

Models of Categorization
Psychology 351 : Seminar in Cognitive Psychology
Fall 1999

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office hours: Tu/Th 11-12 (or by appointment)

Course Overview

The primary aim of this course is to provide a survey of some contemporary formal models of categorization. A secondary aim is to introduce techniques of mathematical and computational modeling in psychological theorizing. The structure of the course will be a combination of lecture and discussion.

Course Requirement

- ◇ 20-30 minute presentation of an empirical or theoretical papers (■'s) 20%
- ◇ 15-20 page paper on a topic of your choosing 50%
- ◇ 30 minute presentation of your paper 10%
- ◇ Class participation 20%

Course Readings

- ◇ Copies of articles and book chapters will be available in a folder in the Psychology mailroom. Other readings are available from me (■'s).

Schedule of Topics

- ◇ **Week 1 : Overview, Classical View, and Prototype Models**
 - Komatsu, L.K. (1992). Recent views of conceptual structure. *Psychological Bulletin*, 112, 500-526.
 - Medin, D.L. (1989). Concepts and conceptual structure. *American Psychologist*, 44, 1469-1481.
- ◇ **Week 2 : Representation and Similarity**
 - Shepard, R.N. (1980). Multidimensional scaling, tree-fitting, and clustering. *Science*, 210, 390-398.
 - Shepard, R.N. (1987). Toward a universal law of generalization for psychological science. *Science*, 237, 1317-1323.
 - Tversky, A. (1977). Features of similarity. *Psychological Review*, 84, 327-352.
- ◇ **Week 3 : More on Similarity**
 - Medin, D.L., Goldstone, R.L., & Gentner, D. (1993). Respects for similarity. *Psychological Review*, 100, 254-278.
 - Nosofsky, R.M. (1991). Stimulus bias, asymmetric similarity, and classification. *Cognitive Psychology*, 23, 94-140.

- ◇ **Week 4 : Introduction to Exemplar models**
 - Hintzman, D.L. (1986). "Schema abstraction" in a multiple-trace model. *Psychological Review*, 93, 411-428.
 - Medin, D.L., & Schaffer, M.M. (1978). Context theory of classification learning. *Psychological Review*, 85, 207-238.

- ◇ **Weeks 5 : The Generalized Context Model**
 - Nosofsky, R.M. (1984). Choice, similarity, and the context theory of classification. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 10, 104-114.
 - Nosofsky, R.M. (1986). Attention, similarity, and the identification-categorization relationship. *Journal of Experimental Psychology: General*, 115, 39-57.
 - Lamberts, K. (1997). Process models of categorization. In K. Lamberts & D.R. Shanks (Eds.), *Knowledge, concepts and categories. Studies in cognition.* (pp. 371-403). Cambridge, MA, USA: The MIT Press.

- ◇ **Week 6 : Categorization, Recognition Memory, and Automaticity**
 - Nosofsky, R.M. (1988). Exemplar-based accounts of relations between classification, recognition, and typicality. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14, 700-708.
 - Nosofsky, R.M., & Palmeri, T.J. (1997). An exemplar-based random walk model of speeded classification. *Psychological Review*, 104, 266-300

- ◇ **Week 7 : Rational Model of Categorization**
 - Anderson, J.R. (1990). *The adaptive character of thought.* Hillsdale, NJ: Erlbaum. Chapters 1 and 3. (on reserve in psychology mail room).
 - Anderson, J.R. (1991). The adaptive nature of human categorization. *Psychological Review*. 98, 408-429.

- ◇ **Weeks 8 and 9 : Connectionist Models of Categorization**
 - Gluck, M.A., & Bower, G.H. (1988). From conditioning to category learning: An adaptive network model. *Journal of Experimental Psychology: General*, 117, 227-247.
 - Kruschke, J. (1992). ALCOVE: An exemplar-based connectionist model of category learning. *Psychological Review*, 99, 22-44.
 - Kosslyn, S., & Koenig, O. (1992). Chapter 2 : Computation in the brain. In *Wet Minds* (pp.17-51). New York: The Free Press. (Optional)

- ◇ **Week 10 : General Recognition Theory**
 - Ashby, F.G., & Gott, R.E. (1988). Decision rules in the perception and categorization of multidimensional stimuli. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14, 33-53.
 - Ashby, F.G., & Lee, W.W. (1991). Predicting similarity and categorization from identification. *Journal of Experimental Psychology: General*, 120, 150-172.

◇ **Week 11 : Rule-based Models**

Erickson, M.A., Kruschke, J.K. (1998). Rules and exemplars in category learning.
Journal of Experimental Psychology: General, 127, 107-140.

Nosofsky, R.M., Palmeri, T.J., & McKinley, S.C. (1994). Rule-plus-exception model of classification learning. *Psychological Review*, 101, 53-79.

◇ **Week 12 : Interaction Between Perception and Conception**

Schyns, P.G., Goldstone, R.L., & Thibaut, J.P. (1998). The development of features in object concepts. *Behavioral and Brain Sciences*, 21, 1-54.

Goldstone, R.L. (1994). Influences of categorization on perceptual discrimination.
Journal of Experimental Psychology: General, 123, 178-200.

◇ **Week 13 : “Theory” Theories of Categorization**

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

◇ **Weeks 14-15 : Wrap-up and Presentation of Projects**

Note on the paper/project:

This paper should be on an original research topic that bears (at least loosely) on some theory (or theories) of similarity, categorization, concept formation, and related areas. Possibilities for projects include: applying one or more of the theories to account for data from some set of experimental phenomena; discussing how the various theories can (or cannot) be applied to issues in development, aging, or dementia; developing a new theory of similarity, categorization, or concept formation (or extending an existing theory in some way); elaborating upon one of the areas we discussed in class, with an emphasis on a critical evaluation of what has been done and what unanswered questions remain to be solved; design a set of experiments to contrast predictions of various models. I'd be especially interested in seeing how some of the ideas we discuss in class might be applied to your own area of research. I am generally very flexible with the topics of such paper. However, please okay all paper topics with me first. These papers should be submitted by the final week of class.