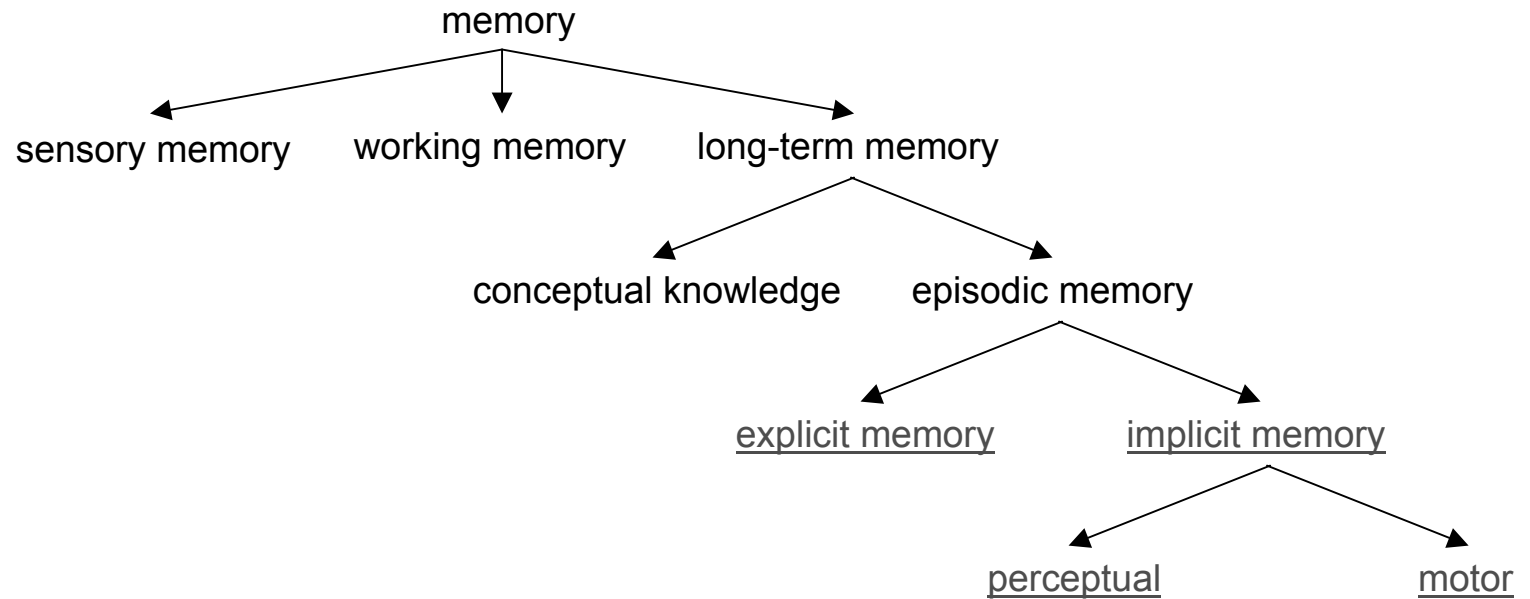
- **episodic memory (Lecture 4b)**



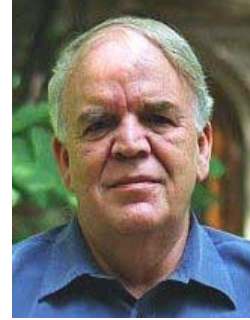
Explicit memory versus implicit memory

- explicit memory

- implicit memory



Experimental demonstration of explicit versus implicit memory Jacoby (1983)



Jacoby

- **3 groups of subjects studied a list of words**
 - **generate condition**
 - received a word, and then generated its opposite
 - **context condition**
 - received a word, and then read its opposite
 - **no-context condition**
 - received a string of Xs, and then read the critical word
- conceptual processing decreases and perceptual processing increases across the three conditions

First event	Second event
hot - ?	subject says "cold"
hot -	subject sees "cold"
xxx -	subject sees "cold"

• 2 groups of subjects performed two tests

- **old / new recognition (explicit test)**
 - subjects received studied words mixed randomly with non-studied words
 - subjects circled words that they believed were studied
- **categorization (implicit test)**
 - subjects named visually presented words flashed at a 33 msec rate
 - received both studied words and unstudied words

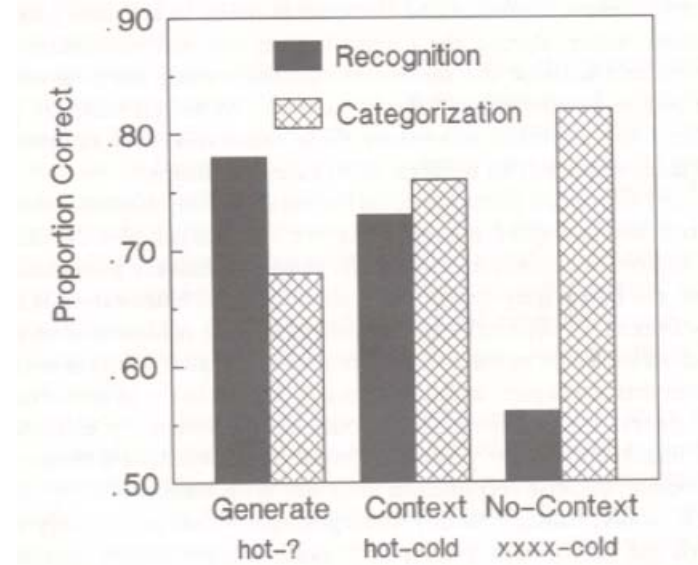
	Recognition	Categorization
Generate	Condition 1	Condition 2
Context	Condition 3	Condition 4
No-Context	Condition 5	Condition 6

Results Jacoby (1983)

- explicit recognition

- implicit categorization

- summary



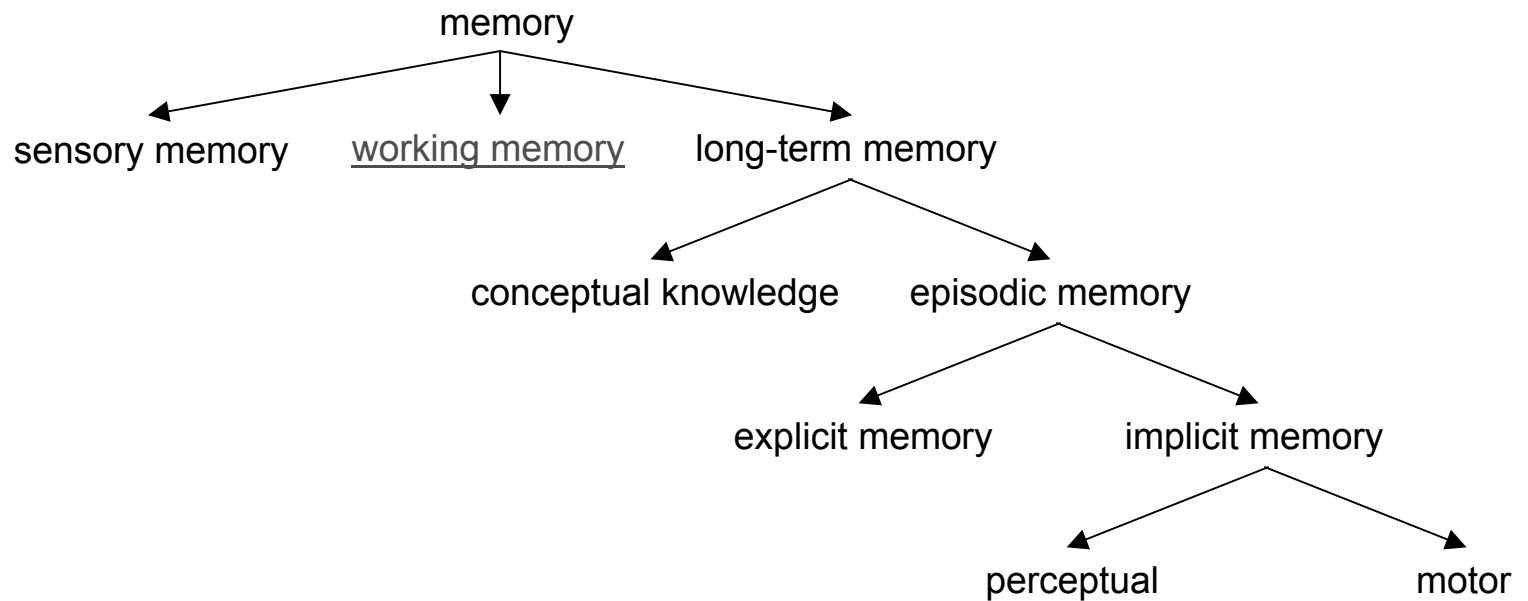
Memory systems Neural mechanisms

- **role of behavioral studies**

- **impact of neuroscience**

Working memory

- the neural bases of the critical systems in the taxonomy



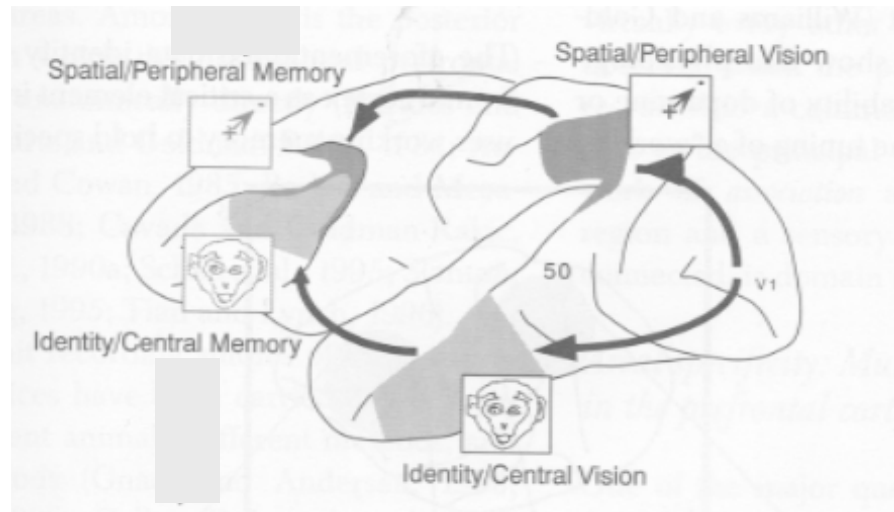
Working memory Neural mechanisms

Goldman-Rakic, O Scalaidhe, Chafee, et al. (2000)



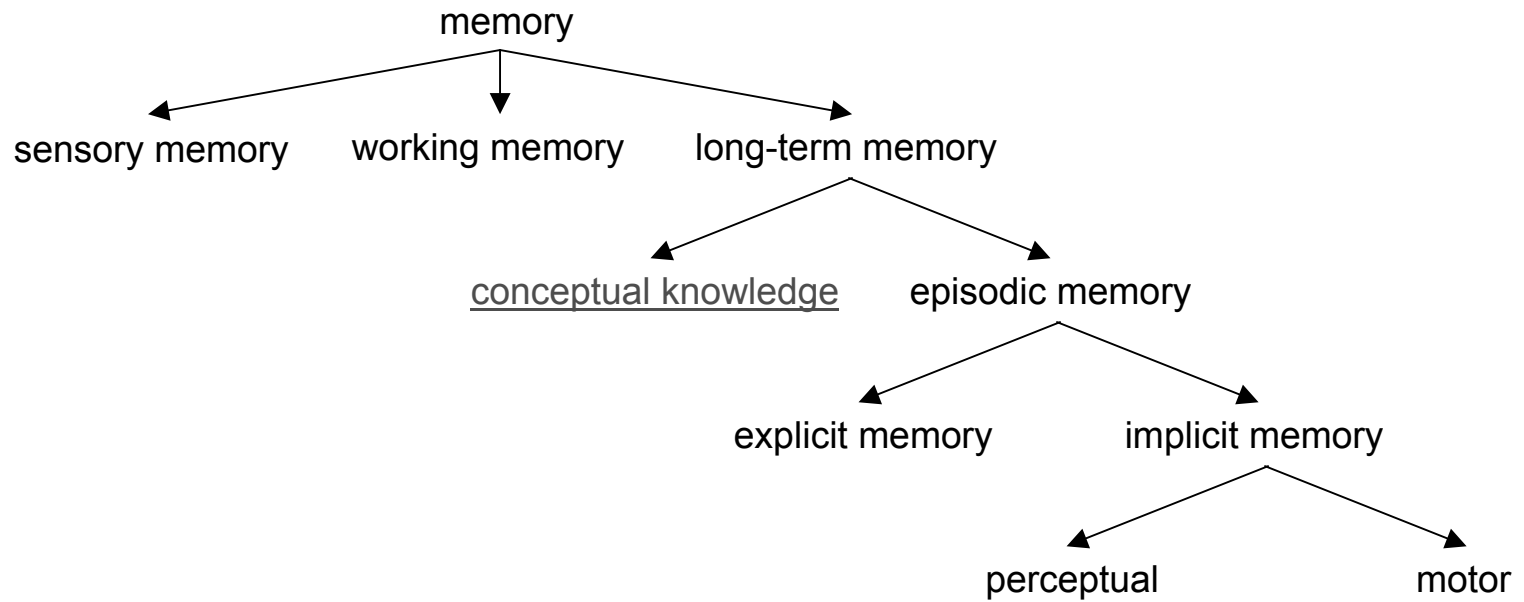
Goldman-Rakic

- modality-specific frontal and posterior areas



monkey cortex

Conceptual knowledge



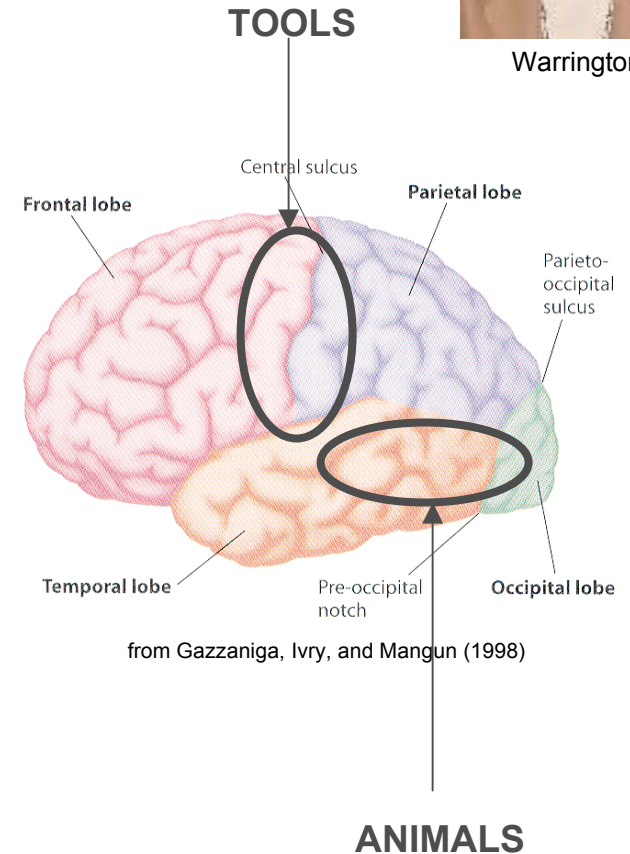
**Conceptual knowledge
Neural mechanisms
Warrington and McCarthy (1983), Damasio (1989)**



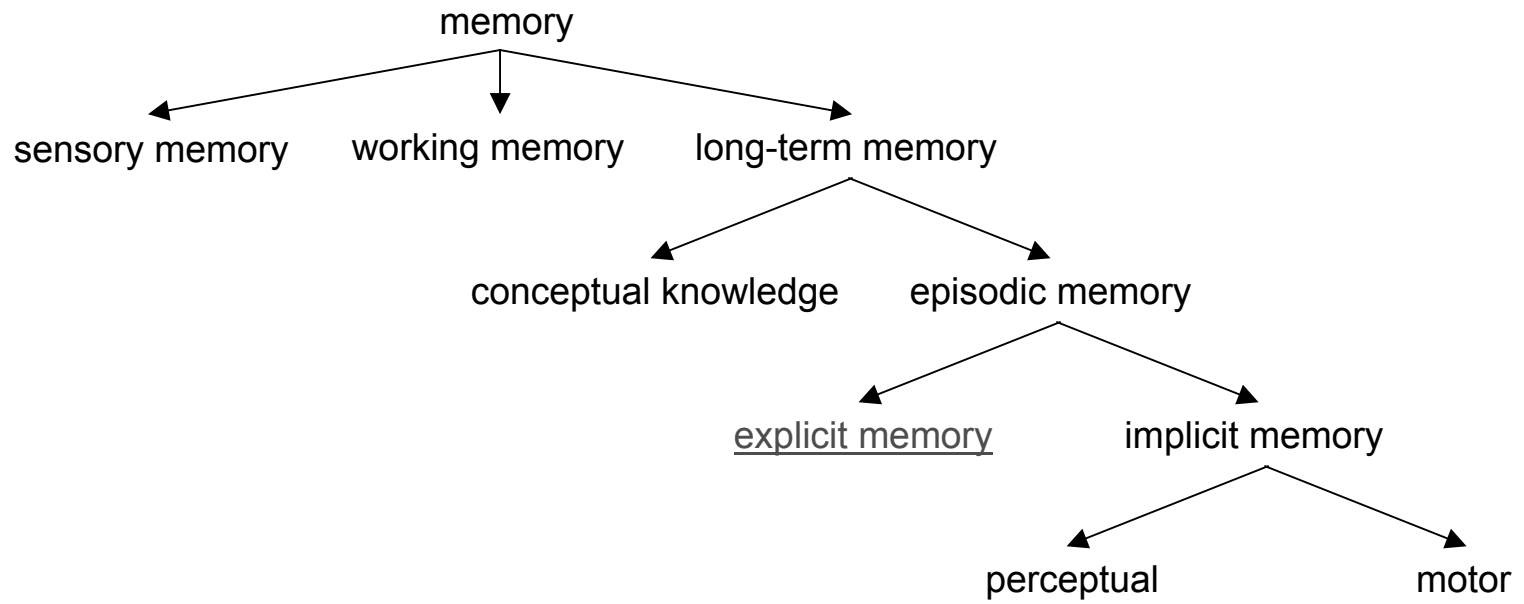
Warrington

- **sensory-motor grounding of categories**

- **as in working memory, entities are represented in sensory-motor areas, but the control centers differ**



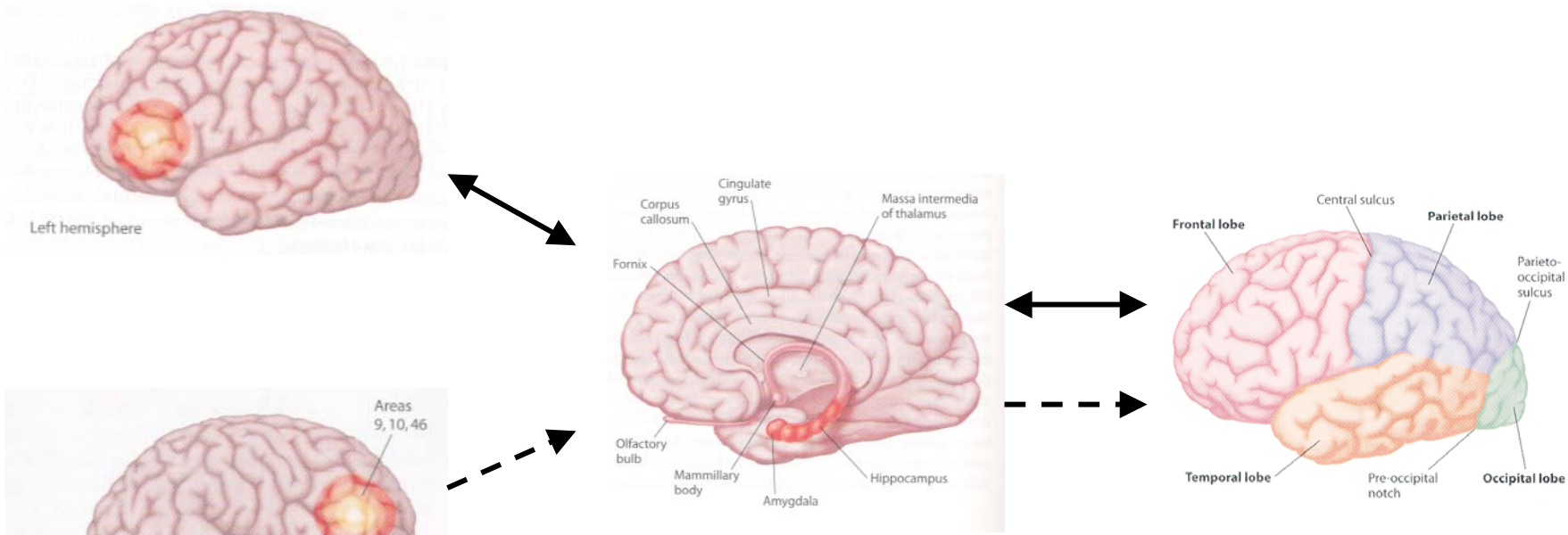
Explicit memory



Explicit memory Neural mechanisms

• encoding

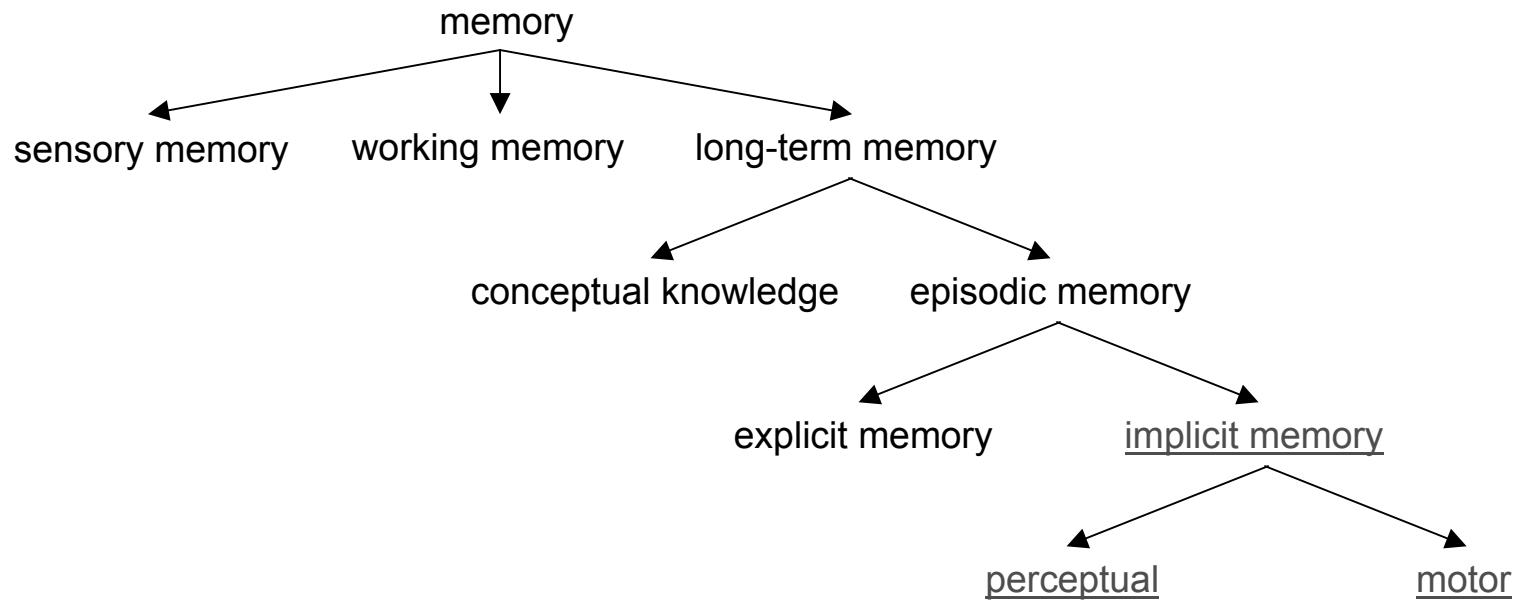
• retrieval

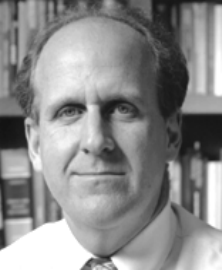


figures from Gazzaniga, Ivry, and Mangun (1998)

← encoding
- - - → retrieval

Implicit memory





Schacter

Implicit memory Neural systems

Buckner



Schacter, Alpert, Savage, Rauch, et al. (1996)

Buckner, Peterson, Ojemann, Miezin, Squire, and Raichle (1995)

- **increased processing efficiency in the relevant sensory-motor modality**

- **implicit memory in the visual stem completion task**

- subjects study words for the presence of T junctions

strike

- later complete visual word stems with the first word that comes to mind

str_---

- words studied earlier are more likely to complete a stem than words not studied (i.e, implicit memory)

strike versus strong

- **results**



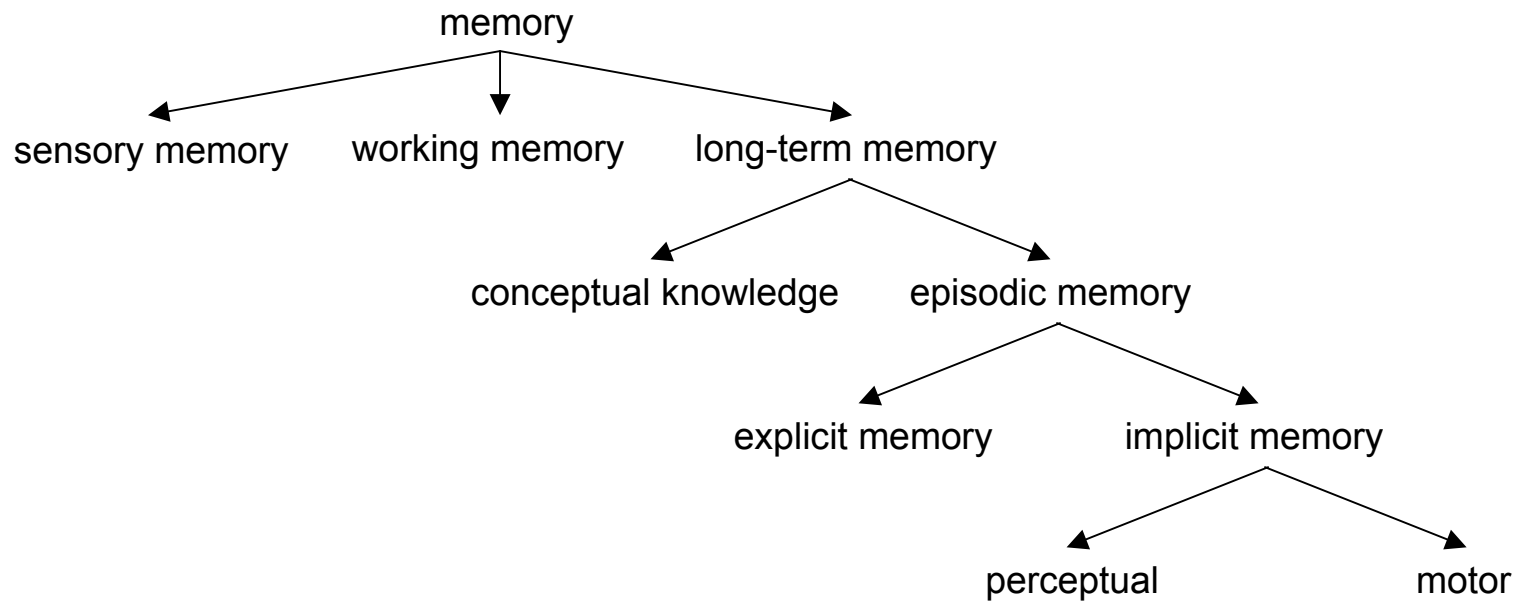
from Schacter et al. (1996)

Memory systems Syndromes

- **category-specific deficits**
- **amnesia**
- **damage to frontal areas**
- **damage to sensory-motor areas**

Conclusions

- a variety of memory systems underlie cognition



Read the following article for the next class meeting

- **assigned reading:**

- Loftus, E.F. (2003). Make-believe memories. *American Psychologist*, 58, 864-873.

- **things to think about while reading the article:**

- how accurate is explicit episodic memory?
- what factors might bias explicit episodic memory?
- what implications might such bias have for real world applications?

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