

**Cognition  
Psychology 215  
Emory University  
Spring 2007**

**Time and Location**

Tuesdays and Thursdays, 11:30–12:45 PM  
White Hall 205

**Instructor and Teaching Assistant**

Instructor: **Lawrence W. Barsalou**  
Office: Psychology 322  
Office hours: Thurs 1:00-2:00PM, or by appointment  
Email: barsalou@emory.edu

Teaching assistant: **Christine D. Wilson**  
Office: Psychology 125  
Office hours: Tues 10:00-11:00AM, or by appointment  
Email: cwilso2@emory.edu

**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

By mastering the material in this course, you will acquire a basic vocabulary about the constructs of cognition and the methods for measuring them. Because these constructs and methods are often adopted in other sub-fields of psychology (e.g., social, developmental, and clinical), in other disciplines (e.g., neuroscience, computer science, and linguistics), and in numerous applications (e.g., education, industry, and business), learning about them will be useful, and often instrumental, for learning about related areas.

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

These two themes will permeate most of the material presented in this course.

**Syllabus**

The syllabus can be found on the Blackboard site for the course by going to:

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

Once you have logged onto this site and found Psychology 215, you will find the syllabus under Course Documents.

**Readings**

The reading assignments for the course are listed with the course schedule, with the full references provided in the reference section. 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. Most 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 present. Students interested in pursuing

lecture material further are encouraged to explore these readings, and the articles cited in them. The instructor and TA will also be glad to suggest additional readings.

Readings must be done by the due date, given that the in-class exercises (described shortly) typically 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 five 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 2-3 pages, along with other activities.

As the time for each assignment approaches, it will be discussed in class. Assignments may be turned in to the TA any time prior to the due date, not only on 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.

The forms for the assignments will *not* be distributed in class, but must be downloaded from the course's Blackboard site, under Course Documents.

### **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 an A based solely on the exams and take-home assignments (i.e., achieving 100% of the course points is possible). Meeting the extra credit criterion will only raise a student's grade (up to a maximum of 105 percentage points). Failing to meet the extra credit criterion will not lower a grade. Again, however, students are strongly encouraged to perform the in-class exercises, given that they will not only help learn the material, but also help in learning to use it creatively, to see its applications, etc.

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. If you turn in an exercise that we score as incomplete, and if you disagree, we will be happy to discuss it with you. In-class exercises will not be returned but can be reviewed in the TA's office if desired.

## Lecture Outlines

Each student should download the 26 lecture outlines Course Documents section of the Blackboard site for the course, and then print the outline. Because the outline files are rather large (up to 17 MB each), it is best to download them over a fast connection, such as via a University computer, or a DSL line.

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. Printing out the larger slides has two advantages: (1) You can see more detail in the slides. (2) You have more space for writing notes, which will be necessary for doing well on the exams. Also, if you print out the slides in color, they will show detail that will be easier to see than in the black and white slides.

Bring the outlines to the lectures, given that they will enhance your ability to follow the lectures and to take 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

Importantly, the outlines are *not* complete accounts of the lecture material. Many areas are left blank where notes need to be taken. If you see a blank area, there is material presented that you will be responsible for on exams. Whenever you see a heading in an outline without material below, view this as a cue for taking notes on the relevant material presented in the lecture. In general, the outlines contain the following material:

- headings and sub-headings of the material to be covered, so that the organization is clear
- detailed information about research methods
- detailed information about complex concepts

Typically, the outlines do *not* contain the following material, where notes should be taken:

- the general issues in an area
- the hypotheses that motivated an experiment
- interpretations and implications of experimental results
- other issues associated with an experiment or a research area

Taking notes in these sections will help you organize and interpret the more detailed information that you will be receiving about methods and results. By understanding the high-level points that go in these sections and writing them down, you will greatly enhance what you learn from the course. Exam questions will often draw on the points in these sections, although you are responsible for knowing the general structure of the methods and results.

Often, we will start a new lecture on the same day that we end a lecture, so please bring all outlines for class that will be relevant for the current day.

## Recording the Lectures

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

## Cell Phones and Conversation

Please turn off all cell phones during class, and refrain from conversation and all other activities that create distractions for nearby students. Students who consistently violate this policy will be asked to leave.

## Exams

There will be 4 quizzes during regular class meetings. Each of the first 3 quizzes only covers the previous 3 topics and their readings (i.e., the previous 6 lectures). The final quiz covers the previous 4 topics and their readings (i.e., the previous 8 lectures). In other words, the quizzes are *not* cumulative. Each quiz will begin promptly at the beginning of the scheduled class period, and last 20 minutes. A lecture that begins the next topic will follow for the remainder of the period (except following Quiz #4).

Unlike the quizzes, the final *will* be cumulative across all topics, lectures, and readings in the course.

All exams will only contain multiple-choice questions. 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 exams will test major points of understanding rather than picky details.

Each quiz will contain 2 multiple choice questions for each lecture. Thus, the first 3 quizzes will each have 12 multiple choice questions (6 lectures X 2 questions each). The 4<sup>th</sup> quiz will have 16 multiple choice questions (i.e., because it covers 4 topics instead of the usual 3). The final will also contain 2 multiple choice questions for each lecture (for a total of 52 questions).

## Exam Strategy

To do well on exams, you must do two things well. First, you must take good notes for every lecture. Second, you must do a good job of studying and learning the material in these notes prior to the exam. You will not do well on the exams just by coming to class and listening. You must also take good notes and study them. Students who do these two things almost always do well in the course.

Students tend to learn a lot from taking the first quiz. If you do not do well on the first quiz, use the experience to adjust your course strategies, and you are likely to do much better on later quizzes. Every year, we see many students adjust after the first quiz and do much better thereafter.

## Make-Up Policies

**In-class exercises.** Because you receive 5% extra credit by completing 22 of the 26 in-class exercises, there are no make-ups for in-class exercises missed due to absence. If you miss an occasional class, for whatever reason, you should still be present often enough to do 22 in-class exercises, thereby receiving extra credit.

If you must miss many classes for a justifiable and documented reason, an alternative means for handling the associated in-class exercises will be arranged. Valid excuses for being allowed to make up in-class exercises include medical illness, family obligation (e.g., a death in the family), extra-curricular activity (e.g., athletic competition), etc. Verification will be required in *every* case, and could be a note from a physician, a medical form, an obituary in a newspaper, etc. No make-ups will be allowed without valid verification. Religious holidays count as a valid excuse, but must be arranged a minimum of 2 weeks in advance.

Please direct all requests and justification for making up in-class exercises to the *TA and not to the instructor*. The TA will make *all* decisions about making up in-class exercises.

**Take-home exercises, quizzes, and the final.** If you cannot perform a take home exercise, a quiz, or the final on time for a justifiable and documented reason, an arrangement for performing it later will be arranged. Again, valid excuses include medical illness family obligation, extra-curricular activity, etc. Verification will be required in *every* case, and could be a note from a physician, a medical form, an obituary in a newspaper, etc. No make-ups will be allowed without valid verification. Religious holidays count as a valid excuse, but must be arranged a minimum of 2 weeks in advance.

Please direct all requests and justification for making up a take-home exercise, a quiz, or the final to the *instructor and not to the TA*. The instructor will make *all* decisions about making up take-home exercises, quizzes, and the final.

Making up a quiz or the final will be proctored by staff in the Department of Psychology. Arrange a time to make up the exam with the instructor. Then present yourself to the receptionist in the Psychology office, say that you're taking a make up exam for Psychology 215, and the receptionist will handle the quiz from there.

**Making up quizzes or the final without a valid excuse.** If you miss a quiz or the final and do *not* have a valid excuse, you may still take a make-up. The points that you receive for the exam, however, will be reduced by 50%. For example, if you receive 6 of 8 points on a make-up quiz, you will actually only receive 3 points. If you don't make up the exam, you will lose all points for it. Of course, students with a valid excuse will receive full credit for all the points that they earn on a make-up exam.

Please note that a strict policy for make up exams is followed in large part out of fairness to students who take exams on time. It would be unfair to allow students without valid excuses to take exams at later times than everyone else.

**Consulting with the College's Office for Undergraduate Education (OUE).** If you like, you may consult with OUE about making up any course requirement. Note, however, that OUE *cannot require* that the TA or instructor grant a request for making up an in-class exercise, take-home exercise, or quiz. For each of these course requirements, it is the TA or instructor who has the jurisdiction to make the final decision, not OUE. You may still consult OUE, and ask that OUE make a recommendation to the TA or instructor about making up one of these requirements. Again, however, the final decision rests with the TA or instructor.

OUE can only *require* that the instructor allow a make up for the *final*, if OUE determines that the student has a valid excuse. Essentially, you should primarily consult OUE if you request a make-up final from the instructor first (with no point reduction for lack of an adequate excuse), and the instructor does not grant your request. If the instructor grants your request, there is no need to consult OUE.

Here is the contact information for OUE if you would like to consult them about a make-up:  
Office For Undergraduate Education (OUE)  
Emory College Office (White Hall 300)  
(404) 727-6069

## 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 graded on scale from 0 to 10 points. Assignments will lose 1 point for each additional day turned in late without a valid excuse (see Make-Up Policies). Take home assignments count for 30% of the final grade, such that each assignment counts for 6%.

### Quizzes

The quizzes will count for 32% of the final grade, such that each quiz counts for 8%. Please note that the actual number of points on a quiz will not be 8 (i.e., this is the percent of the grade, not the actual number of quiz points). For each of the first 3 quizzes the total number of quiz points will be 24 (i.e., 2 points for each of 12 multiple-choice questions). For the 4<sup>th</sup> quiz, the total number of points will be 32 (i.e., 2 points for each of 16 multiple-choice questions).

## Final

The final will count for 38% of the final grade. The total number of points is 104 (i.e., 2 points for each of 52 multiple-choice questions).

## In-Class Exercises

Each in-class exercise will receive 1 point if completed, and 0 if not. See the earlier sections on In-class Exercises and Make-Up Policies for details about grading and make ups. Again, 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.

## Final Grades

The composition of the final grades will be as follows:

| <u>Graded Activity</u>            | <u>Points</u> |
|-----------------------------------|---------------|
| 5 take-home assignments (6% each) | 30            |
| 4 quizzes (8% each)               | 32            |
| final                             | 38            |
| total                             | 100           |

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 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.

## Grades on Blackboard

Scores for the take home assignments, quizzes, and final will all be posted on Blackboard's grade book for the course. We will also post the total number of in-class assignments that we've received from you as a running total, once after each of the four quizzes. Please note that all these scores will be posted as *raw points*, not as the *scaled points* defined above for how various things are weighted. If you want to know your weighted scores, you can compute them yourself using the weights above.

At the end of the course, once we've computed the final grades, we'll also post the total number of *scaled* course points you received (out of 100), both before and after we apply any benefit of receiving extra credit for the in-class exercises. We will also post the final letter grade that you received for the course. If you turned in 22 or more of the in-class assignments, your letter grade will reflect this.

## Doing Well in the Course

There are two keys for doing well. First, come to class regularly, and turn assignments in on time. Second, take good notes, and study them well. This course is designed around regular student participation. If you come to class regularly, do all your assignments, and study well,

you are very likely to receive an A or at least a B in the course. Almost always, students who don't come to class regularly are the ones who do poorly.

## 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 five 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 doing so 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 of class, unless approved by the instructor or TA.

## Classroom Procedures When Taking Quizzes

When arriving in the classroom to take a quiz, first take all packs, purses, and other containers to the front of the classroom and leave them there. When you take a seat, there should be no one sitting next to you in the chair on either side. You should have nothing at your seat except the quiz and a pencil or pen. Also, please leave cell phones and headsets in your packs and purses. Use of a cell phone or headset during the quiz will be considered a violation of the Honor Code.

Upon completing a quiz, turn it over on your desk, and *do not pass it in* until requested. When the time for the quiz is over, each row will be asked, one at a time, to pass in the quizzes. You *may not continue working on your* quiz as the quizzes in your row are passed in. Marking of a quiz as it is passed in will be considered a violation of the Honor Code.

After all quizzes have been handed in, we will take a short break. At this time, please come forward, retrieve your belongings, and return to your seat. The next lecture will follow shortly.

The instructor and TA sincerely apologize for having to follow this procedure. Please understand, however, that we only do so to ensure that all students take a quiz under equal conditions, and that no one has an unfair advantage in the curve when final grades are given. Our primary aim is to ensure that students who follow the rules do not receive lower grades because of students who don't follow the rules. Our general strategy is to prevent problems from arising in the first place, which is why we follow the above rules.

## Classroom Procedures When Taking the Final

When arriving in the classroom to take the final, first take all packs, purses, and other containers to the front of the classroom and leave them there. When you take a seat, there should be no one sitting next to you in the chair on either side. You should have nothing at your seat except the final and a pencil or pen. Also, please leave cell phones and headsets in your packs and purses. Use of a cell phone or headset during the final will be considered a violation of the Honor Code.

Upon completing the final, raise your hand for permission to bring the exam forward. Do not turn in your exam until the instructor or TA has indicated that you should do so. Once you receive permission, please turn in your exam, pick up your belongings, and depart through the

front door of the classroom. Handing anything to a student as you leave will be considered a violation of the Honor Code.

Again, we sincerely apologize for having to follow this procedure, and only do so to ensure that no one has an unfair advantage in the curve when final grades are given. Again, the primary purpose of these rules is to prevent problems from arising in the first place.

**Psychology Major Breadth Requirement and NBB Elective Requirement**

This course satisfies the Cognition and Development breadth requirement for Psychology majors. This course counts as an NBB elective.

**Writing Requirement**

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

## Course Schedule

| Topic                              | Date                       | Sub-topic   | Assignment due                    |
|------------------------------------|----------------------------|---|-----------------------------------|
| <b>1. Introduction</b>             |                            |   |                                   |
|                                    | Jan. 18                    | The study of cognition (history and background)   |                                   |
|                                    | Jan. 23                    | Cognition as embodied and situated                | Clark readings (3)                |
| <b>2. Perception and action</b>    |                            |   |                                   |
|                                    | Jan. 25                    | Perceptual systems                                |                                   |
|                                    | Jan. 30                    | The motor system                                  | Barsalou et al. article           |
| <b>3. Attention</b>                |                            |   |                                   |
|                                    | Feb. 1                     | Selective attention                               | Brain coloring assignment #1      |
|                                    | Feb. 6                     | Automaticity                                      | Bargh et al. reading              |
| <b>4. Episodic memory</b>          |                            |   |                                   |
|                                    | Feb. 8                     | Memory systems                                    | <b>Quiz on Topics 1-3</b>         |
|                                    | Feb. 13                    | Memory processes                                  | Loftus reading                    |
| <b>5. Working memory</b>           |                            |   |                                   |
|                                    | Feb. 15                    | Structure and function                            |                                   |
|                                    | Feb. 20                    | Imagery   | Amnesia assignment #2             |
| <b>6. Categorization</b>           |                            |   |                                   |
|                                    | Feb. 22                    | The variability problem and categorization models | Biederman reading                 |
|                                    | Feb. 27                    | The neural bases of categories                    |                                   |
| <b>7. Concepts and knowledge</b>   |                            |   |                                   |
|                                    | Mar. 1                     | Conceptual structure                              | <b>Quiz on Topics 4-6</b>         |
|                                    | Mar. 6                     | Conceptual processes                              | Imagery Assignment #3             |
| <b>8. Construal</b>                |                            |   |                                   |
|                                    | Mar. 8                     | Construal in perception                           | Ramachandran and Hirstein reading |
|                                    | Spring Break (March 12-16) |   |                                   |
|                                    | Mar. 20                    | Construal in cognition                            |                                   |
| <b>9. Language</b>                 |                            |   |                                   |
|                                    | Mar. 22                    | Properties of language                            |                                   |
|                                    | Mar. 27                    | Language comprehension                            | Zwaan and Madden reading          |
| <b>10. Thought</b>                 |                            |   |                                   |
|                                    | Mar. 29                    | Decision making                                   | <b>Quiz on Topics 7-9</b>         |
|                                    | Apr. 3                     | Reasoning   | Newspaper assignment #4           |
| <b>11. Learning and plasticity</b> |                            |   |                                   |
|                                    | Apr. 5                     | Learning in problem solving                       |                                   |
|                                    | Apr. 10                    | Plasticity  | Elman et al. reading              |
| <b>12. Social cognition</b>        |                            |   |                                   |
|                                    | Apr. 12                    | Emotion, individuals, and the self                |                                   |
|                                    | Apr. 17                    | Implicit social cognition                         |                                   |
| <b>13. Cultural cognition</b>      |                            |   |                                   |
|                                    | Apr. 19                    | Cultural universals                               | Gentner & Levinson readings (2)   |
|                                    | Apr. 24                    | Cultural divergences                              | Decision making assignment #5     |
| <b>14. Other</b>                   |                            |   |                                   |
|                                    | Apr. 26                    | Quiz only, no lecture                             | <b>Quiz on Topics 10-13</b>       |
|                                    | May 3                      | Final, Thursday, 4:30 – 7:00 PM, White Hall 205   | <b>Cumulative Final</b>           |

## 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)
- Barsalou, L.W., Niedenthal, P.M., Barbey, A., & Ruppert, J. (2003). Social embodiment. In B. Ross (Ed.), *The Psychology of Learning and Motivation*, Vol. 43 (pp. 43-92). San Diego: Academic Press.
- 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.
- Loftus, E.F. (2003). Make-believe memories. *American Psychologist*, *58*, 864-873.
- 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. (2005). Embodied sentence comprehension. In D. Pecher and R. Zwaan (Eds.), *Grounding cognition: The role of perception and action in memory, language, and thinking* (pp. 224-245). 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 and mind: Let's get the issues straight*. *Language in mind* (pp. 25-46). 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* (2<sup>nd</sup> 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.

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## 5. Categorization

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