

**Cognition
Psychology 215
Emory University
Fall 2005**

Time and Location

Tuesdays and Thursdays, 11:30–12:45 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/2005-Fall/cognition.html>

It can also be found for the class on Blackboard 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. 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 later 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. The forms for the assignments will *not* be distributed in class, but must be downloaded from:

<http://userwww.service.emory.edu/~barsalou/Courses/2005-Fall/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.

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. Meeting the extra credit criterion will only raise a student's grade. 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.

There are no make-ups for in-class exercises missed due to absence. 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.

Valid excuses for missing an in-class exercise and being allowed to make it up include medical illness or family obligations (e.g., a death in the family). 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.

Lecture Outlines

Each student should download the 26 lecture outlines from the web and print them out. 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

Because these files are rather large (typically 1 to 4 MB), it would be best to download them over a fast connection, such as via a University computer, or a DSL line.

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 for 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 (up to 17 MB), and will take a long time to download via a standard modem over a phone line.

Printing out the larger pdf 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. One other thing perhaps worth noting is as follows: 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 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. Importantly, however, the outlines are *not* complete accounts of the lecture material. Therefore, taking additional notes is necessary to understand and fill out the outlines. 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. Please turn off all cell phones during class, and refrain from conversation and all other activities that create distractions for nearby students.

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 25 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 contain multiple-choice and short-answer 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. The short answer questions will *not* be open-ended assessments of creativity. Instead, they will assess your knowledge for specific aspects of the course material, much like the multiple-choice questions.

Each quiz will contain 2 multiple choice questions for each lecture, and 1 short answer question for each topic. Thus, the first 3 quizzes will each have 12 multiple choice questions (6 lectures X 2 questions each) and 3 short answer questions. The 4th quiz will have 16 multiple choice questions and 4 short answer 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), and 1 short answer question for each of the 4 sections of the course, where a “section” is a group of topics covered by a quiz (i.e., there will be 4 short answer questions on the final).

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 those 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. Also, 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 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.

Valid excuses for missing an exam and being allowed to make it up include medical illness or family obligations (e.g., a death in the family). 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.

All make-up exams 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 this course, and the receptionist will handle things from there.

If you miss an exam and do *not* have a valid excuse for missing it, 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.

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. Students who experience extenuating circumstances, validated 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, 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 36 (i.e., 2 points for each of 12 multiple-choice questions, and 4 points for each of 3 short answer questions). For the 4th quiz, the total number of points will be 48 (i.e., 2 points for each of 16 multiple-choice questions, and 4 points for each of 4 short answer questions).

Final

The final will count for 38% of the final grade. The total number of points will 120 (i.e., 2 points for each of 52 multiple-choice questions, and 4 points for each of 4 short answer questions).

In-Class Exercises

Each in-class exercise will receive 1 point if completed, and 0 if not. See the discussion earlier of in-class exercises 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 assignments. 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, this will have been figured into your final letter grade, and 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. In contrast, students who participate regularly do well.

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.

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			
	Sept. 1	The study of cognition (history and background)	
	Sept. 6	Cognition as embodied and situated	Clark readings (3)
2. Perception and action			
	Sept. 8	Perceptual systems	
	Sept. 13	The motor system	Barsalou et al. article
3. Attention			
	Sept. 15	Selective attention	Brain coloring assignment
	Sept. 20	Automaticity	Bargh et al. reading
4. Episodic memory			
	Sept. 22	Memory systems (Quiz on Topics 1-3)	
	Sept. 27	Memory processes	Loftus reading
5. Working memory			
	Sept. 29	Structure and function	
	Oct. 4	Imagery	Amnesia assignment
6. Categorization			
	Oct. 6	The variability problem and categorization models	Biederman reading
	Oct. 11	Fall Break (no class)	
	Oct. 13	The neural bases of categories	
7. Concepts and knowledge			
	Oct. 18	Conceptual structure (Quiz on Topics 4-6)	
	Oct. 20	Conceptual processes	Imagery Assignment
8. Construal			
	Oct. 25	Construal in perception	Ramachandran and Hirstein reading
	Oct. 27	Construal in cognition	
9. Language			
	Nov. 1	Properties of language	
	Nov. 3	Language comprehension	Zwaan and Madden reading
10. Thought			
	Nov. 8	Decision making (Quiz on Topics 7-9)	
	Nov. 10	Reasoning	Newspaper assignment
11. Learning and plasticity			
	Nov. 15	Learning in problem solving	
	Nov. 17	Plasticity	Elman et al. reading
12. Social cognition			
	Nov. 22	Emotion, individuals, and the self	
	Nov. 24	Thanksgiving (no class)	
	Nov. 29	Implicit social cognition	
13. Cultural cognition			
	Dec. 1	Cultural universals	Gentner & Levinson readings (2)
	Dec. 6	Cultural divergences	Decision making assignment
14. Other			
	Dec. 8	Quiz on Topics 10-13	
	Dec. 16,	Final, Friday, 4:30 – 7:00 PM, White Hall 205	

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* (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.