Core Seminar in Knowledge and Conceptual Processes
Psychology 507
Emory University
Fall 2001

Time and Location

Tuesdays and Thursdays, 1:00—2:15 PM
Psychology 302

Instructors

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Overview

This course is required of all graduate students in the Cognition and Development Program. Students from other psychology programs, other Emory departments, and other Atlanta universities are also welcome. The course begins by reviewing briefly the history of important previous work on knowledge and conceptual processes. Historical perspectives will be covered later for specific topics as well. For each topic, important issues, theories, findings, and methods will be addressed, using exemplary research as illustrations. In addition, each topic will be addressed from multiple perspectives, to the extent that work reflecting multiple perspectives exists. The perspectives most likely to be addressed include cognitive psychology, developmental psychology, cognitive neuroscience, and computational modeling.

Readings will typically be primary sources that cover theory, findings, and methods on the topics of interest. The specific readings selected will vary yearly to reflect the most current work in the field. In addition, background texts on cognition, development, cognitive neuroscience, and computational modeling are recommended. These texts will not be covered in the course, nor will they be required reading. Instead, they will provide tutorials as needed for students who lack strong background; they will also serve as reference sources for more experienced students who want to increase their background on specific topics.

Evaluation will be based on three sources: participation in the presentation and discussion of readings, submission of questions for the readings, and performance on written exams. The course may be taken Pass/Fail. Students taking the course Pass/Fail do not have to take the exams, but must participate regularly in presenting and discussing papers, and they must submit questions for readings. All first-year psychology students must take the course for a grade, as must all students in the Cognition and Development program who are using the course to satisfy a course requirement toward a degree.

Seminar Meetings

Readings. Prior to each seminar meeting, everyone should read the excerpts from the assigned readings. Although only excerpts are typically assigned, students are encouraged to read further in the articles if doing so is of interest. All assigned readings can be found on line in Woodruff's Library's electronic reserve.

Questions for readings. Students must prepare a question or comment on each reading. These questions should be submitted to the instructors via email before 3 p.m. the day before each class. The instructors will circulate these comments via email. The questions should be oriented toward promoting discussion of important issues, shedding light on things that aren't clear, etc. We encourage you to raise your questions during the course of class discussion.

Presentations and discussion. Students are required to regularly present articles for discussion, and are expected to do so equally often as other students. The presentation of an article should *not* cover it in detail—please assume that everyone has read the assigned excerpt carefully. Instead, presentations should simply refresh everyone's memory of what the point of the article was, its basic method, its general results, etc., and offer ideas, insights and points of discussion regarding the views and findings depicted. Typically the presentation of an article should take 5-10 minutes.

Exams

Midterm exams. There will be three in-class exams over the course of the semester, one on each third of the course. Exam questions will be drawn from the integrative questions at the end of the syllabus. Each exam will contain four of the questions from the respective third of the course.

Grading criteria for the essays. Typically, essays question will be graded on the following five criteria:

Completeness. Did the essay address *all parts of the question*? A serious attempt to answer all parts of the question will receive full credit, even if parts of the essay are weak, incorrect, etc. Failure to address part(s) of a question will reduce credit.

Study. Does the essay show clear evidence of *carefully studying* the content of the readings and discussions? Also does the essay attempt to integrate points and findings from most relevant parts of the readings and discussions. To the extent that an essay shows careful study (*correct* description of findings) and broad study (*full utilization* of findings), maximum credit will be given. To the extent that careful and broad study appears lacking, credit will be reduced.

Coherence. Is the essay *coherent*? A serious attempt to integrate *all parts of the argument* coherently will receive full credit. To the extent that an essay is a haphazard list of points, credit will be reduced. Ideally, an essay should make a coherent argument, or be coherent in some other way. It should be clear how the various sections of the essay relate, and the various sections should progress clearly and meaningfully.

Evidence. How well is *specific evidence* from the lectures and text used to support the main points of the coherent argument? To the extent that an essay just makes a set of general points, credit will be reduced. Neglecting to mention important and obvious findings from the readings and discussions will lower credit as well. Also, if the evidence mentioned does not really bear on a point, credit will be reduced. Typically, there will be no particular evidence that must be mentioned. Of primary importance is mentioning a *sufficient amount* of evidence at a sufficiently specific level to justify the claims made.

Creativity. Does the essay indicate *creative attempts* to develop ideas and insights not present in the course materials? Does the essay indicate an attempt to discover a *thoughtful solution* to the problem posed in the question? To the extent that an essay simply reiterates course material and goes no further, credit will be reduced.

When students receive a graded essay back, the scores on each of the relevant sub-scales will be indicated. Examples of excellent essays will be distributed to help students learn how to write on the questions effectively. Also, the instructors will be available to help students develop good strategies for preparing answers.

Final Grades

For students taking the course for a grade, the various materials that each student develops will be weighted as follows:

Exams	75%
Participation/presentations	15%
Weekly question	10%

For students taking the course Pass/Fail, satisfactory performance on presentations, questions, and discussions is required to pass.

Final grades are not determined strictly by absolute levels of performance, nor strictly by curve. Typically, both factors are taken into to 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 will dominate to ensure that a reasonable number of students receive high grades. These are only rules of thumb, with the particular grading policy adopted reflecting the attitudes and abilities of the students taking the course, the difficulty of the assignments, the grading standards of the instructors, and so forth.

Background Texts

The following texts are not required reading. However, they may be used as reference sources when students deem necessary or useful. Specifically, these texts provide tutorials for students who lack strong background; they also serve as reference sources for more advanced students who need to increase their background on specific topics. Some of these texts are available at the University bookstore.

Text on Cognition

Eysenck, M.W., & Keane, M.T. (1995). *Cognitive psychology: A student's handbook* (3rd edition). Mahwah, NJ: Erlbaum.

Texts on Development

Bremner, J.G. (1994). *Infancy* (2nd ed.). Cambridge, MA: Blackwell.

Flavell, J.H., Miller, P.H., & Miller, S.A. (1993). *Cognitive development* (3rd. ed.). Englewood Cliffs, NJ: Prentice Hall.

Kellman, P. & Arterberry, M.E. (1998). *The cradle of knowledge: Development of perception in infancy.* Cambridge: M.I.T. Press.

Text on Cognitive Neuroscience

Gazzaniga, M.S., Ivry, R.B., & Mangun, G.R. (1998). *Cognitive neuroscience: The biology of the mind.* New York: Norton.

Johnson, M. (1997). *Developmental cognitive neuroscience*. Oxford, U.K.:Blackwell Publishers.

Texts on Computational Modeling

Anderson, J.A. (1997). *An introduction to neural networks.* Cambridge, MA: MIT Press. [a more advanced text]

Bechtel, W., & Abrahamsen, A. (1991). *Connectionism and the mind: An introduction to parallel processing in networks.* Cambridge, MA: Basil Blackwell. [an elementary text]

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, USA: MIT Press

Course Schedule

Topic Date Sub-topic / Required Readings [assigned pages]

1. Introduction and background

Tues. Sept. 4 Course orientation

Thurs. Sept. 6 Historical Background

Margolis, E., & Laurence, S. (1999). Concepts and cognitive science. In E. Margolis & S. Laurence (Eds.), *Concepts: Core readings* (pp. 3-81). Cambridge, MA: MIT Press. **[read pages 3-26, 52-71]**

2. Category Learning

Tues. Sept. 11 Category learning: Children

Smith, L. B. & Samuelson, L. K. (1997). Perceiving and remembering: Category stability, variability and development. In Lamberts, K. & Shanks, D. R. (Ed). *Knowledge, concepts and categories. Studies in cognition*. (pp. 161-195). Cambridge, MA: MIT Press. **[read 161-182]**

Gelman, S.A., & Coley, J.D. (1991) Language and categorization: The acquisition of natural kind terms. In Gelman, S.A. & Byrnes, J.P. (Eds.) *Perspectives on language and thought: Interrelations in development,* 146-197 **[read 146-180].**

Gentner, D. & Namy, L.L. (1999). Comparison in the development of categories. *Cognitive Development, 14,* 487-513. **[read 487-493, 500-509]**

Thurs. Sept. 13 Category learning: Children

Madole, K. L. & Oakes, L. M. (1999). Making sense of infant categorization: Stable processes and changing representations. *Developmental Review, 19*, 263-296. **[read all]**

Mandler, J. M. (1999). Seeing is not the same as thinking: Commentary on "Making sense of infant categorization." *Developmental Review, 19*, 297-306. **[read all]**

Mareschal, D., French, R.M., & Quinn, P.C. (2000). A connectionist account of asymmetric category learning in early infancy. *Developmental Psychology, 36,* 635-645. **[read all]**

Tues. Sept. 18 Category learning: Adults

Barsalou, L.W., & Hale, C.R. (1993). Components of conceptual representation: From feature lists to recursive frames. In I. Van Mechelen, J. Hampton, R. Michalski, & P. Theuns (Eds.), *Categories and concepts: Theoretical views and inductive data analysis* (pp. 97-144). San Diego, CA: Academic Press. **[read all]**

Thurs. Sept. 20 Category learning: Adults

Nosofsky, R.M. (1984). Choice, similarity, and the context theory of classification. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 10,* 104-114. **[read pages 104-107]**

Nosofsky, R.M. (1988). Similarity, frequency, and category representations. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 14,* 54-65. **[read pages 54-60]**

Smith, J.D., & Minda, J.P. (1998). Prototypes in the mist: The early epochs of category learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 24,* 1411-1436. **[read all]**

3. Representation

Tues. Sept. 25 Representation

Rumelhart, D.E., & Norman, D.A. (1988). Representation in memory. In R.C. Atkinson, R.J. Herrnstein, G. Lindzey, & R.D. Luce (Eds.), *Stevens' handbook of experimental psychology: Vol. 2. Learning and cognition* (pp. 511-587). New York: Wiley. **[read pages 511-575]**

Thurs. Sept. 27 Representation

Mandler, J. M. (1998). Representation. In Kuhn. D. & Siegler, R. (Ed.) *Handbook of Child Psychology, Vol. 2.: Cognition, Perception and Language* (pp. 255-308) New York, NY: John Wiley & Sons, Inc. **[read 268-301]**

Tues. Oct. 2 Exam #1

4. Representational Mappings

Thurs. Oct. 4 Similarity

Tversky, A. (1977). Features of similarity. *Psychological Review, 84*, 327-352. [read 327-344]

Medin, D. L., Goldstone, R.L., & Gentner, D. (1993). Respects for similarity. *Psychological Review, 100*, 254-278. **[read pages 254-270]**

Tues. Oct. 9 The theory-theory

Murphy, G.L., & Medin, D.L. (1985). The role of theories in conceptual coherence. *Psychological Review, 92*, 289-316. **[read pages 289-306]**

Kaplan, A.S., & Murphy, G.L. (2000). Category learning with minimal prior knowledge. *Journal of Experimental Psychology: Learning, Memory, & Cognition, 26*, 829-846. **[read pages 829-836, 840-845]**

Smith, E.E., & Sloman, A. (1994). Similarity- versus rule-based categorization. *Memory & Cognition, 22*, 377-386. **[read all]**

Thurs. Oct. 11 Analogy

Forbus, K. D., Gentner, D., & Law, K. (1995). MAC/FAC: A model of similarity-based retrieval. *Cognitive Science, 19*, 141-205. **[read 141-178]**

Markman, A. B. & Gentner, D. (1993). Splitting the differences: A structural alignment view of similarity. *Journal of Memory & Language, 32*, 517-535. **[read all]**

Tues. Oct. 16 Fall break

5. Taxonomies and Conceptual Organization

Thurs. Oct. 18 The basic level

Rosch, E.H., Mervis, C.B., Gray, W.D., Johnson, D.M., & Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitive Psychology, 8*, 382-439. **[read pages 382-406]**

Malt, B.C. (1995). Category coherence in cross-cultural perspective. *Cognitive Psychology, 29*, 85-148. **[read pages 85-97, 104-105, 110-111, 120-121, 128-141]**

Tues. Oct. 23 Other levels

Waxman, S. R., Lynch, E. B., Casey, K. L., & Baer, L. (1997). Setters and samoyeds: The emergence of subordinate level categories as a basis for inductive inference in preschool-age children. *Developmental Psychology, 33*, 1074-1090. **[read 1074-1084]**

Callanan, M. A. (1985). How parents label objects for young children: The role of input in the acquisition of category hierarchies. *Child Development, 56*, 508-523. **[read all]**

Mandler, J. M., Bauer, P.J., & McDonough, L. (1991). Separating the sheep from the goats: Differentiating global categories. *Cognitive Psychology, 23*, 263-298. **[read 263-285]**

Mervis, C. B. (1987). Child-basic object categories and early lexical development. In Neisser, U. (Ed). *Concepts and conceptual development: Ecological and intellectual factors in categorization. Emory symposia in cognition, 1.* (pp. 201-233). New York, NY: Cambridge University Press. **[read 201-208, 219-231]**

Thurs. Oct. 25 NO CLASS (Cog Dev Society)

Tues. Oct. 30 Goal-based organizations

Barsalou, L.W. (1991). Deriving categories to achieve goals. In G.H. Bower (Ed.), *The psychology of learning and motivation: Advances in research and theory* (Vol. 27, pp. 1-64). San Diego, CA: Academic Press. **[read pages 22-39, 45-58]**

Ross, B.H., & Murphy, G.L. (1999). Food for thought: Cross-classification and category organization in a complex real-world domain. *Cognitive Psychology, 38*, 495-553. **[read pages 495-518]**

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. **[read pages 555-569**

Thurs. Nov. 1 Expertise

Medin, D.L., Lynch, E.B., Coley, J.D., Atran, S. (1997). Categorization and reasoning among tree experts: Do all roads lead to Rome? *Cognitive Psychology, 32*, 49-96. **[read 49-57, 77-96]**

Johnson, K. E., & Eilers, A. T. (1998). Effects of knowledge and development on subordinate level categorization. *Cognitive Development,13*, 515-545. **[read all]**

Gauthier, I., Skudkarski, P., Gore, J. C., & Anderson, A. W. (2000). Expertise for cars and birds recruits brain areas involved in face recognition. *Nature Neuroscience, 3*, 191-197. **[read all]**

Tanaka, J. W., & Curran, T. (2001). A neural basis for expert object recognition. *Psychological Science,12*, 43-47. **[read all]**

6. Conceptual Change

Tues. Nov. 6 Conceptual change in scientific thinking

Gentner, D., Brem, S., Ferguson, R. W., Markman, A. B., Levidow, B. B., Wolff, P., & Forbus, K. D. (1997). Analogical reasoning and conceptual change: A case study of Johannes Kepler. *The Journal of the Learning Sciences, 6*, 3-40. **[read pages 10-35]**

Nersessian, N. J. (1992). How do scientists think? Capturing the dynamics of conceptual change in science. In Giere, R. N. (Ed.), *Cognitive models of science* (pp. 3-44). University of Minnesota Press. Minneapolis, MN. **[read pages 7-24, 30-35]**

Thurs. Nov. 8 Conceptual change in development

Carey, S. (1999). Sources of conceptual change. Scholnick, E. K., & Nelson, K. (Ed). *Conceptual development: Piaget's legacy. The Jean Piaget Symposium series*. (pp. 293-326). Mahwah, NJ: Lawrence Erlbaum Associates, Inc. **[read 293-317]**

Gutheil, G., Vera, A., & Keil, F. C. (1998). Do houseflies think? Patterns of induction and biological beliefs in development. *Cognition, 66*, 33-49. **[read all]**

7. Function

Tues. Nov. 13 Form/Function Relations and Young Children's Categorization

McCarrell, N. S., & Callanan, M. A. (1995). Form-function correspondences in children's inference. *Child Development, 66*, 532-546. **[read all]**

Kemler Nelson, D. G. (1999). Attention to functional properties in toddlers' naming and problem-solving. *Cognitive Development, 14*, 77-100. **[read all]**

Rakison, D. H., & Cohen, L. B. (1999). Infants' use of functional parts in basic-like categorization. *Developmental Science, 2*, 423-431. **[read all]**

Thurs. Nov. 15 NO CLASS (Psychonomics)

Tues. Nov. 20 Role of Function in Artifact Concepts

Matan, A., & Carey, S. (2001). Developmental changes within the core of artifact concepts. *Cognition, 78*, 1-26. **[read 1-14, 17-22]**

Bloom, P. (1996). Intention, history, and artifact concepts. *Cognition, 60*, 1-29. **[read all]**

Malt, B., & Johnson, E. C. (1998). Artifact category membership and the intentional-historical theory. *Cognition, 66*, 79-85. **[read all]**

Lin, E. L., & Murphy, G. L. (1997). Effects of background knowledge on object categorization and part detection. *Journal of Experimental Psychology: Human Perception & Performance, 23*, 1153-1169. **[read 1155-1163]**

Thurs. Nov. 22 Thanksgiving

8. Conceptual Combination

Tues. Nov. 27 Conceptual representations of noun phrases

Hampton, J.A. (1997). Conceptual combination. In K. Lamberts & D. Shanks (Eds.), *Knowledge, concepts, and categories*. (pp. 133-159). Cambridge, MA: The MIT Press. **[read all]**

Wisniewski, E. J. (1997). When concepts combine. *Psychonomic Bulletin & Review, 4*, 167-183. **[read all]**

9. Sensory-Motor Grounding of Knowledge

Thurs. Nov. 29 Neural evidence

Gainotti, G., Silveri, M.C., Daniele, A., & Giustolisi, L. (1995). Neuroanatomical correlates of category-specific semantic disorders: A critical survey. *Memory, 3*, 247-264. **[read all]**

Pulvermüller, F. (1999). Words in the brain's language. *Behavioral and Brain Sciences*, *22,* 253-336. **[read pages 267-272]**

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. **[read all]**

Tues. Dec 4 Theories: Adult

Glenberg, A.M. (1997). What memory is for. *Behavioral and Brain Sciences*, *20*, 1-55. **[read pages 3-17]**

Barsalou, L.W. (1999). Perceptual symbol systems. *Behavioral and Brain Sciences, 22*, 577-660. **[read pages 577-603]**

Thurs. Dec 6 Theories: Developmental

Jones, S. S., & Smith, L. B. (1993). The place of perception in children's concepts. *Cognitive Development 8*, 113-139. **[read all]**

Responses to Jones and Smith (1993) by Mandler, Mervis et al., Gelman & Medin, Barsalou, *Cognitive Development, 8*, 141-188. **[read 141-179]**

Tues. Dec. 11 Behavioral evidence

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. **[read pages 212-224]**

Zwaan, R.A., Stanfield, R.A., Yaxley, R.H. (in press). Do language comprehenders routinely represent the shapes of objects? *Psychological Science.* **[read all]**

Spivey, M., Tyler, M., Richardson, D., & Young, E. (2000). Eye movements during comprehension of spoken scene descriptions. *Proceedings of the 22nd Annual Conference of the Cognitive Science Society,* (pp.487-492). Mahwah, NJ: Erlbaum. **[read all]**

Glenberg, A.M., & Kaschak, M.P. (2001). Grounding language in action. Brief report submitted for publication. **[read all]**

Integrative Questions

Topic 1: Historical background

1. Based on our meetings since the first one, how has research on knowledge and conceptual processes pursued classical themes in philosophy? In what ways has it headed off in new directions? In what ways have important issues been ignored?

Topic 2: Category Learning

1. What model of adult categorization seems best suited for explaining child categorization? What additions might be necessary for adult models to do a better job?
2. What types of information are central to child categorization? Do some types of information seem more important than others? Do the important types of information change or evolve over development? If so, how?
3. Consider the categories used in child and adult research on categorization. Can we learn what we need to know about categorization from studying them? If so, explain why current categories can produce useful knowledge. Or do we need to study other categories as well? If so, what categories and why?
4. Consider the two categories below, where Category A contains exemplars 1, 2, and 3, and Category B contains exemplars 4, 5, and 6. F is the form of the object (0=round, 1=square), S is size (0=small, 1=large), C is color (0=blue, 1=red), and P is position (0=left side of screen, 1=right). Describe how each of the following models would attempt to learn these two categories: exemplar, prototype, connectionist, rule-based. For each model, also describe the kinds of exemplars to which it would show the strongest transfer. Finally give an overall assessment of each model's performance on learning these categories.

Training exemplars

	Category A					Category B			
	F	S	C	P		F	S	C	P
E_1	1	1	1	1	E_4	0	0	0	0
E_2	1	0	1	0	E_5	1	0	1	1
E_3	0	1	0	1	E_6	0	1	0	0

Topic 3: Representation

1. In what ways do knowledge representation schemes go beyond the representations found in categorization models? What purposes might these additional mechanisms serve? To what extent should categorization models be revised to reflect these mechanisms, and how?
2. Consider the literatures on infant categorization, object representation, causality, agency, and so forth. To what extent is this evidence consistent with Piaget's, Mandler's, and Leslie's conceptions of the representational system's initial state and how it develops.

Topic 4: Representational Mappings

1. What roles does similarity play in categorization and representation?
2. In what tasks and under what conditions is simple similarity a useful and perhaps optimal form of processing. In what other tasks and under what other conditions are additional representational mechanisms, such as theories and alignment, necessary and optimal?
3. What is an intuitive theory? What mechanisms for categorization and representation could be used to capture them? Are they really the right construct? If so, justify. If not, what else would you suggest?

Topic 5: Taxonomies and Conceptual Change

1. What sorts of categories seem to be the most privileged in the human conceptual system? What evidence supports them being privileged? Why might they be privileged in terms of early category learning and in terms of the roles they play in conceptual processing throughout life?
2. How do more specific categories evolve out of basic level categories? Do the same basic mechanisms underlie the growth of subordinate categories and expert categorization?
3. Why might the human conceptual system contain multiple organizations of concepts, in particular, taxonomic organizations and event-based organizations? Are these two organizations independent, or do they interact in various ways? Explain. Under conditions is each most relevant?
4. To what extent are taxonomies represented explicitly in memory as opposed to implicitly? Are the relations between some levels more explicit than between others? Use findings and theories from categorization, representation, and conceptual mapping to justify your answers.

Topic 6: Conceptual Change

1. Does the conceptual system develop continuously and incrementally? Or does it undergo radical reorganization? Characterize either course of development using representational mechanisms from earlier parts of the course.
2. Optimally speaking, is continuous or abrupt change superior for understanding the world in the long run? Specify your answer once each for development and for science? Also, how does conceptual change in science parallel and/or depart from conceptual change in development? Are the two related or independent?

Topic 7: Function

1. During category learning, does function evolve out of form, or does form evolve out of function? Specify a theory of how form, function, and the relation between them develops during early concept learning.
2. Philosopher Bob purchased an artifact having a claw at the end of a handle, which was originally created for the purpose of scooping pasta from a serving bowl to a plate. Over time, however, he came to use it for scratching his back while reading papers in his office. One day, he saw a cockroach crawling across his desk and smashed it with this object. Consider the various papers in this section that focus on the role of intentionality in conceptualizing an object's function (e.g., Bloom, Malt). How would they explain Bob's functional understanding of this object? Where do they succeed; where do they fail; what else is needed?

Topic 8: Conceptual Combination

1. Select at least three phenomena from the section on conceptual combination. For each phenomenon, explain how the modal and amodal view would account for it.

Topic 9: Sensory-Motor Grounding of Knowledge

1. Consider the evidence in this section for modal views. How might amodal views attempt to handle them? How might we go about resolving this issue? What sources of evidence are likely to be critical?
2. How might the modal view represent the theories in the theory-theory, and account for the phenomena that motivated it?
3. Consider conceptual change over development and select at least two examples. Does this reflect a shift from modal to amodal representations? If so, explain. If not, describe how the modal view could explain these shifts.
4. Consider Glenberg's (1997) proposal that the cognitive system evolved to serve situated action. How might the conceptual system have evolved to support situated action? How might we want to reconstrue existing theories from this perspective? What new additions might be needed? Can you think of any novel predictions that such a view might make for knowledge and conceptual processing?