

**Cognition
Psychology 215
Emory University
Spring 2004**

Time and Location

Tuesdays and Thursdays, 2:30–3:45 PM
White Hall 205

Instructor and Teaching Assistant

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Overview

This course aims to provide students with two levels of knowledge about cognitive psychology:

- basic theoretical constructs and established empirical findings
- examples of state-of-the-art research

The following perspectives organize presented material:

- cognition can only be understood properly by grounding it in the neural mechanisms that underlie cognitive abilities
- cognition is not detached computation but arises out of the need for embodied agents to function intelligently in situated action

Online Syllabus

The syllabus can be found at:

<http://userwww.service.emory.edu/~barsalou/Courses/2004/cognition.html>

Readings

There are seven reading assignments for the course, listed later. All readings are on electronic reserve at Woodruff Library. To access these readings, log onto Euclid, go to Reserves Direct, and look up this course.

Optional readings are also available electronically on Emory's Reserves Direct. All of these articles are discussed in the lectures. The references for most articles covered in the lectures are listed at the end of each day's lecture notes. Not all of the articles referenced, however, are on electronic reserve. Only the most central ones are. Students interested in pursuing lecture material further are encouraged to explore these readings, and the articles cited in them.

Readings must be done by the due date, given that the in-class exercises described later often require having read them. If a student hasn't read the relevant reading, and cannot perform the exercise, credit for the exercise will not be given.

Take-Home Assignments

Over the course of the semester there will be six take-home assignments. The purpose of these assignments is to get you thinking about the course material in creative ways. Each assignment will typically involve a short writing assignment of a few pages, along with other activities. The forms for the assignments will *not* be distributed in class, but must be downloaded from:

<http://userwww.service.emory.edu/~barsalou/Courses/2004/cognition.html>

As the time for each assignment approaches, it will be discussed in class. Assignments may be turned in any time prior to the due date, not just that day. All take-home assignments will be graded on a scale of 1 to 10 points. Assignments will lose 1 point for each additional day turned in late, unless there is a valid and documented reason for being late.

In-Class Exercises

During each of the 26 lectures, we will have an in-class exercise that aims to help students actively understand and relate to the course material. Much research has found that active processing greatly promotes learning, relative to passive memorization. During each exercise, students will write on an in-class exercise sheet to be turned in at the end of class. Often, these exercises will be related to reading assignments and take-home assignments. They will also often draw on individual experience and interests.

Participating in and completing a satisfactory exercise form for 22 or more of the 26 in-class exercises (85% completion) counts for extra credit in the course. Students who successfully meet this criterion will have 5% of the total course points added to their final course points. For example, if a student earned 88% of the regular course points, his or her grade would be raised to 93%. Similarly, if a student earned 79% of the regular course points, his or her grade would be raised to 84%.

It is essential to note the following: Not participating in 22 or more in-class exercises will *not* hurt a student's grade. As described later, final grades will first be computed and assigned based only on the exams and take-home assignments. Once the final grades have been given, all students receiving extra credit will have 5% of the total course points added to their score. If this raises their grade, the higher grade will be given. Students can receive As based solely on the exams and take-home assignments. Meeting the extra credit criterion will only raise a student's grade. Failing to meet the extra credit criterion will not lower a grade.

In-class exercises will not be graded, but will simply be scored as completed or not completed in class. If a student performs an exercise half-heartedly, it will be scored as not completed. On the other hand, if a student makes a serious attempt to complete an exercise but cannot, it will be scored as complete. If you have trouble completing an exercise, please describe the problem you had on the exercise sheet. Also leave your email address so that we contact you about it if necessary. If you turn in an exercise and we score it as incomplete, we will contact you, so that you know about it. In-class exercises will not be returned but can be reviewed in the TA's office if desired.

There are no make-ups for in-class exercises missed. If a student misses many classes for a justifiable and documented reason, and therefore misses many exercises, an alternative means for handling them will be arranged. As described earlier, if a student hasn't read a reading that is necessary for performing an exercise, credit will not be given.

Lecture Outlines

Each student should download the 26 lecture outlines from the web and print them out. Although there is color in the slides, they will print fine on either a color or black and white

printer. To download the lectures notes in pdf format, where 1 lecture slide is on 1 printed page, go to:

http://userwww.service.emory.edu/~barsalou/Courses/Cognition/Lecture_Notes/lecture_notes.html

Some students prefer having multiple slides on each page. If you want to print out the lecture notes in this form, go to Emory Blackboard:

<http://classes.emory.edu/>

Here, under Course Materials for Psych 215, you will find the original PowerPoint files containing the slides. Using PowerPoint's printing and formatting functions, you can place whatever number of slides you want on each page, and then print them out, either in color or black and white. Note that these PowerPoint files are *much* larger than the pdf versions, and will take a long time to download via a standard modem over a phone line.

Bring the outlines to the lectures, given that they will enhance following the lectures and taking notes. Because the outlines contain information that would take much time and energy to copy, bringing them to class will make following the lectures easier. However, the outlines are *not* complete accounts of the lecture material. Therefore, taking additional notes is necessary to understand and fill out the outlines. Occasionally we will start a new lecture on the same day that we end a lecture, so please bring the outline for the next lecture to each class, as well as the outline for the current lecture.

Recording the Lectures

Students are welcome to audio record the lectures so as to complement the lecture notes.

Exams

The midterm will be on Thursday, March 4, during the regular class time. The final will be on Friday, April 30, from 12:30 to 3:00.

The midterm will contain 3 multiple-choice questions and 1 short-answer question for each of the 7 topics covered in the first half of the course. Material from both the lectures and readings will be covered.

The final will be cumulative. For each of the 7 topics from the first half of the course, the final will contain 1 multiple-choice question and 1 short-answer question. For each of the 6 topics in the second half of the course, the final will contain 4 multiple-choice questions and 2 short-answer questions. Again, material from both the lectures and readings will be covered.

Questions will *not* be about the names and dates of studies, although names and dates will be given along with other information to help you remember the material. In general, the exam will test major points of understanding rather than picky details. Examples of exam questions are provided at the end of this syllabus.

Make-Up Exams

Students who experience extenuating circumstances at the time of an exam, confirmed by a reliable source, can make alternative arrangements for taking the exam. Standard College procedures will be followed in allowing and administering these exams.

Students with Disabilities

Following standard College procedures, students with disabilities may arrange for alternative forms of instruction and testing. Please let the instructor know about the need for making such arrangements at the start of the course.

Grading

Take-Home Assignments

Each take-home assignment will be worth from 0 to 10 points. Assignments will lose 1 point for each additional day turned in late. Students who experience extenuating circumstances, confirmed by a reliable source, can arrange to turn in an assignment after the due date. The instructor should be notified as soon as possible about the need for any such arrangements. Take home assignments count for 30% of the final grade.

Exams

Each multiple-choice question on an exam will be worth 2 points. Each short-answer question will be worth 4 points. Thus the midterm will be worth 70 points (21x2 for the multiple choice questions plus 7x4 for the short answer questions), and the final will be worth 138 points (31x2 for the multiple choice questions plus 19x4 for the short answer questions). With respect to final grades, the midterm will count 30%, and the final will count 40%.

In-Class Exercises

Each in-class exercise will receive 1 point if completed, and 0 if not. As described earlier, starting an exercise and failing to complete it will count only if a serious attempt was made to it. Missed exercises cannot be made up, except in the case of extenuating circumstances. As described earlier, students receive extra credit if they successfully complete a minimum of 22 in-class exercises, where extra credit is 5% of the total course points added to the final grade.

Review Sessions

Prior to each exam, we will hold a review session. No material will be presented, but students can ask questions about material covered in the lectures and readings. Students should have gone through all of their relevant lecture outlines and readings prior to the review session, so that they are prepared with questions to ask about it. Reiteration of lecture material will generally not be provided at this time for students who did not attend them, and the same for the readings. Instead questions of clarification and detail will be most relevant.

Final Grades

The composition of the final grades will be as follows:

| Graded Activity | Max Points | Scaling Factor | Scaled Points |
|-------------------------------------|------------|----------------|---------------|
| 6 take-home assignments @ 10 points | 60 | .5000 | 30 |
| midterm | 70 | .4286 | 30 |
| final | 138 | .2899 | 40 |
| total | 268 | | 100 |

The number of points that a student obtains for each of the three graded activities above is multiplied by the activity's scaling factor, such that the activity ends up having the number of scaled points on the right. Thus, the first two activities each have a maximum of 30 scaled points, such that each activity counts for 30% of the grade. Similarly, the final has a maximum of 40 scaled points, such that it counts for 40% of the grade.

As can be seen above, a maximum of 268 points is possible summed across the four graded activities. However, the final grades will be determined by the number of scaled points out of 100 that a student receives. Here's how this works. If a student achieves the full 60 points for the 6 take-home assignments, then their score of 60 is multiplied by the scaling factor, .5000, to produce 30 scaled points, which is 30% of the 100 scaled points possible for the course. If a student similarly receives the maximum of 70 points for the midterm, then, when multiplied by .4286, it also yields 30 scaled points and counts 30% toward the final grade. Finally, receiving

the maximum of 138 points on the final, and then multiplying it by the scaling factor, .2899, produces 40 scaled points, counting 40%. To see how your grade would be computed if you didn't receive the maximum number of points, simply insert the number you do receive for each graded activity in the left column, then multiply each number by its respective scaling factor, and then sum the four products to obtain your total scaled points.

Final grades are not determined strictly by absolute levels of performance (e.g., an A is not necessarily 90% of the total points), nor strictly by curve (e.g., an A is not necessarily any student in the top 33% of the class). Typically, both factors are taken into account, depending on the particular group of students taking the course. If many students achieve high levels of performance, absolute grading criteria will dominate grading on the curve, such that more students receive higher grades. If few students achieve high levels of performance, absolute criteria may be relaxed, and grading on the curve may dominate to ensure that a reasonable number of students receive good grades. These are only rules of thumb, with the particular grading policy adopted reflecting the attitudes and abilities of the students taking the course, as well as any other relevant circumstances surrounding it.

Extra credit. Students who meet the extra credit criterion—successful completion of 22 more in-class exercises—will have 5 scaled points added to their scaled points for the exams and take-home exercises. If this raises a student's grade, the higher grade will be given.

Honor Code

All students are expected to adhere to the Emory Honor Code. Prior to each exam, students will be asked to sign a sheet indicating that they agree to follow the honor code at all points in the exam process. Students suspected of violating the honor code will have their cases sent to the appropriate University committee.

All students are also expected to write the six take-home assignments independently, although discussions beforehand with other students and the instructors are appropriate and desirable.

Similarly, students are encouraged to discuss the in-class exercises when it is appropriate for the exercise. However, filling out an in-class exercise sheet for another student will be considered a violation of the Honor Code. Handwriting will be compared between sheets to ensure that this doesn't happen. It is also a violation of the honor code to fill out an in-class exercise form outside class.

Psychology Major Breadth Requirement

This course satisfies the Cognition and Development breadth requirement for Psychology majors.

Writing Requirement

This course does *not* satisfy the Emory College writing requirement.

Course Schedule

| Topic | Date | Sub-topic | Assignment due |
|------------------------------------|---|---|-----------------------------------|
| 1. Introduction | | | |
| | Jan. 15 | The study of cognition (history and background) | |
| | Jan. 20 | Cognition as embodied and situated | Clark reading |
| 2. Perception and action | | | |
| | Jan. 22 | Perceptual systems | |
| | Jan. 27 | The motor system | |
| 3. Attention | | | |
| | Jan. 29 | Selective attention | Brain coloring assignment |
| | Feb. 3 | Automaticity | Bargh, et al. reading |
| 4. Episodic memory | | | |
| | Feb. 5 | Memory systems | |
| | Feb. 10 | Memory processes | |
| 5. Categorization | | | |
| | Feb. 12 | The variability problem and categorization models | Biederman reading |
| | Feb. 17 | The neural bases of categories | Amnesia assignment |
| 6. Concepts and knowledge | | | |
| | Feb. 19 | Conceptual structure | |
| | Feb. 24 | Conceptual processes | |
| 7. Construal | | | |
| | Feb. 26 | Construal in perception | Ramachandran and Hirstein reading |
| | Mar. 2 | Construal in cognition | Conceptual combination assignment |
| Midterm | Thursday, Mar. 4, regular class time | | |
| Spring Break | March 8 - 12 | | |
| 8. Working memory | | | |
| | Mar. 16 | Structure and function | |
| | Mar. 18 | Imagery | |
| 9. Language | | | |
| | Mar. 23 | Properties of language | Imagery assignment |
| | Mar. 25 | Language comprehension | Zwaan and Madden reading |
| 10. Thought | | | |
| | Mar. 30 | Decision making | |
| | Apr. 1 | Reasoning | |
| 11. Learning and plasticity | | | |
| | Apr. 6 | Learning in problem solving | Elman et al. reading |
| | Apr. 8 | Plasticity | Decision making assignment |
| 12. Social cognition | | | |
| | Apr. 13 | Emotion, individuals, and the self | |
| | Apr. 15 | Implicit social cognition | |
| 13. Cultural cognition | | | |
| | Apr. 20 | Cultural universals | Gentner & Levinson readings (2) |
| | Apr. 22 | Cultural divergences | Newspaper assignment |
| Final | Friday, April 30, 12:30 – 3:00 | | |

Required Readings on Electronic Reserve (in assigned order)

- Clark, A. (1997). *Being there: Putting brain, body, and world together again*. Cambridge, MA: MIT Press. [pp. xi-xiii, and pp. 1-33]
Includes three separate entries in the reserves:
Preface: Deep thought meets fluent action (pp. xi-xiii)
Introduction: A car with a cockroach brain (pp. 1-8)
Ch. 1: Autonomous agents walking on the moon (pp. 11-33)
- Bargh, J.A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal of Personality and Social Psychology*, 71, 230-244.
- Biederman, I., & Shiffrar, M.M. (1987). Sexing day-old chicks: A case study and expert systems analysis of a difficult perceptual-learning task. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 13, 640-645.
- Ramachandran, V.S., & Hirstein, W. (1998). The perception of phantom limbs: The D.O. Hebb lecture. *Brain*, 121, 1603-1630.
- Zwaan, R.A., & Madden, C.J. (in press). Embodied sentence comprehension. In D. Pecher and R. Zwaan (Eds.), *Grounding cognition: The role of perception and action in memory, language, and thought*. New York: Cambridge University Press.
- Elman, J.L., Bates, E.A., Johnson, M.H., Karmiloff-Smith, A., Parisi, D., & Plunkett, K. (1996). *Rethinking innateness: A connectionist perspective on development*. Cambridge, MA: MIT Press. [Ch. 1, New perspectives on development, 1-46]
- Gentner, D. & Goldin-Meadow, S. (2003). Whither Whorf. In D. Gentner & S. Goldin-Meadow (Eds.), *Language in mind* (pp. 3-14). Cambridge, MA: MIT Press.
- Levinson, S. (2003). S.C. In D. Gentner & S. Goldin-Meadow (Eds.), *Language in mind* (pp. *). Cambridge, MA: MIT Press.

Optional Readings on Electronic Reserve

1. Introduction

- Beer, R.D., & Chiel, H.J. ((1993). Simulations of locomotion and escape. In R.D. Beer, R.E. Ritzmann, & T. McKenna (Eds.), *Biological neural networks in invertebrate neuroethology and robotics* (267-285). San Diego: Academic Press.
- Clark, A. (1997). *Being there: Putting brain, body, and world together again* (pp. 34-69 optional). Cambridge, MA: MIT Press.
- Lachman, R., Lachman, J.L., & Butterfield, E.C. (1979). *Cognitive psychology and information processing: An introduction* (Ch. 1, Sciences and paradigms, pp. 1-34). Mahway, NJ: Lawrence Erlbaum Associates.
- Lachman, R., Lachman, J.L., & Butterfield, E.C. (1979). *Cognitive psychology and information processing: An introduction* (Ch. 2, Psychology's contribution to the information processing paradigm, pp. 35-59). Mahway, NJ: Lawrence Erlbaum Associates.
- Lachman, R., Lachman, J.L., & Butterfield, E.C. (1979). *Cognitive psychology and information processing: An introduction* (Ch. 3, Contributions of other disciplines to information processing psychology, pp. 36-87). Mahway, NJ: Lawrence Erlbaum Associates.
- Lachman, R., Lachman, J.L., & Butterfield, E.C. (1979). *Cognitive psychology and information processing: An introduction* (Ch. 4, The information processing paradigm, pp. 88-129). Mahway, NJ: Lawrence Erlbaum Associates.

Trachtman, P. (2000). Redefining robots. *Smithsonian Magazine*, 2 (Feb), 97-112.

2. Perception and action

- Gazzaniga, M.S., Ivry, R.B., & Mangun, G.R. (1998). Chapter 4. Perception and encoding (pp. 212-162). *Cognitive neuroscience: The biology of the mind*. New York: Norton.
- Gazzaniga, M.S., Ivry, R.B., & Mangun, G.R. (1998). Chapter 5. Higher perceptual functions (pp. 163-206). *Cognitive neuroscience: The biology of the mind*. New York: Norton.
- Gazzaniga, M.S., Ivry, R.B., & Mangun, G.R. (1998). Chapter 10. Motor control (pp. 371-422). *Cognitive neuroscience: The biology of the mind*. New York: Norton.
- Palmer, S.E. (1999). *Vision science: From photons to phenomenology*. Cambridge, MA: MIT Press. [Ch. 3. Color vision: A microcosm of vision science, 94-142]

3. Attention

- Barsalou, L.W. (1982). Context-independent and context-dependent information in concepts. *Memory & Cognition*, 10, 82-93.
- Norman, D.A. (1981). Categorization of action slips. *Psychological Review*, 88, 1-15.
- Posner, M. I., & DiGirolamo, G.J. (2000). Attention in cognitive neuroscience: An overview. In M.S. Gazzaniga (Ed.), *The new cognitive neurosciences* (2nd ed., 623-632). Cambridge, MA: MIT Press.

4. Episodic memory

- Loftus, E.F. (1975). Leading questions and the eyewitness report. *Cognitive Psychology*, 7, 560-572.
- Schooler, J.W., & Engstler-Schooler, T.Y. (1990). Verbal overshadowing of verbal memories: Some things are better left unsaid. *Cognitive Psychology*, 17, 36-71.
- Jacoby, L.L., Kelley, C.M., Brown, J., & Jasechko, J. (1989). Becoming famous overnight: Limits on the ability to avoid unconscious influences of the past. *Journal of Personality and Social Psychology*, 56, 326-338.

5. Categorization

- Biederman, I., & Gerhardstein, P.C. (1993). Recognizing depth-rotated objects: Evidence and conditions for three-dimensional viewpoint invariance. *Journal of Experimental Psychology: Human Perception and Performance*, 19, 1162-1182.
- Martin, A., Ungerleider, L.G., & Haxby, J.V. (2000). Category-specificity and the brain: The sensory-motor model of semantic representations of objects. In M.S. Gazzaniga (Ed.), *The new cognitive neurosciences* (2nd ed., 1023-1036). Cambridge, MA: MIT Press.
- Warrington, E.K., & McCarthy, R.A. (1983). Category specific access dysphasia. *Brain*, 106, 859-878.

6. Concepts and knowledge

- Barsalou, L.W. (1999). Perceptual symbol systems. *Behavioral and Brain Sciences*, 22, 577-609.
- Barsalou, L.W., Solomon, K.O., & Wu, L.L. (1999). Perceptual simulation in conceptual tasks. In M.K. Hiraga, C. Sinha, & S. Wilcox (Eds.), *Cultural, typological, and psychological perspectives in cognitive linguistics: The proceedings of the 4th conference of the International Cognitive Linguistics Association, Vol. 3* (209-228). Amsterdam: John Benjamins.
- Damasio, A.R. (1989). Time-locked multiregional retroactivation: A systems-level proposal for the neural substrates of recall and recognition. *Cognition*, 33, 25-62.
- Glenberg, A.M., Schroeder, J.L., & Robertson, D. A. (1998). Averting the gaze disengages the environment and facilitates remembering. *Memory & Cognition*, 26, 651-658.
- Vallée-Tourangeau, F., Anthony, S.H., & Austin, N.G. (1998). Strategies for generating multiple instances of common and ad hoc categories. *Memory*, 6, 555-592.

7. Construal effects

- Bregman, A. S. (1990). *Auditory scene analysis: The perceptual organization of sound* (Ch. 1, 1-45). Cambridge, MA: MIT Press.
- Intraub, H., & Bodamer, J.L. (1993). Boundary extension: Fundamental aspect of pictorial representation or encoding artifact? *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 19, 1387-1397.
- Ramachandran, V.S. (1992). Filling in gaps in perception: Part 1. *Current Directions in Psychological Science*, 1, 199-205.

Ross, M. (1989). Relation of implicit theories to the construction of personal histories. *Psychological Review*, 96, 341-357.

8. Working memory

Baddeley, A.D., Gathercole, S., & Papagno, C. (1998). The phonological loop as a language learning device. *Psychological Review*, 105, 158-173.

Farah, M. (2000). The neural bases of mental imagery. In M.S. Gazzaniga (Ed), *The new cognitive neurosciences* (965-974). Cambridge, MA: MIT Press.

Jeannerod, M. (1995). Mental imagery in the motor context. *Neuropsychologia*, 33, 1419-1432.

Smith, E.E., & Jonides, J.(1998). Neuroimaging analyses of human working memory. *Proceedings of the National Academy of Sciences, USA.*, 95, 12061-12068.

9. Language

Donald, M. (1993). Precis of "Origins of the modern mind: Three stages in the evolution of culture and cognition." *Behavioral and Brain Sciences*, 16, 737-748.

Barsalou, L.W. (1999). Language comprehension: Archival memory or preparation for situated action? *Discourse Processes*, 28, 61-80

Bower, G.H., & Morrow, D.G. (1990). Mental models in narrative comprehension. *Science*, 247, 44-48.

10. Thought

Ahn, W., Kalish, C.W., Medin, D.L., & Gelman, S.A. (1995). The role of covariation versus mechanism information in causal attribution. *Cognition*, 54, 299-352.

Cummins, D.D. (1996) Dominance hierarchies and the evolution of human reasoning. *Minds & Machines*, 6, 463-480.

Gigerenzer, G. (1991). How to make cognitive illusions disappear: Beyond "heuristics and biases." *European Review of Social Psychology*, 2, 83-115.

Kahneman, D. and Tversky, A. (1972). Subjective probability: A judgment of representativeness. *Cognitive Psychology*, 3, 430-454.

Kahneman, D., & Tversky, A. (1982). The simulation heuristic. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 201-210). New York: Cambridge University Press.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185, 1124-1131.

11. Learning and plasticity

Bates, E., Thal, D., Trauner, D., Fenson, J., Aram, D., Eisele, J., & Nass, R. (1997). From first words to grammar in children with focal brain injury. *Developmental Neuropsychology*, 13, 275-343

Pascual-Leone, A., Grafman, J., & Hallett, M. (1994). Modulation of cortical motor output maps during development of implicit and explicit knowledge. *Science*, 263, 1287-1289.

12. Social cognition

Gilbert, D.T. (1991). How mental systems believe. *American Psychologist*, 46, 107-119.

Greenwald, A.G. & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review*, 102, 4-27.

Hinkley, K., & Andersen, S.M. (1996). The working self-concept in transference: Significant-other activation and self change. *Journal of Personality and Social Psychology*, 71, 1279-1295.

13. Cultural cognition

Malt, B.C. (1995). Category coherence in cross-cultural perspective. *Cognitive Psychology*, 29, 85-148.

Markus, H., R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98, 224-253.

Peng, K., & Nisbett, R.E. (1999). Culture, dialectics, and reasoning about contradictions. *American Psychologist*, 54, 741-754.

Werker, J.F., & Tees, R.C. (1984). Cross-language speech perception: Evidence for perceptual reorganization during the first year of life. *Infant Behavior and Development*, 7, 49-63.

Examples of Multiple Choice Questions

Huntington's disease is characterized by:

- (a) the weakening of the releasing system in the basal ganglia that initiates action in the motor cortex, such that the inhibitory circuit gains too much control
- (b) the weakening of the inhibitory system in the basal ganglia that suppresses action in the motor cortex, such that the releasing circuit gains too much control
- (c) develops as the secondary motor areas atrophy, thereby producing errors in action selection
- (d) develops as cerebellar areas atrophy, thereby producing errors in execution

In studying the ability to shift visual attention, Posner, Snyder, and Davidson (1980) found that:

- (a) visual attention can shift before an eye movement occurs
- (b) visual attention is largely independent of eye movements
- (c) visual attention always follows eye movements
- (d) none of the above

Which of the following statements below describes the correct relation between a retrieval task and the memory cues it uses:

- (a) in free recall, the subject receives the content of a memory as a cue and has to remember the context of when and where the memory took place
- (b) in cued recall, the subject receives, as cues, the content of a memory plus its location and has to remember when the memory occurred
- (c) in recognition, the subject receives cues about the context of a memory and has to generate the memory's content
- (d) none of the above is correct

In studies of visual imagery, which of the following results has been found:

- (a) subjects can rotate visual images
- (b) subjects can scan across mental images
- (c) as images become larger, their resolution increases, which speeds the processing of their parts
- (d) all of the above (a, b, and c)

Examples of Short Answer Questions

Describe one piece of evidence that processing of a stimulus can take place in the absence of selective attention.

What is a category-specific deficit, and what causes it? Describe some of the specific deficits that have been observed.

Describe the construal process that takes place in Martin and Jones' (1998) handedness effect on memory for British road signs.

Describe two pieces of evidence that the motor system affects mental imagery (either motor imagery or visual imagery).