

Concepts

The concept of “concepts” in cognitive science aka

CONCEPTS

Cognitive Science 310 (01:185:310:01, #17872)

Prof. Jacob Feldman

Fall, 2015

“What is a concept, that the brain may know it, and the brain, that it may know a concept?”
[Apologies to Warren McCulloch]

What is a concept? An idea, an insight, a theory? An abstraction from experience, or an innate belief? The way our mind organizes the world, including the mental categories with which we represent it, is a central idea in cognitive science. This course aims to introduce students to the study of concepts from a broad interdisciplinary point of view, surveying how concepts are understood in Psychology, Philosophy, Computer Science, and Neuroscience. The emphasis is on both the diversity of conceptions of “concepts” in these disciplines, as well as on core principles they all share.

Class coordinates

Where: Frelinghuysen Hall (CAC), Room A6

When: Tuesdays and Fridays, 9:50am - 11:10am

Professor’s office hours: Psychology, Busch, Room A125. Thursdays 1-2pm.

TA: [EJ Green](#). Office hours: Fridays, 12-1pm, Dept. of Philosophy (106 Somerset St., 5th floor) room 529.

Schedule of topics and reading assignments

<i>Week:</i>	<i>Topic</i>	<i>Read:</i>
Week 1	Introduction: concepts	Murphy, Ch. 1; Seriès & Sprevak
<i>Note: NO CLASS on Tuesday Sept. 9 (Rutgers Monday schedule)</i>		
Week 2	Induction and concept learning	Murphy Ch. 2; Sober, 2009 ; Sloman & Lagnado, 2005
Week 3	Classical vs. fuzzy models of categories	Murphy Ch. 3; Medin & Smith, 1984 ; Fodor & Lepore, 1996
Week 4	Simplicity and its discontents	Murphy Ch. 4; Murphy & Medin, 1985 ; Feldman, 2003
— MIDTERM: Tuesday, Oct. 20, in class —		
Week 7	Meaning and reference	Block (forthcoming) ; Putnam, 1973
Week 8	Culture and language	Colapinto, 2007 ; Davidoff et al., 1999 ; Ojalehto & Medin, 2015
Week 9	Hierarchical representation of concepts	Murphy, Ch. 7
Week 10	Connectionism and	Waskan ; Friedenberg & Silverman,

	concepts	2006; Vasilev
Week 11	Neuroscience of concepts	Ashby & Ell (2001)
Week 12	Putting it all together	Quiroga et al. (2013)

Grading

25%: Midterm. In class, closed book. Tuesday, Oct. 20

25%: Essays. A number of short (2-page) essays will be assigned at irregular intervals throughout the course.

40%: Weekly reading responses (in Assignments on Sakai).

10%: Class participation. (Criteria determined by the whim of the professor. Basically, show up and try to participate in class discussions.)

There is no final exam in this course.

Text and readings

Primary Text:

- [Murphy, G. \(2002\) *The Big Book of Concepts*. Cambridge, MA: MIT Press.](#)

Supplementary readings (Preliminary list; more will be added later):

- Murphy, G. L., and Medin, D. L. (1985). The role of theories in conceptual coherence. *Psychological Review*, 92, 289-316.
- Seriès, P and Sprevak, M. (2015) From intelligent machines to the human brain. In Massimi, M., Carmel, D., Clark, A., Lavelle, J. S., Peacock, J., Prtichard, D., Richmond, A., Seriès, P, Smith, K. and Sprevak, M (eds.) *Philosophy and the sciences for everyone*. Abingdon, Oxon: Routledge.
- Sloman, S.A., & Lagnado, D. (2005). The problem of induction. In R. Morrison and K. Holyoak (Eds.). *Cambridge Handbook of Thinking & Reasoning*, New York: Cambridge University Press, pp. 95-116.
- Sober, E. (2009) Justified belief and Hume's problem of induction. From *Core questions in philosophy*. Pearson.

- Feldman, J. (2003) The simplicity principle in human concept learning. *Current Directions in Psychological Science*, 12(6), 227–232.
- Medin, D. & Smith, E. E. (1984) Concepts and Concept Formation. *Annual Review of Psychology*, 35, 113-138.
- Fodor, J. (1996): The pet fish and the red herring: why concepts aren't prototypes. *Cognition*, 58, 243—276.
- Putnam, H. (1973) Meaning and reference. In *The Journal of Philosophy*, Vol. 70, No. 19, pp. 699-711.
- Block, N. (forthcoming). Holism, mental and semantic. Forthcoming in *The Routledge Encyclopedia of Philosophy*.
- Colapinto, J. (2007). The interpreter. *The New Yorker*, April 2007.
- Davidoff, J., Davies, I. and Roberson, D. (1999). Colour categories in a stone-age tribe. *Nature* 398, 203–204.
- Ojalehto, B. L. and Medin, D. L. (2015) Perspectives on culture and concepts. *Annual Review of Psychology*, 66, 249–275.
- Waskan, J. Connectionism. *The Internet Encyclopedia of Philosophy*. On-line resource.
- Friedenber, J. and Silverman, G. (2006). The network approach: mind as a web. Ch. 7 of *Cognitive Science: An introduction to the study of the mind*. Sage.
- Vasilev, I. A deep learning tutorial: From perceptrons to Deep Networks. On-line resource.
- Ashby, F. G. and Ell, S. (2001) The neurobiology of human category learning. *Trends in Cognitive Science*, 5(5) 204–210.
- Shepard, R. (1987): Towards a universal law of generalization. *Science*, 237, 1317—1323.
- Jakel, F., Scholkopf, B., and Wichmann, F. (2008) Generalization and similarity in exemplar models of categorization: Insights from machine learning. *Psychonomic Bulletin and Review*, 15(2), 25—271.
- Quiroga, R. Q., Fried, I. and Koch, C. (2013). Brain cells for grandmother. *Scientific American*, 308, 30-35.

Course policies

“Graduation insurance.” If this is your last semester and you need to pass this course in order to graduate on time, email me before the midterm. If you don't ask before the midterm, “graduation insurance” will not be offered.

Final grades are final. Once grades are assigned after the final exam, grade changes will not be considered. Don't even ask. If you are having trouble with the material before that, email me or come to office hours.

Academic integrity. Cheating and other violations of academic integrity will not be tolerated in this course. The university's policy on academic integrity can be found [here](#).

Weather alerts. If there is bad weather (e.g., snow or threat of snow), class may be canceled, even if the university remains open. If so, I will send an email to the entire class via Sakai. So if you suspect bad weather, please check your email before coming to class.
