

## Psychology W4215

### *Memory Representations* Fall 2007

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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—memory for the immediate past (working memory), long-term memory for specific episodes (episodic memory), and memory for general knowledge (semantic memory). Issues include differences in mental and neural representations of these different kinds of memory, as well as breakdowns of these memory systems in various neurological and psychiatric disorders.

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#### **II. A full description of the content of the course**

This seminar examines a number of issues about how we represent information in memory, including memory for the immediate past (“working memory”), long-term memory for specific episodes (“episodic memory”), and long-term 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 use working memory in everyday thinking? (2) What role do breakdowns in working memory play in psychiatric disorders, such as schizophrenia and depression? (3) When we consciously remember specific episodes do we re-perceive the actual experience – is episodic memory like time travel? (4) 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? (5) What are the effects of emotion and stress on the different kinds of memories?

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

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### III. The rationale for giving the course

PSYC G4215 is an advanced seminar, designed for undergraduates who are majoring in Psychology or in Neuroscience and Behavior, for students participating in the Post-bac Psychology Program; and for graduate Students in Psychology or Neuroscience and Behavior. Residents and fellows in Psychiatry may also find the seminar useful. 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, Psychiatry, 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 5<sup>th</sup> 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.

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### IV. The reading list and weekly syllabus

Discussion topics and representative reading assignments are provided in what follows.

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**Week 1**

**09/04/07**

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**Topic:** Organizational

**Readings:** No readings

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**Week 2**

**09/11/07**

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**Topic:** Kinds of Memory: Explicit vs. Implicit

**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*, 2<sup>nd</sup> 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.

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**Week 3**

**09/18/07**

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**Topic:** Kinds of Explicit Memory: Working Memory, Episodic, and Semantic Memory

**Readings:**

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

Talmi, D., Grady, C. L., Goshen-Gottstein, Y., Moscovitch, M. (2005). Neuroimaging the serial position curve. A test of single-store versus dual-store models. *Psychological Science*, 16, 716-723.

TBD

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**Week 4**

**09/25/07**

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**Topic:** Working Memory: Maintaining information in an active state

**Readings:**

Smith, E.E., and Jonides, J. (1999). Storage and executive processes in the frontal lobes. *Science*, 283, 1657-1661.

Smith, E. E., & Kosslyn, S. M. (2007). *Cognitive Psychology: Mind and Brain*. New Jersey: Prentice Hall. Chapter 6.

Jonides, J., Lewis, R. L., Nee, D. E., Lustig, C. A., Berman, M. G., Moore, K. S. (in press). The mind and brain of short-term memory. *Annual Review of Psychology*.

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**Week 5**

**10/02/07**

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**Topic:** Working Memory: Dealing with Interference

**Readings:**

D'Esposito, M., & Postle, B. (1999). The dependence of span and delayed-response performance on prefrontal cortex. *Neuropsychologia*, 37, 1302-1315.

TBD

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**Week 6**

**10/09/07**

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**Topic:** Breakdowns of Working Memory in Psychopathology: Role of Frontal Cortex and Dopamine Systems

**Readings:**

Abi-Dargham, A., Mawlawi, O., Lombardo, I., Gil, R., Martinez, D., Huang, Y., et al. (2002). Prefrontal Dopamine D<sub>1</sub> Receptors and Working Memory in Schizophrenia. *The Journal of Neuroscience*, 22, 3708-3719.

Goldberg, T. E., Egan, M. F., Gscheidle, B. A., Coppola, R., Weickert, T., Kolachana, B. S., et al. (2003). Executive subprocesses in working memory. *Archives of General Psychiatry*, 60, 889-896.

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**Week 7**

**10/16/07**

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NO CLASS

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**Week 8**

**10/23/07**

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**Topic:** Forming New Episodic Memories

**Readings:**

Paller, K. A., & Wagner, A. D. (2002). Observing the transformation of experience into memory. *Trends in Cognitive Science*, 6, 93-102.

Blumenfeld, R. S., & Ranganath, C. (2007). Prefrontal cortex and long-term memory encoding: And integrative review of findings from neuropsychology and neuroimaging. *Neuroscientist*, 13, 280-291.

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**Week 9**

**10/30/07**

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**Topic:** Retrieval from Episodic Memory

**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

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**Week 10**

**11/06/07**

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**Topic:** Stress, Emotion, and Episodic Memory

**Readings:**

TBD

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**Week 11**

**11/13/07**

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**Topic:** Semantic Memory: Knowledge is Modality-Specific

**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.

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

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**Week 12**

**11/20/07**

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**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.

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.

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.

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

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**Week 13**

**11/27/07**

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**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.

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**Week 14**

**12/04/07**

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**Topic:** Is Implicit Memory Preserved in Brain Damage and Psychopathology?

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**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 or relevant original research, and to serve as a stimulus for discussion. Students will sign up to lead the discussion each week. Graduate students will be expected to lead the discussion twice.

The students have a take-home 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.

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Grading is allocated as follows:

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