

PSYC 789D
Advanced Cognitive Development
Spring 2019
(syllabus v3; 2/5/19)
Tuesdays 12:30 – 3:00 pm
Room: JMZ 1226

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Overview:

This course will review fundamental questions – and the empirical progress made toward answering those questions – regarding the development of conceptual thought in young children.

Our central focus will be a close reading of Susan Carey’s 2009 book, *The Origin of Concepts*. We will contrast empiricist arguments that root concepts in sensori-motor and/or perceptual primitives with Carey’s argument for a small number of innate, domain-specific systems of core cognition; in so doing, we will review contemporary findings regarding humans’ early-developing abilities to detect and reason about objects, number, and agents. Moving on, we will consider how these core systems introduce or interact with notions of causality, and we will assess the developmental relation between natural language and our capacities for categorization and abstract, kind-based reasoning. Finally, we will discuss the limits of what systems of core cognition may represent, and we will follow Carey’s discussion of how true examples of conceptual change may occur.

During the final 2 weeks of the semester, we will read and discuss the grand visions of other scholars – both those critical of Carey’s proposals and those sympathetic to it. We will read the precis of Cecilia Heyes’ new book, *Cognitive Gadgets*, as well as the commentaries and Heyes’ response (all forthcoming in *Brain and Behavioral Sciences*). And we will explore how similar debates about the role of innate learning mechanisms and representational structure are playing out in cutting-edge efforts in artificial intelligence.

Grading:

Attendance and participation	40%
Discussion posts	20%
Discussion leading	20%
Final paper	20%

Format:

This class is discussion-based. It is essential for students to arrive to class having engaged and reflected on the assigned readings, prepared to share their thoughts and pose questions. Class will be structured as follows:

- 1) Each week, the readings will comprise: a chapter in Carey's book and up to 2 additional articles. I will endeavor to keep the additional readings manageable, to ensure time for you to read slowly through the Carey chapter.
- 2) During the week preceding our class meeting, students will post a brief reflection on the assigned reading on an online discussion board (minimum ~300 words).
- 3) Each class meeting, at least two students will have specially designated roles:
 - a. A discussion leader for the Carey chapter.
 - b. A discussion leader for one or both of the assigned empirical papers. I will provide guidance to this discussant on additional background material that would be helpful to review.

Shared notes

To keep track of Carey's ideas, we will maintain two shared documents, via Google Docs:

- 1) Vocabulary, key terms, etc.
 - a. Each week, the Discussion Lead #1 is responsible for updating this document with new terms. Lead #1 should also add definitions from the current chapter. Please keep definitions as succinct as possible, but quotations of short passages are acceptable.
 - b. All students are invited to add their own terms and definitions as they read. Many terms will receive more elaborate or precise definitions as the book continues, so retrospective additions are welcome.
- 2) An outline of each chapter
 - a. Each week, the Discussion Lead #1 will also produce a succinct outline of the ideas and arguments that Carey offers. Because her argument is complex, developing a bird's eye view of its shape will be very helpful.

Empirical paper summaries

Each week, Discussion Lead #2 will write a short (!) summary of their assigned empirical paper. Prose is to be avoided; please keep this in outline form. Include bullet points and/or illustrations on the big picture issues, the specific research question(s), how the study was conducted, what the findings were, and how the authors interpret them with respect to the big picture. Without making this document too long, please include relevant observations from any additional reading you do (whether I recommend it, or whether you find more papers on your own).

In general, these summaries will fit on one double-side sheet of paper, unless we discuss otherwise.

Final paper

More to come on this. I want this to be useful to you; we can discuss ways to make it so. One possibility is to prepare a literature review or theoretical commentary on a topic you care about, as seen through the lens of this class.

Readings:

The main reading for the class is:

- Carey, S. (2009). *The origin of concepts*. Oxford University Press

If you are unable to obtain a copy, please let me know. Each week, a small number of additional readings will be posted on ELMS.

Campus Policies:

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics like:

- Academic integrity
- Student and instructor conduct
- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property

Please visit (<http://apps.gradschool.umd.edu/Catalog/policy.php>) for a list of campus-wide policies. Additional information is available at <http://apps.gradschool.umd.edu/Catalog/policy.php?the-academic-record>

Schedule Spring 2019

Note: This schedule is tentative; the topics and readings may change as new opportunities and needs arise (or snow falls!). All changes will be announced in class or via ELMS.

Date	Topic	Lead 1	Lead 2
1/29	Intro and Organization		
2/5	Chapters 1 + 2: “Some Preliminaries”; “The Initial Representational Repertoire”		
2/12	Chapter 3: “Core Object Cognition”		
2/19	Chapter 4: “Core Cognition: Number”		
2/26	Chapter 5: “Core Cognition: Agency”		
3/5	Chapter 6: “Representations of <i>Cause</i> ”		
3/12	Chapter 7: “Language and Core Cognition”		
3/19			
3/26	Chapter 8: “Beyond Core Cognition: Natural Number”		
4/2	Chapter 9: “Beyond the Numeral List Representation of Integers”		
4/9	Chapter 10: “Beyond Core Object Cognition”		
4/16	Chapter 11: “The Process of Conceptual Change”		
4/23	Chapter 12: “Conclusion I: The Origin of Concepts”		
4/30	Chapter 13: “Conclusion II: Implications for a Theory of Concepts”		
5/7	[Cecilia Heyes BBS]		
5/14	[Artificial systems; Marcus, Tenenbaum, etc.]		

Readings

For the first 13 weeks of the semester, please read the Carey chapter listed on the course schedule. Please also read the empirical articles planned to accompany these chapters. Selection of these empirical articles will be on-going, and partially a product of group discussion during the preceding week.

Week 14: Cecilia Heyes, *Cognitive Gadgets* and BBS commentaries

- Heyes, C. (2018). Précis of cognitive gadgets: The cultural evolution of thinking. *Behavioral and Brain Sciences*, 1-57.
- I have obtained the BBS commentaries and Heyes' reply from the BBS editors, for use in our class. I will share these on the ELMS course website, but please do not circulate them outside of this class.

Week 15: AI, Deep learning, and innateness

- LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. *Nature*, 521(7553), 436.
 - This is a short, high-level review of the new big thing in AI, "Deep Learning". Although offered for a general audience, there are places where it gets slightly technical. Treat those sections as placeholder structures! There's absolutely no need for you to understand the ins and outs of how these neural networks work, nor all the various tweaks and add-ons. My aim in suggesting this short review is to give you a sense of a) the history of advancement in DL, b) its impressive range of current successes, and c) just enough insight into how it works to recognize where it fits into historical dialogues about the nativist-empiricist continuum in cognitive development. In short, both the current systems themselves and the pioneers in the field have a strong empiricist orientation.
- Now watch this debate between LeCun and Marcus about the role of innate structure in AI.
 - LeCun vs Marcus AI Debate, NYU Center for Mind, Brain, and Consciousness:
 - <https://youtu.be/aCCotxqxFsk>
 - It's about an hour of the two of them, plus another hour of interesting Q&A. (A tip: I watched it at 2x speed and only had to pause and rewind a few times to follow). My goal in assigning this is twofold: a) to see how these two camps are pushing back against one another, and b) to see that, even though I'm gearing the subsequent reading toward a nativist perspective, LeCun is very thoughtful and many of his positions are quite reasonable. As you watch, I encourage you to reflect broadly on what these two (as representatives of different theoretical perspectives) view as the aim of AI and what they think counts as an attractive solution.
- Now read two working papers by Gary Marcus.
 - Marcus, G. (2018). Deep learning: A critical appraisal. *arXiv preprint arXiv:1801.00631*.
 - Marcus, G. (2018). Innateness, alphazero, and artificial intelligence. *arXiv preprint arXiv:1801.05667*.

- Marcus is a nativism-oriented developmental psychologist who increasingly works on AI in the tech world, and he's been offering a consistent message for the last 20 years about the benefits of built-in structure and symbolic processing (which the Deep Learning camp resists). These are both highly readable papers and you'll see many familiar ideas come up.