Course Summary C.8-13: Elements of Cognitivism II

Overview

The course Elements of Cognitivism II examines the philosophical superstructure and interdisciplinary foundations of the cognitive sciences, which are shaped by the interaction between mathematical logic, physics, neuroscience and brain sciences, artificial intelligence, linguistics, and cognitive psychology.

Starting from semiotic language analysis, the course shows how formalist mathematical logic distinguishes itself from traditional ontological logic as a purely syntactic calculus of symbols. It then critically examines scientistic reductionism, which reduces mental states to brain processes.

Next, the course addresses the development of neuroscience, debates surrounding the "illusion of free will," and the emergence of cybernetics, Chomsky's generative grammar, artificial intelligence, and neural connectionism.

Finally, the course analyses developments in cognitive psychology - from laboratory experiments on the placebo effect to Jerome Bruner's cultural psychology and the narrative self - and concludes with the philosophical struggle between the Churchlands' eliminative materialism and the rediscovery of the full, lived experience of the human mind.

1: The Structure of the Cognitive Sciences, Semiotics, and Mathematical Logic

Cognitivism is a multifaceted field in which four specific disciplines—neuroscience and brain sciences, cognitive psychology, artificial intelligence, and linguistics—come together under the overarching framework of the philosophy of mind.

Within semiotic language analysis, three levels are distinguished: syntax (the formal arrangement of symbols), semantics (reference to reality and meaning), and pragmatics (the intended purpose or effect of language use). In formalist cognitivism, pragmatics and semantics are often excluded, leaving nothing but a meaningless syntax.

Formalized mathematical logic rests on this syntactic foundation. The course draws a clear distinction between traditional or ontological logic and modern mathematical logic (such as propositional and predicate calculus). Whereas classical logic is based on substantive identity and refers to facts in reality, mathematical logic is an abstract symbolic calculus that abstracts away from all substantive meaning. Neo-rhetorical and metaphysical criticism

emphasizes that human thought in everyday life does not operate through mechanical derivations of formulas, but through meaningful connections, contexts, and similarities.

2: Reductionism, Neurophysiology, and the Problem of Free Will

Materialist cognitivism is characterized by strong reductionism: the tendency to explain mental and social phenomena entirely in terms of underlying biological, chemical, and physical processes. In neuroscience and brain sciences, advanced imaging techniques (such as PET and fMRI scans) are used to map specific brain regions and neural networks that support, among other things, language, emotions, and decision-making.

In radically materialist circles, this brain research often leads to the claim that human free will is an "illusion," since decisions of the will are physiologically preceded by neurological activity in the brain. The course opposes this one-dimensional view and emphasizes that language and mind are more than mere physical sounds or electrical impulses. Thinkers such as Nobel Prize winner John Eccles defend a form of dualist interactionism: the human mind is immaterial and does indeed work closely with the brain (possibly through microphysical or quantum-mechanical interactions at the level of nerve cells), but it cannot be reduced to it.

3: Cybernetics, Artificial Intelligence (AI), and Neural Connectionism

The historical roots of control-oriented thinking (cybernetics) can be traced back to ancient and biblical insights into goal-directed processes that correct themselves when deviations occur. Norbert Wiener formalized this as the study of self-regulating systems through feedback. With the advent of the computer, computationalism emerged: the idea that human thinking functions by processing information step by step and manipulating symbols according to fixed algorithms. In linguistics, Noam Chomsky developed a related approach through his generative-transformational grammar, which sought to derive sentences from formal deep structures, although this formalism encountered semantic paradoxes.

Artificial intelligence (AI), which grew out of the pioneering work of figures including John McCarthy, Marvin Minsky, Herbert Simon, and Allen Newell, evolved from "strong AI" (the ambition to reproduce the human mind entirely by machine) towards practical "expert systems" and fuzzy logic.

In contrast to classical computer-based thinking, connectionism emerged as a model that does not view thinking as a sequence of successive steps, but

as a distributed neural network in which information is spread simultaneously across many nodes. Mathematicians such as Roger Penrose nevertheless emphasize that human understanding and consciousness are non-algorithmic and can never be fully replicated by a machine.

4: Cognitive Psychology, Cultural Psychology, and the Narrative Self

Cognitive psychology emerged in the 1950s, with pioneers such as Jerome Bruner and George Miller, as a liberating reaction against rigid behaviorism. Researchers reopened the "black box" of the human mind in order to investigate mental processes, categorization, and problem-solving strategies scientifically. Earlier psychologists of thought, such as Otto Selz (of the Würzburg school) and A. D. de Groot (with his research on chess thinking), had already shown that human thought is neither blind association nor mechanical calculation, but a goal-directed process guided by internal tasks and experience.

The causal power of the human mind is also apparent in the medical placebo effect: conscious expectation and belief in a cure lead to demonstrable physiological and bodily changes in the organism. However, Jerome Bruner, one of the field's founders, later turned away from excessive computerization in psychology and established cultural psychology. He argued that human beings are not cold information processors, but cultural beings who give meaning to existence through stories (narrativism). Our "self" is narrative in nature: we understand ourselves and others through cultural traditions and life stories.

5: Philosophy of Mind: From Eliminative Materialism to the Rediscovery of the Mind

Within the philosophy of mind, different views of the relationship between mind and brain stand in opposition to one another. At one extreme is the eliminative materialism (eliminativism) of Paul and Patricia Churchland. They argue that everyday "folk psychology," with concepts such as consciousness, belief, desire, and intention, is an outdated theory that must be radically eliminated in favor of a purely neurobiological language.

In contrast, the course warns against the blind spots of this scientistic exclusivism. Through phenomenology and the reflective philosophy of thinkers such as Maine de Biran, Paul Ricoeur, and Edward Pols, the unique, immediate experience of conscious mental life is restored.

In his debate with Jean-Pierre Changeux, Ricoeur emphasizes that the brain does not “think” by itself; it is the human being who thinks, feels, and acts. The inner effort of will, introspective experience, and ethical lived experience possess their own non-physical reality and causal power, which cannot be explained away by purely materialist models.