

Philosophy of Mind: Topics in the Foundations of Cognitive Science

PHIL 425, FALL 2019, Tu-Th: 2:00 - 3:20pm, Room: Gregory Hall 205

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Office Hours: Thursdays 4pm–6pm

Prerequisites: An introductory course in psychology, cognitive science, or philosophy of mind. However, this is not a strict pre-requisition; please contact me if you haven't taken any of the relevant courses, but still wish to take this class.

Tentative Course Outline:

Classical architectures	2 weeks
Non-classical architectures	2 weeks
Modularity and formats	2 weeks
Learning: Empiricism vs. Rationalism	2 weeks
Learning a natural language	2 weeks
Learning about objects	2 weeks
Learning about numbers	2 week

Course Description: This course will explore several foundational questions about the nature of the mind and higher-cognition raised by recent advances in the cognitive sciences. The course will revolve around three main themes: (i) What are the empirical and philosophical advantages and disadvantages of the major ways of modeling the "mind as a computer", i.e., as an information processing system? (ii) Is there a language of thought—i.e., a representational system that enables 'thinking'—and if so, what are its basic architectural properties? Does the language of thought differ across cognitive domains such as linguistic vs spatial cognition? (iii) What can we learn about the computational architecture of the mind, and the properties of the language(s) of thought, from recent debates between Rationalist vs. Empiricist accounts of human learning both in general and across specific domains such as acquisition of natural languages, numerical knowledge, and 'intuitive' physics?

Grade Policy:

- Class participation, (20%). To received the full score for participation, you are required to provide iClicker input on at least 80% of the student presentations. You are also required to submit at least 10 critical reactions/comments on the weekly readings (which should be between 250-500 words each), and submitted *before* the class when the reading is due.
- In-class presentation of a research article. The presentation consists of exposition of the main ideas/arguments of the article, and also raise 2 or 3 points for critical discussion. The presentation should be around 30mins, so that we have time for discussion (40%).

- You have two options for the remaining (40%). Option 1: one term paper of \approx 2,000 to 3,000 words. Option 2: two term papers of \approx 1,500 to 2,500 words each (each paper will count the same). If you choose Option 1, the due date is Dec 17th. If you choose Option 2, the due date is Oct 10 for the first paper, and Dec 17th for the second paper.

Academic Integrity: Each student in this course is expected to abide by the University of Illinois's Student Code.

Accommodations for students with disabilities: In compliance with the University of Illinois's policy and equal access laws, I am available to discuss appropriate academic accommodations that may be required for student with disabilities. To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603, e-mail disability@illinois.edu or go to the DRES website.

Inclusivity statement: Our members represent a rich variety of backgrounds and perspectives. The Philosophy Department is committed to providing an atmosphere for learning that respects such diversity. While working together to build this community we ask all members to: (i) share their unique experiences, values and beliefs, (ii) be open to the views of others, (iii) honor the uniqueness of their colleagues, (iv) appreciate the opportunity that we have to learn from each other in this community, (v) value each other's opinions and communicate in a respectful manner, (vi) keep confidential discussions that the community has of a personal (or professional) nature, (vii) use this opportunity together to discuss ways in which we can create an inclusive environment in this course and across the UIUC community.

Extra Help: Please do not hesitate to come to my office during office hours or make an appointment to discuss any aspect of the course. Also, if you are interested in obtaining information to improve writing skills and organization, the following campus resources are available to all students: Writer's Workshop, Undergrad Library, 217-333-8796. For a very useful guide to writing a philosophy or any theoretical paper, see Jim Pryor's Guidelines on Writing a Philosophy Paper.

University Class Attendance Policy: Students are expected to attend classes regularly. A student who incurs an excessive number of absences may be withdrawn from a class at the discretion of the instructor. For details, see the University of Illinois's Student Code Part 5.

Readings: All readings will be available at the course website.

PART 1: ARCHITECTURAL ISSUES

Week 1 (8/27 & 8/29): The computer model of the mind and the tri-level hypothesis

(Tu) Pylyshyn, Z. (1999). What is Cognitive Science?

(Th) Marr, D. (1982). The Philosophy and the approach. Selections from *Vision* (ch. 1).

***Notes:** Pylyshyn (1999) is an overview of some of the material we will cover in weeks 1-2, but also in other parts of the course; useful if you need to re-fresh some of the basic ideas behind the ‘classical’ approach to the ‘mind as computer’. For the Marr text, focus on pp. 8-29.

Week 2 (9/3 & 9/5): Classical architectures: computational, algorithmic and implementation levels

(Tu) Pylyshyn, Z. (1998). Computing in Cognitive Science. In Posner, M. *Foundations of Cognitive Science*. Cambridge: MIT Press.

(Th) Pylyshyn, Z. (1985). Constraining Functional Architecture. Selections from *Computation and Cognition*.

(Th) Pylyshyn, Z. (1988). The Role of Cognitive Architecture in Theories of Cognition. In K. VanLehn (Ed.) *Architectures for Intelligence*. Hillsdale, N.J.: Erlbaum.

***Notes:** The main reading for the week is Pylyshyn (1998). On Thursday, we will focus in some detail on the notion of cognitive/computational architecture. For that purpose, the most thorough text is Pylyshyn (1985), but you can also focus on Pylyshyn (1988) if you prefer a more basic introduction.

Week 3 (9/10 & 9/12): Non-classical architectures: Connectionism

(Tu) Rogers, TT. (2009). Connectionist models.

(Th) Hinton, G. (1992) How Neural Networks Learn from Experience. *Scientific American*.

***Notes:** For a useful and entertaining overview of Connectionism, see Pinker (1997: pp. 98-131), section ‘Replaced by a machine & Connectoplasma’. This material also includes a good discussion of some of the criticisms raised against deep learning in Marcus (2017, ms), which we discuss week 4.

Week 4 (9/17 & 9/19): Non-classical architectures: Deep Learning

(Tu) Buckner, (2019). Deep Learning: A philosophical introduction. *Philosophy Compass*,

(Tu) Gibney (2015). DeepMind algorithm beats people at classic video games. *Nature*.

(Th) Marcus (2017, ms). Deep Learning: A critical appraisal.

***Notes:** If you want to read more on this topic, one good place to start is Marcus’s (2017) companion piece, ‘Innateness, AlphaZero, and Artificial Intelligence’. Within philosophy, one of the most influential criticisms of Connectionism is Fodor and Pylyshyn’s ‘Connectionism and cognitive architecture: A critical

analysis' (which I added to the course readings). There are many important responses by Connectionists, including Smolensky's 'On the proper treatment of Connectionism'.

Week 5 (9/24 & 9/26): Modularity

- (Tu) Fodor, J. (1992). Précis of *Modularity of Mind* and Why should the mind be modular? In *A Theory of Content and other Essays*, ch. 8-9.
- (Th) Prinz, J. (2006). Is the mind really modular? In Stainton (ed.) *Contemporary debates in cognitive science*.

***Notes:** If interested in reading more about this topic, see also Carruthers, (2006), 'The case for massive modularity' (which I added to the compass reading folder) for a classic defense of the view that the mind really consists only of specialized psychological modules.

Week 6 (10/1 & 10/3): Formats

- (Tu) Pylyshyn, (2003). Return of the mental image: Are there really pictures in the brain? In *Trends in Cognitive Sciences*
- (Th) Moulton and Kosslyn, (2009). Imagining predictions: Mental imagery as mental emulation. *Philosophical Transactions of the Royal Society*.
- (Th) Rescorla (2009). Cognitive Maps and the language of thought. In *British Journal for the Philosophy of Science*.

***Notes:** Student presentations: Lindsey Wisniewski on Pylyshyn (2003)

PART 2: RATIONALISM VS. EMPIRICISM

Week 7 (10/8 & 10/10): Learning: Empiricism vs. Rationalism

- (Tu) Markie (2017), "Rationalism vs. Empiricism" in the Stanford Encyclopedia of Philosophy.
- (Th) Gallistel, R. (2000). "The replacement of general-purpose learning models with adaptively specialized learning modules". In Gazzaniga (ed.) *The new cognitive neurosciences*.

***Notes:** Student presentations: Matthew Davis on Gallistel (2000).

Week 8 (10/15 & 10/17): Learning: Empiricism vs. Rationalism

- (Tu) Spelke. Initial knowledge: six suggestions. In *Cognition*
- (Tu) Pietroski and Crain (2005), Innate Ideas. In *The Cambridge Companion to Chomsky*, ch. 8
- (Th) Fodor, selections from *Language of Thought* and *LOT2*.
- (Th) Churchland, P. (1978). Fodor on language learning. *Synthese*.

***Notes:** Student presentations: Daniel Olsen on Pietroski and Crain (2005), Jennifer Kuo on Fodor selections from *LOT2*, Xiuhao Chen on Churchland (1978).

Week 9 (10/22 & 10/24): Learning a natural language

- (Tu) Chomsky, N. Review *Verbal Behavior* by B. F. Skinner.
- (Th) Chomsky, N. (1987). “On The Nature, Use, and Acquisition of Language”
- (Th) Senghas, et al. (2004). Children Creating Core Properties of Language: Evidence from an Emerging Sign Language in Nicaragua. In *Science*.

***Notes:** Student presentations: Colm Keane on Chomsky (1987) and Santiago Duran on Senghas et al. (2004).

Week 10 (10/29 & 10/31): Learning a natural language

- (Tu) Pullum and Scholz (2002), Empirical assessment of poverty of stimulus arguments. *The Linguistic Review*
- (Th) Crain and Pietroski (2002), Why language acquisition is a snap. *The Linguistic Review*
- (Th) Fodor and Crowther (2002), Understanding poverty of stimulus arguments. *The Linguistic Review*

***Notes:** Student presentations: Kyle Listermann on Crain and Pietroski (2002), and Ireland Flannery on Fodor and Crowther (2002).

For a more advanced and recent discussions (and defense of nativism) see, Berwick et al. (2011). The Poverty of Stimulus Revisited, in *Cognitive Science*. And Perfors et al. (2011). Poverty of the stimulus: A rational approach, in *Cognition*. For a recent empiricist friendly position see Christiansen and Chater (2016), *Creating a Language*.

Week 11 (11/5 & 11/7): Learning ‘intuitive physics’

- (Tu) Quine, (1958/1969). Speaking of Objects. In Proceedings In *Ontological Relativity and other essays*: ch. 1
- (Th) Carey, S. (2009). The Empiricist Picture. In *The Origins of Concepts*, ch. 2.

***Notes:** Student presentations: Jake Kokoris on Quine (1958)

Week 12 (11/12 & 11/14): Learning ‘intuitive physics’

- (Tu) Carey, S. (2009). Core object cognition. In *The Origin of Concepts*, Ch. 3.
- (Th) Soja et al. (2001). Ontological categories guide young children’s inductions about word meanings. In *Cognition*.

***Notes:** Student presentations: Mithin Nehrubabu on Carey ch. 3, Joseph Scheri on Soja et al (2001).

Week 13 (11/19 & 11/21): Learning about numbers

- (Tu) Wynn, K. (1992) Evidence Against Empiricist Accounts of the Origins of Numerical Knowledge. In *Mind & Language*, 7(4).
- (Th) Leslie et al. (2008). The generative basis of the natural number concepts. In *Trends in Cognitive Sciences*.

***Notes:** Student presentations: Luka Kulbis on Wynn (1992).

Week 14 (12/3 & 12/5): Learning about numbers

- (Tu) Carey, (2009). Where do our numbers come from. *Journal of Philosophy*
- (Tu) Spelke, (2017). Core knowledge, language, and number. *Language Learning and Development*.
- (Th) Rips, L. et al. (2008). From numerical concepts to concepts of number. In *Behavioral and Brain Sciences* 31: 623-642.

***Notes:** Student presentations: Paolo Maloles on Carey (2009).