

Psychology 1654

Topics in Cognitive Development

Wed: 2-4 pm, Room 1050, William James Hall

Instructor: Elizabeth Spelke

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Office hours: Tuesday 1:30-2:30, WJH 1130

Overview

This seminar considers the origins and nature of human knowledge, by focusing on the development of knowledge in four broad domains: objects and intuitive physics, agents and action understanding, number and mathematics, and persons, minds and morality. The basic premise is that human cognitive development begins with a set of systems of core knowledge, and it grows exponentially, in uniquely human ways, as we combine concepts from across these systems to create new concepts and domains of understanding.

Format and requirements: By 2 pm Tuesday at the latest, you must have done the readings for the next day's class, and submitted a response paper in which you discuss a question that the readings raised for you. Each class, you will read one chapter from a forthcoming book and 1-2 papers that expand on or challenge the claims in the chapter. Over the course of the term, you also will read 2-3 additional papers and present their findings in class. The format of each class is discussion, not lecture, focused on the questions you and other students raise as well as other questions raised in the readings and presentations.

Toward the end of term, you will design an original research project on a topic related to the readings. You will present your project orally in a final class meeting, and in writing in a final paper (c. 10 pages, due one week after the class presentations). **Grading:** 50% response papers and class discussion; 25% class presentations (both of assigned papers and of their own proposed research), 25% final paper.

The goals of the class are to engage with ancient questions and with modern research that bears on them, in discussion with others. As an experimental effort to foster better discussions, I ask that laptops and smartphones be turned off during class, except in the rare case where they are utterly necessary for presenting findings or making a point during a presentation. (This shouldn't happen often: people worked on the questions we'll be discussing for millennia without them!)

Class Schedule

- 1 -- Jan. 25: Organization and overview
- 2 -- Feb. 1: Methods for studying core knowledge; space perception
- 3 -- Feb. 8: Objects and intuitive physics
- 4 -- Feb. 15: Agents and action understanding
- 5 -- Feb. 22: Persons and states of engagement
- 6 -- March 1: Core knowledge and human cognition: questions and debates
- 7 -- March 8: Language and conceptual combination
- March 15: No class – spring break.
- 8 -- March 20: Object kinds and tool use
- 9 -- April 4: Euclidean geometry
- 10 -- April 12: Mental states: beliefs and desires
- 11 -- April 19: Persons: minds, morals, and conscious experience
- 12 -- April 26: Student presentations

Readings

The primary readings come from a new, unpublished 2-part book titled “Core knowledge and human cognition.” We will read 5 chapters from the first part, “What infants know,” and 4 chapters from the second part, “How children learn.” Each week, we also will read 2-4 short papers, chosen based on student interests. Here is a tentative list:

Spelke, E. *Core Knowledge and Human Cognition*. Book in review.

Adolph, K. E., Kretch, K. S., & LoBue, V. (2014). Fear of heights in infants? *Current Directions in Psychological Science*, 23, 60-66.

Held, R., Ostrovsky, Y., deGelder, B., Gandhi, T., Ganesh, S., Mathur, U., & Sinha, P. (2011). Newly sighted cannot match seen with felt. *Nature Neuroscience*, 14, 551-553.

Chiandetti, C., & Vallortigara, G. (2011). Intuitive physical reasoning about occluded objects by inexperienced chicks. *Proceedings of the Royal Society B: Biological Sciences*. doi:10.1098/rspb.2010.2381

Stahl, A. E., & Feigenson, L. (2015). Observing the unexpected enhances infants' learning and exploration. *Science*, 348(6230), 91-94.

Mascalzoni, E., Regolin, L., & Vallortigara, G. (2010). Innate sensitivity for self-propelled causal agency in newly hatched chicks. *Proceedings of the National Academy of Sciences of the United States of America*, 107(9), 4483-4485.

Liu, S., Ullman, T., Tenenbaum, J., & Spelke, E. (2017). What’s worth the effort: 10-month-old infants infer the value of goals from the costs of actions.

Halberda, J., Mazocco, M. M. M., & Feigenson, L. (2008). Individual differences in non-verbal number acuity correlate with maths achievement. *Nature*, 455(7213), 665-668.

Meltzoff, A. N., & Moore, M. K. (1978). Imitation of facial and manual gestures by human neonates. *Science*, 198(4312), 75-78.

Warneken, F., & Tomasello, M. (2006). Altruistic helping in human infants and young chimpanzees. *Science*, 311(5765), 1301-1303.

Hamlin, J. K., Wynn, K., & Bloom, P. (2007). Social evaluation in preverbal infants. *Nature*, 450(7169), 557-559.

Tomasello et al. (2005). Understanding and sharing intentions: The origins of cultural cognition. *Behavioral and Brain Sciences*, 28, 675-735.

Csibra, G., & Gergely, G. (2009). Natural pedagogy. *Trends in Cognitive Sciences*, 13(4), 148-153. doi: 10.1016/j.tics.2009.01.005

Bloom, P. (2013). *Just babies: The origins of good and evil*. London: Bodley. Chapters 1 & 2.

Yoon, J. M. D., Johnson, M. H. & Csibra, G. 2008 Communication-induced memory biases in preverbal infants. *PNAS* 105, 13 690–13 695.

Xu, F. (2007). Sortal concepts, object individuation, and language. *Trends in Cognitive Sciences*, 11(9), 400-406.

Xu, F., Cote, M., & Baker, A. (2005). Labeling guides object individuation in 12-month-old infants. *Psychological Science*, 16(5), 372-377.

Dewar, K. & Xu, F. (2007). Do 9-month-old infants expect distinct words to refer to kinds? *Developmental Psychology*, 43, 1227-1238.

Dewar, K. & Xu, F. (2009). Do early nouns refer to kinds or distinct shapes? *Psychological Science*, 20(2), 252-257.

Futo, J., Teglas, E., Csibra, G. & Gergely, G. (2010). Communicative function demonstration induces kind-based artifact representation in preverbal infants. *Cognition*, 117(1), 1-8.

Landau, B. (2016) Update on 'What' and 'where' in spatial language: A new division of labor for spatial terms. *Cognitive Science*.

Amalric, M. & Dehaene, S. (2016). Origins of the brain networks for advanced mathematics in expert

mathematicians. *PNAS*, www.pnas.org/cgi/doi/10.1073/pnas.1603205113

Goldin, A. et al. (2011). From ancient Greece to modern education: Universality and lack of generalization of the Socratic dialogue. *Mind Brain & Education*, 5, 180-185.

Dillon, M. R., & Spelke, E. S. (in review). From map reading to Euclidian intuitions.

Hart, Y. et al. (in review). The statistical nature of geometric reasoning.

Onishi, K. H. & Baillargeon, R. (2005). Do 15-month-old infants understand false beliefs? *Science*, 308 (5719), 255-258.

Krupenye, C., Kano, F., Hirata, S., Call, J. & Tomasello, M. (2016). Great apes anticipate that other individuals will act according to false beliefs. *Science*, 354 (6308), 110-114.

Apperly, I. A. & Butterfill, S. A. (2009). Do humans have two systems to track beliefs and belief-like states? *Psychological Review*, 116 (4), 953-970.

Gray, H. M., Gray, K., & Wegner, D. M. (2007). Dimensions of Mind Perception. *Science*, 315(5812), 619. doi: 10.1126/science.1134475

Haidt, J. (2007). The new synthesis in moral psychology. *Science*, (Vol. 316) 998 -0302.

Reading Assignments

Week 2: [prologue](#) and [chapter 1, depth](#); [Adolph et al.](#); [Held et al.](#)

Week 3: [chapter 2, objects](#) (skim first half, read second half); [Chiandetti & Vallortigara](#); [Stahl & Feigenson](#); [Ostrovsky et al.](#)

Week 4: [chapter 3, agents](#); [Mascalzoni et al.](#); [Liu et al.](#); [Skerry et al.](#)

Week 5: [chapter 11, persons](#); [Warneken et al.](#); [Hamlin et al.](#); [Knobe & Prinz](#); [Griffiths](#)

Week 6: [chapter 12, minds, pp. 1-11](#); [Tomasello](#); [Csibra & Gergely](#); [Bloom](#); [Yoon](#)

Week 7: [chapter 7, language](#); [Pinker](#); [Ferry et al. \(2010\)](#); [Ferry et al. \(2013\)](#); [Bergelson & Swingley \(2012\)](#); [Bergelson & Swingley \(2013\)](#)

Week 8: [chapter 8, kinds](#); [Xu](#); [Xu et al.](#); [Dewar & Xu \(2007\)](#); [Dewar & Xu \(2009\)](#); [Futo et al.](#)

Week 9: [chapter 10, geometry](#); [Landau](#); [Amalric & Dehaene](#); look at one or more of: [Goldin et al.](#), [Dillon et al.](#); [Hart et al.](#)

Week 10: [chapter 12, minds, pp. 11-36](#); [Onishi & Baillargeon](#); [Krupenye et al.](#); [Apperly & Butterfill](#)

Week 11: chapter 12, minds, pp. 36-end; Gray et al., Haidt

Week 12: no assigned readings (student presentations)