SPECIAL TOPICS IN COGNITIVE DEVELOPMENT
Cognitive Science 050.356/656
Psychological and Brain Sciences 200.356/656

Fall, 2006
Wednesdays 12:00- 2:30
Krieger Hall 234C
Instructors:
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Overview:
This advanced undergraduate and graduate course is designed to provide students with tools we think they need to carry out first-rate research on cognitive development. Cognitive development is not a field itself-- rather, the study of cognitive development is a powerful *approach* to studying the nature of the human mind. This approach requires understanding theoretical issues that span many fields, and understanding empirical approaches that draw on studies of animals, human infants, children and adults, both intact and impaired, using methods ranging from cognitive processing to measurement of brain activities. In our view, the successful study of cognitive development requires multiple approaches and knowledge that is both broad and deep. In this course, we will begin by discussing some large theoretical issues about the structure of the human mind and how to study it; and will then proceed to consider two specific case studies in cognitive development-- knowledge of objects, and knowledge of spatial language. These will serve as examples of how different theoretical, experimental, and computational approaches can enhance the study of a single domain.

Ethics Statement: The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition.

In addition, the specific ethics guidelines for this course are:

(1) You may discuss readings with your peers (and are encouraged to do so). However, all written work must be entirely your own.
(2) Any material that is directly taken from another source must be properly attributed (via quotation marks and citation).

For violations you witness, you may consult the associate dean of students and/or the chairman of the Ethics Board before reporting these to the Professor. See the guidelines on "Academic Ethics for Undergraduates" and the Ethics Board web site (http://ethics.jhu.edu) for more information.

Requirements:
This is an upper level seminar, and participation should reflect that. Weekly attendance in class is absolutely required, and it is assumed that all students will have thoroughly read all materials *before* coming to class. Everyone should be prepared to participate actively in class. To ensure substantive participation, students will be required to hand in-- at the outset of class-- three

questions for class discussion of the weekly materials (10% of your grade). At the beginning of each class, an assigned student will provide a very short synopsis of each reading (one reading per student). Students will be asked to volunteer the week before for the following week's readings. Everyone should plan on volunteering 2-3 times throughout the semester (20% of your grade). In addition, each student will write 5 position papers (3 pages each) throughout the semester. These position papers will state the problem(s) addressed in the readings, and will then evaluate the theory and/or data critically (50% of your grade). There will be no midterm or final exam.

Grades will be computed as follows:
20% Class participation
20% Presentations of readings
50% The five position papers (10% each)
10% Weekly questions

Schedule:

September 13: **No class but start reading; pick up syllabus from TA**

I. Theoretical Foundations
September 21: Modularity (≈ 55 pgs)

Fodor, J.A. (1985) Precis of The Modularity of Mind. Behavioral and Brain Sciences, Vol 8(1), Mar 1985. pp. 1-42.

Issues in the continuing study of modularity:

1) "Massive modularity". *[read only the first few sections pgs 628-631]*
Barrett, H. C. & Kurzban, R. (2006). Modularity in cognition: framing the debate. Psychological Review, 113(3), 628-647.

2) Modules can develop, not necessarily innate.
Karmiloff-Smith (1999) Modularity of mind. In R.A.Wilson and F. C. Keil (Eds,), MIT Encyclopedia of the Cognitive Science. pp. 558-560.

3) Brain-imaging and modularity *[read only what looks interesting to you, skim]*
Kanwisher, N. (1998). The modular structure of human visual recognition: Evidence from functional imaging. In: M. Sabourin, F. Craik & M. Robert (Eds.), Advances in psychological science, Vol. 2: Biological and cognitive aspects. pp. 199-213. Hove, England: Psychology Press/Erlbaum (UK) Taylor & Francis.

4) Fodor's Reply to Massive modularity
Fodor, J. (2003). The mind doesn't work that way: The scope and limits of computational psychology. Theory & Psychology, Vol 13(1), pp. 142-144.

September 28: Nativism and empiricism (≈ 90 pgs)

Gallistel, C.R., Brown, A., Carey, S., Gelman, R., & Keil, F. (1991) Lessons from animal learning for the study of cognitive development. In S. Carey & R. Gelman (Eds.), The epigenesis of mind: Essays on biology and cognition, pp.3-36. Hillsdale: Erlbaum.

Smith, L.B. & Katz, D. (1996) Activity-dependent processes in perceptual and cognitive development. In R. Gelman & T. Au (Eds.), Perceptual and cognitive development, 414-446. San Diego: Academic Press.

Case Study: Objects and Physical Knowledge: Connectionist Accounts

Elman, J. L.; Bates, E. A.; Johnson, M. H. (1996). Rethinking innateness: A connectionist perspective on development. pgs147-171. Cambridge, MA, US: The MIT Press.

October 4: Concept Learning (≈ 65 pgs)

Fodor, J.A. (1981). The present status of the innateness controversy. In Representations. Cambridge, Mass: MIT Press. pp. 257-316

[read only pgs 191-211]

Elman, J. L. (1990). Finding structure in time. Cognitive Science, Vol 14(2), 179-211.

October 11: Perception and cognition: Concepts (≈ 80 pgs)

Spelke, E.S., Breinlinger, K., Macomber, J. & Jacobson, K. (1992). Origins of knowledge. Psychological Review, 99, 605-632.

Scholl, B.J. & Leslie, A.M. (1999). Explaining infant's object concept: Beyond the perception/cognition dichotomy. In E. Lepore & Z. Pylyshyn (Eds.), What is cognitive science? Oxford: Blackwell, (pp. 26-73).

October 18: Perception and cognition: Development (≈ 17 pgs)

Mandler, J.M. (2004) A synopsis of The foundations of mind: Origins of conceptual thought (2004). Developmental Science, 7(5), 499-505.

Commentaries (same volume as Mandler main article)

Murphy, G.L. (2004). On the conceptual–perceptual divide in early concepts. (513-515)

Nelson, K. (2004). A welcome turn to meaning in infant development: commentary on Mandler's The foundations of mind: Origins of conceptual thought. (506–507)

Quinn, P.C. (2004). Multiple sources of information and their integration, not dissociation, as an organizing framework for understanding infant concept formation. (511–513)

Shutts, K., & Spelke, E.S. (2004). Straddling the perception– conception boundary. 507–511.

Response by Mandler:
Mandler, Jean M. (2004). On the other hand...Developmental Science, Vol 7(5), pp. 516-517.

October 25: Competence Performance, Dynamical Systems (≈ 60 pgs)

Thelen, E., Fisher, D. M. & Ridley-Johnson, R. (2002). The relationship between physical growth and a newborn reflex. Infant Behavior & Development, Vol 25(1), Special issue: 25th anniversary issue. 72-85

[read only the first 2 sections, "The Nativist Empiricist Dialogue" and "Knowing How To Act"]
Spelke, E. S. & Newport, E. L. (1998). Nativism, empiricism, and the development of knowledge. In W. Damon & R. M. Lerner (Eds.), Handbook of child psychology: Volume 1: Theorectical models of human development (5th ed.) . pp. 275-340. Hoboken, NJ, US: John Wiley & Sons, Inc.

Van Gelder, T. (1999) Dynamic approaches to cognition. In R.A.Wilson and F. C. Keil (Eds,), MIT Encyclopedia of the Cognitive Science. pp. 245-246.

[read pg. V (abstract), read pgs 107-130 paying attention to how well infants did when changing from crawling to walking, glance at actual data in pgs 57-97 as you read 107-130]
Adolph, K. E. (1997). Learning in the development of infant locomotion. Monographs of the Society for Research in Child Development, Vol 62(3), 1-140.

November 1: Comparative Psychology and Development (≈ 52 pgs)

Diamond, A. (1991). Neuropsychological insights into the meaning of object concept development. In S. Carey & R. Gelman (Eds.) The epigenesis of mind: Essays on biology and cognition. pp. 67-110. Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc.

Gómez, J. C. (2005). Species comparative studies and cognitive development. Trends in Cognitive Sciences, Vol 9(3), 118-125.

Case Study: Spatial Representations
Wang, R. F. & Spelke, E. S. (2002). Human spatial representation: Insights from animals. Trends in Cognitive Sciences, Vol 6(9), 376-382.

II. Case study: Spatial language

November 8: Acquiring and losing phonemes (≈ 60 pgs)

Kuhl, Patricia K.; Conboy, Barbara T.; Padden, Denise (2005). Early speech perception and later language development: Implications for the "critical period". Language Learning and Development, Vol 1(3-4), 2005. pp. 237-264.

Kuhl, P.K. (2004) Early language acquisition: Cracking the speech code. *Nature Reviews Neuroscience, 5* (11), 831-841.

Maye, J., Werker, J. F. & Gerken, L.A. (2002). Infant sensitivity to distributional information can affect phonetic discrimination. Cognition, Vol 82(3), B101-B111.

Iverson, Paul; Kuhl, Patricia K. (2000) Perceptual magnet and boundary effects in speech perception: Do they arise from a common mechanism? Perception & Psychophysics, Vol 62(4), 874-886.

November 15: Acquiring spatial language/ losing spatial contrasts (≈ 60 pgs)

Bowerman, M. and Choi, S (2003) Space under construction: Language-specific spatial categorization in first language acquisition. In D. Gentner and S. Goldin-Meadow (Eds.), Language in mind. Cambridge, Mass: MIT Press, pp. *387*-427.

Choi, S., McDonough, L., & Bowerman, M (1999) Early sensitivity to language-specific spatial categories in English and Korean. Cognitive Development, 14(2), 241-268.

November 22: Acquiring spatial language from spatial cognition? (≈ 50 pgs)

Hespos, S. J., & Spelke, E.S. (2004) Conceptual precursors to language. Nature, Vol 430(6998), 453-456

McDonough, L., Choi, S., & Mandler, J.M. (2003) Understanding spatial relations: Flexible infants, lexical adults. Cognitive Psychology, 46, 229-259.

Munnich, E. & Landau, B. (in preparation) Input and maturation in the acquisition of second language spatial semantics. (selected sections from this or Munnich's Ph.D. thesis)

November 29: Computational mechanisms for learning spatial terms (≈ 60 pgs)

Regier, T. (1996) The human semantic potential. Cambridge, Mass: MIT Press. Selected chapters.

Regier, T. (2003) Emergent constraints on word-learning: a computational perspective.

Trends in Cognitive Science, 7(6), 263-268.

Coventry, K. & Cangelosi, A. (2006) A psychologically plausible model for spatial language. http://www.tech.plym.ac.uk/soc/staff/angelo/epsrc/results.htm

December 6: Summing up