

Psychology W4215

Memory Representations Fall 2006

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I. Bulletin description

PSYC G4215. Memory Representations (seminar)
3 points. E. E. Smith. Tuesdays: 2:10-4p.m. Room 405 Schermerhorn Hall

Prerequisite: At least two other psychology courses and the instructor's permission. Discussion of issues and research on mental and neural processes involved in the representation of information in memory—both memory for specific episodes (episodic memory), and memory for general knowledge (semantic memory). Issues include differences in representations of, and retrieval of, memories acquired intentionally and those acquired without awareness, as well as the underlying neural mechanisms.

II. A full description of the content of the course

This seminar examines a number of issues about how we represent information in memory, both memory for specific episodes (“episodic memory”), and memory for general knowledge (“semantic memory”). In discussing each issue, we will consider research that focuses on both mental and neural processes. The issues include: (1) How do we represent information that is acquired without awareness? (2) Is information acquired without intention represented in a different format than information acquired intentionally? (3) Do intentional and incidental learning recruit different neural mechanisms? (4) When we consciously remember specific episodes do we re-perceive the actual experience – is episodic memory like time travel? (5) Similarly, does retrieving knowledge about everyday objects (retrieval from semantic memory) involve re-perceiving the objects? (6) What are the neural mechanisms that underlie re-perception? and (7) Do some forms of brain damage impair our semantic memories selectively, e.g., leading to a deficit in knowledge about living things but not other objects?

Specific issues covered may vary in future terms. Seminar may be repeated for credit in some instances.

III. The rationale for giving the course

PSYC G4215 is an advanced seminar, designed particularly for undergraduates who are majoring in Psychology or in Neuroscience and Behavior, for students participating in the Post-bac Psychology Program, and for Psychology Graduate Students. In covering the cognitive and neural bases of memory representations, the course provides an integrated perspective on topics of current interest in the fields of psychology and neuroscience. The course is intended to explore the ideas of interest in the broader context of liberal arts education, such as the nature of human knowledge and abilities.

It fulfills the following degree requirements:

- For Psychology Graduate Students PSYC G4215 will apply toward the “two seriously graded seminars” requirement for the Master’s degree.
- For the Psychology major of concentration in the College and in G. S., for the Psychology minor in Engineering, and for the Psychology Post-bac, PSYC G4215 will meet the Group I (Perception and Cognition) distribution requirement.
- For the Neuroscience and Behavior joint major, G4215 will fulfill the 5th Psychology requirement: “one advanced psychology seminar from a list approved by the Psychology Department advisor to the program.”
- For the science requirements of the College and GS, G4215 meets the second term of the requirement, provided that students obtain the necessary permission and have taken the prerequisite two psychology courses. For instance, a student who has completed PSYC 1010 (Mind, Brain, and Behavior) and PSYC 2680 (Social and Personality Development), would be able to use G4215 for the second term of the integrated sequence requirement. However, students who are majoring in Psychology or in Neuroscience and Behavior will have priority over students who are taking the course for the science requirement.
- For the Barnard Psychology major, PSYC 4215 will fulfill the senior seminar requirement.

IV. The reading list and weekly syllabus

Discussion topics for eight weeks and representative reading assignments for the first five weeks are provided.

Week 1

09/05/06

Topic: Organizational

Readings: No readings

Topic: Kinds of Memory

Readings:

Squire, L. R., & Knowlton, B. J. (2000). The medial temporal lobe, the hippocampus, and the memory system of the brain. In M. Gazzaniga (Ed.), *The New Cognitive Neurosciences*, 2nd Edition, Chapter 53, pp. 765-779. Cambridge, MA: MIT Press.

Smith, E. E., & Kosslyn, S. M. (2007). *Cognitive Psychology: Mind and Brain*, Upper Saddle River, N. J.: Prentice Hall, Chapter 5.

Topic: Semantic vs. Episodic Memory: What are the critical differences?

Readings:

Tulving E. (1985). How many memory systems are there? *American Psychologist*, 40, 385-398.

Nyberg, L., McIntosh, A. R., & Tulving, E. (1998). Functional brain imaging of episodic and semantic memory with positron emission tomography. *Journal of Molecular Medicine*, 76, 48-53.

Topic: Retrieval from Explicit Memory

Readings:

Buckner, R. L., & Wheeler, M. E. (2001). The cognitive neuroscience of remembering. *Nature Reviews Neuroscience*, 2, 624-634.

Wagner, A. D. (2002). Cognitive control and episodic memory: Contributions from prefrontal cortex. In L. R. Squire & D. L. Schacter (Eds.), *Neuropsychology of memory* (3rd ed., pp. 174-192). New York: Guilford Press.

Topic: Do episodic memories permit re-perceiving?

Readings:

Wheeler, M. E. & Buckner, R. L. (2003). Functional dissociation among components of remembering: Control, perceived oldness, and content. *Journal of Neuroscience*, 23, 3869-3880.

TBD

Week 6

10/10/06

Topic: Structure of semantic memory

Readings:

Collins, A. M. & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. *Psychological Review*, 82, 407-428.

Thompson-Schill, S. L. (2003). Neuroimaging studies of semantic memory: inferring “how” from “where”. *Neuropsychologia*, 41, 280-292

Week 7

10/17/06

NO CLASS

Week 8

10/24/06

Topic: Modality-specific representations (representations contain perceptual and/or motoric information): Patients with visual agnosia

Readings:

Warrington, E. K., & Shallice, T. (1984). Category specific semantic impairments. *Brain*, 107, 829-853.

Caramazza, A., & Shelton, J. R. (1998). Domain-specific knowledge systems in the brain: The animate-inanimate distinction. *Journal of Cognitive Neuroscience*, 10, 1-34.

TBD

Week 9

10/31/06

Topic: Modality-specific representations: Simulation models of visual agnosia patients

Readings:

Farah, M. J., & McClelland, J. L. (1991). A computational model of semantic memory impairment: Modality specificity and emergent category specificity. *Journal of Experimental Psychology: General*, 120, 339-357.

Rogers et al. (2004). Structure and deterioration of semantic memory: A neuropsychological and computational investigation. *Psychological Review*, 111, 205-235.

Topic: Modality-specific representations: Evidence from neuroimaging

Readings:

Martin et al. (1995). Discrete cortical regions associated with knowledge of color and knowledge of action. *Science*, 270, 102-105.

Martin et al. (1996). Neural correlates of category-specific knowledge. *Nature*, 379, 649-652.

Chao, L. L., Haxby, J. V., & Martin, A. (1999). Attribute-based neural substrates in temporal cortex for perceiving and knowing about objects. *Nature Neuroscience*, 2, 913-917.

Topic: Neuroimaging of knowledge (cont.)

Readings:

Mummery, C. J., Patterson, K. and Hodges, J. R., & Price, C. J. (1998). Functional neuroanatomy of the semantic system: Divisible by what? *Journal of Cognitive Neuroscience*, 10, 766-777.

Thompson-Schill, S. L., Aguirre, G. K., D'Esposito, M., & Farah, M. J. (1999). A neural basis for category and modality specificity of semantic knowledge. *Neuropsychologia*, 37, 671-676.

TBD

Topic: Neuroimaging of knowledge: Beyond visual perception

Readings:

Simmons, W. K., Martin, A., & Barsalou, L. W. (2005). Pictures of appetizing foods activate gustatory cortices for taste and reward. *Cerebral Cortex*, 15, 1602-1608.

Hauk, O., Johnsrude, I., & Pulvermuller, F. (2004). Somatotopic representation of action words in human motor and premotor cortex. *Neuron*, 41, 301-307.

TBD

Topic: Implicit (procedural) representations

Readings:

Tulving, E., & Schacter, D. L. (1990). Priming and human memory systems. *Science*, 247, 301-306.

Schacter, D. L., & Buckner, R. L. (1998). Priming and the brain. *Neuron*, 20, 185-195.

Week 14

12/05/06

Topic: Implicit representations: social intuitions

Readings:

Higgins, E. T. (1996). Knowledge activation: Accessibility, applicability, and salience. In E. Higgins & A. Kruglanski (Eds.), *Social Psychology: Handbook of Basic Principles*, New York: The Guilford Press. Chapter 5, pp. 133-168.

TBD

V. Course requirements

Each week, students will attend a two-hour seminar. Class time will be devoted to the presentation and discussion of book chapters and journal articles. The readings are intended to provide background knowledge on relevant original research, and to serve as a stimulus for discussion. Two students sign up to lead the discussion each week. Graduate students will be expected to lead the discussion twice.

The students take a written midterm exam with essay questions covering the material presented in class. During the second half of the semester, the students write a term paper due on the Monday of Reading Week. The 10-15 page paper should take the form of a critical review paper that addresses a specific question related to the topics of the seminar.

Grading is allocated as follows:

Midterm paper	30%
Term paper	30%
Attendance and participation	30%
Facilitation of class discussion	10%