

Cognitive Science: A Multidisciplinary Introduction

(Taught fall 2019, spring 2020, fall, 2020, spring 2021, fall 2021, spring 2022)

This course is an introduction to cognitive science. To capture the interdisciplinary nature of this field, we will review a range of topics and research programs from philosophy, computer science, psychology, neuroscience, and linguistics. As such, this course aims to introduce students to the foundations of cognitive science and give them a sense of the contemporary debates that are currently taking place within and across the disciplines that make up the field. After completing this course students should:

- Appreciate the interdisciplinarity of cognitive science—in particular the diversity of viewpoints, the controversies, and the areas of emerging consensus.
- Be able to make appropriate connections and comparisons in research fields across disciplines.
- Know how to read and substantively engage with scholarly articles.
- Be able to define and discuss foundational concepts in cognitive science (e.g., computation, mental representation, and information processing).
- Understand how perception, memory, language, and decision making come together to produce behavior and shape how we see and understand the world.
- Have basic familiarity with brain anatomy and neuroimaging techniques.

Readings

There is no required textbook for this course. The weekly readings are listed on the syllabus and can be found as PDFs on the course's Canvas site. Be sure to keep up with your reading—anything in the assigned readings is fair game on the exams.

Note: Even though required readings were chosen to be more-or-less accessible to an introductory audience, some of the readings are harder than others. One of the aims of this course is to ease you into reading scientific articles. When approaching a difficult reading, I suggest going slowly and looking up phrases you are unfamiliar with. By this point you will have discerned one thing that makes cognitive science different (but perhaps more exciting!) than other fields—it's interdisciplinarity! But this means that even if you are very comfortable reading, say, psychology articles you might find yourself struggling with philosophy or artificial intelligence articles if these are new fields for you. This feeling is entirely normal—reading papers for the first time in a new field feels daunting for everyone (we want to avoid feelings of impostor syndrome). So, take a deep breath, read slowly, (virtually) attend all lectures, and ask the TAs and I for help during office hours.

Week 1: Intro to Cog Sci and Types of Representation

Reading: Friedenberg, Jay & Silverman, Gordon “(Chapter 1) Introduction: Exploring Inner Space,” In *Cognitive Science: An Introduction to the Study of Mind*, London: Sage Publications, pp. 1-27.

Week 2: Marr and Explanatory Levels of Representation

Reading: Marr, David (1982). “(Chapter 1) The Philosophy and the Approach ” In *Vision*, Cambridge: MIT Press, pp. 19-29.

Week 3: Computation

Reading: Clark, Andy “(Chapter 1) Meat Machines: Mindware as Software,” In *Mindware*.

Week 4: Connectionism

Reading: Bruckner, Cameron & Garson, James (2019). “Connectionism,” In *The Stanford Encyclopedia of Philosophy*, (ed.) E. Zalta.

Week 5: Neuroimaging: fMRI & EEG

Reading: Kanwisher, Nancy (2017). “The Quest for the FFA and Where it Led,” *The Journal of Neuroscience*, 37(5), 1056-1061.

Week 6: Vision

Reading: Beaumont, J. “Sensation and Perception”, In *Understanding Neuropsychology*, (ed.) J. Beaumont & G. Rogers, London: Blackwells.

Week 7: Exam 1

Week 8: Development

Readings: Talbot, Margaret “The Baby Lab: How Elizabeth Spelke Peers into the Infant Mind,” *The New Yorker*, September 4, 2006.

Stahl, Aimee & Feigenson, Lisa (2015). “Cognitive Development: Observing the Unexpected Enhances Infants’ Learning and Exploration,” *Science*, 348(6230), 91-94.

Week 9: Memory

Reading: Brady, Tim, Konkle, Talia, & Alvarez George “A Review of Visual Memory Capacity: Beyond Individual Items and Toward Structured Representations”

Week 10: Phonology

Reading: Jackendoff, Ray. “Phonological Structure” in *Patterns in the Mind: Language and Human Nature*

Week 11: Syntax & Semantics

Reading: Everaert, Martin et al. (2015). "Structure, Not Strings: Linguistics as Part of the Cognitive Sciences," *Trends in Cognitive Science*, 19(12), P729-743.

Week 12: Bias & Social Cognition

Reading: Dovidio, John, Hewstone, Miles, Glick, Peter, & Esses Victoria (2010). "Stereotyping and Discrimination: Theoretical and Empirical Overview," In *The SAGE Handbook of Prejudice, Stereotyping and Discrimination*, London: SAGE Publications Ltd., 3-28.

Week 13: Decision Making

Reading: Tversky, Amos & Kahneman, Daniel (1974). "Judgment under Uncertainty: Heuristics and Bias," *Science*, 165(4157), 1124-1131.

Finals Week: Exam 2