

# UCSB INT200A: Introduction to Cognitive Science – Spring 2022

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## Handout 1: What is Cognitive Science?

### 1. Cognitive Sciences or Cognitive Science?

“Some veterans of those days question whether the program was successful, and whether there really is something now that we can call ‘cognitive science’. For myself, I prefer to speak of the cognitive sciences, in the plural.” (Miller 2003)

Question: Which sciences are the cognitive sciences? **The 1978 Diagram:** Philosophy, Linguistics, Anthropology, Neuroscience, Computer Science, and Psychology.

**The Weak Definition of Cognitive Science:** Cognitive science is the scientific study of the mind and philosophical reflection on it.

Problems: (a) Philosophy isn’t a science. (b) Is all work in these (other) disciplines, cognitive science? What about work on operant conditioning? What about psychophysics? What about introspective studies or phenomenology? What about scientists working in these fields who do not consider themselves cognitive scientists? How are they thinking of cognitive science when they reject the label?

### 2. The History

A more restrictive definition brings in a “theoretical orientation” that arose in the 1950s. The idea that the mind contains representations is a very old one. It is shared by every major philosopher of mind in the western canon. But in the 1940s behaviorist psychologists, led by Skinner, were pressuring theorists to reframe their explanations to avoid talk of representations. When Chomsky took down Skinner, he basically showed that Skinner could not avoid using folk psychological concepts to explain complex behaviors: most saliently, Chomsky ridiculed Skinner’s explanations of language use, which we know can be very creative and holistic and stimulus independent. (I’ve posted Chomsky’s paper on the website.)

Question: What is the relationship between accepting the “mentalist” ontology of folk psychology—as we do when we speak of each other’s memories, plans, expectations and motives—and participating in cognitive science? Cognitive science is usually thought of as something beyond folk psychology, though Fodor’s language of thought might be used to integrate the two very closely.

We might say that the original cognitive scientists were those who used the notions of information and representation (which are arguably part of folk psychology) to theorize about the mind as an information processing device. The representational/computational theory of mind needn’t posit that all mentality is computation, but processes sandwiched between sensation and movement are thought of in this way and the computational model is increasingly extended “back” to perception and forward to “motor control.”

Note that Miller’s seminal “magical number 7” paper from 1955 uses the information-theoretic framework to analyze “absolute judgments” in sensory domain: e.g. the judgment that a sound has a certain frequency, so from the very beginning the computational model was not supposed to just apply to mathematical reasoning, logical inference, decision making, classification and other paradigmatically “cognitive” mental operations. (I’ve posted Miller’s paper too.)

**The Strong Definition of Cognitive Science:** Cognitive science is the scientific study of the mind and philosophical reflection on it that is in some robust way guided by a theory or picture of certain core mental processes as computational, where computation is understood as the generation and manipulation of representations or states of information.

This strong definition doesn't yet build in anything about the interdisciplinary nature of cognitive science explanations. But one "guiding idea" in cognitive science is that explanations of minds and the complex activities of humans and other animals, must be multi-level and multi-dimensional and so bring in the history, function, and biological realization of those psychological processes responsible for these activities.

**Question:** Do what extent does the representational/computational theory of mind provide a framework for thinking of the contributions of Philosophy, Linguistics, Anthropology, Neuroscience, Computer Science, and Psychology to explanations of mental processes and the tasks they are used to execute?

**Start with Linguistics:** Understanding and producing language are computational processes. To fully understand them do we need knowledge of the neurological circuits operative when someone speaks or writes or interprets speech or writing? Do we need anthropology to understand the development of languages and computer science to provide the tools to model the computations involved? Do we need psychological experiments to test hypotheses about how language is used or understood? Do we need to engage in philosophy to understand the relationship between linguistics and folk psychology and the development of logics or normative systems of inference?

**A Stronger Definition of Cognitive Science:** Cognitive science is the use of all or many of the fields of linguistics, anthropology, neuroscience, computer science, and psychology to explain a complex psychological or sociological phenomenon in a way that is guided by a theory or picture of certain core mental processes as computational, where computation is understood as the generation and manipulation of representations or states of information.

**Question:** On this understanding of the subject, is cognitive science differentiable from philosophy of mind?

**Critique by Nunez et al:** The cognitive sciences are dominated by cognitive psychology. It is not really a unified field in its own right. (See website for replies.) How might we redraw the traditional cognitive science diagram to reflect the institutional realities reported by Nunez?

**A Project Going Forward:** We have selected readings for the quarter from some of the UCSB faculty who identify as cognitive scientists. Let's assume, going forward, that our definition of the field must cover all these contributions and see what sort of definition we can come up with by the end of the quarter.