Cognitive Psychology: The Quest to Decode the Human Mind

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Attempts to understand the mind and its operation go back at least to the Ancient Greeks, when philosophers such as Plato and Aristotle tried to explain the nature of human knowledge. The study of mind remained the province of philosophy until the nineteenth century, when experimental psychology developed. Wilhelm Wundt and his students initiated laboratory methods for studying mental operations more systematically. Within a few decades, however, experimental psychology became dominated by behaviorism, a view that virtually denied the existence of mind. According to behaviorists such as J. B. Watson, psychology should restrict itself to examining the relation between observable stimuli and observable behavioral responses. Talk of consciousness and mental representations was banished from respectable scientific discussion. Especially in North America, behaviorism dominated the psychological scene through the 1950s. Around 1956, the intellectual landscape began to change dramatically. George Miller summarized numerous studies which showed that the capacity of human thinking is limited, with short-term memory, for example, limited to around seven items. He proposed that memory limitations can be overcome by recoding information into chunks, mental representations that require mental procedures for encoding and decoding the information. At this time, primitive computers had been around for only a few years, but pioneers such as John McCarthy, Marvin Minsky, Allen Newell, and Herbert Simon were founding the field of artificial intelligence. In addition, Noam Chomsky rejected behaviorist assumptions about language as a learned habit and proposed instead to explain language comprehension in terms of mental grammars consisting of rules. The six thinkers mentioned in this paragraph can be viewed as the founders of Cognitive Psychology. For a comprehensive review of the history of Cognitive Psychology, see Boden (2006).

Ulric Neisser coined the term "cognitive psychology" in his book Cognitive Psychology, published in 1967 wherein Neisser provides a definition of cognitive psychology characterizing people as dynamic information-processing systems whose mental operations might be described in computational terms. Also emphasizing that it is a "point of view" that postulates the mind as having a certain conceptual structure. Neisser's point of view endows the discipline with a scope beyond high-level concepts such as "reasoning" that other works often espouse as defining psychology. Neisser's definition of "cognition" illustrates this well:

The term "cognition" refers to all processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used. It is concerned with these processes even when they operate in the absence of relevant stimulation, as in images and hallucinations... Given such a sweeping definition, it is apparent that cognition is involved in everything a human being might possibly do; that every psychological phenomenon is a cognitive phenomenon. But although cognitive psychology is concerned with all human activity rather than some fraction of it, the concern is from a particular point of view. Other viewpoints are equally legitimate and necessary. Dynamic psychology, which begins with motives rather than with sensory input, is a case in point. Instead of asking how a man's actions and experiences result from what he saw, remembered, or believed, the dynamic psychologist asks how they follow from the subject's goals, needs, or

instincts.

Cognitive psychology is one of the more recent additions to psychological research, having only developed as a separate area within the discipline since the late 1950s and early 1960s following the "cognitive revolution" initiated by Noam Chomsky's 1959 critique of behaviorism and empiricism more generally. The origins of cognitive thinking such as computational theory of mind can be traced back as early as Descartes in the 17th century, and proceeding up to Alan Turing in the 1940s and '50s. The cognitive approach was brought to prominence by Donald Broadbent's book Perception and Communication in 1958. Since that time, the dominant paradigm in the area has been the information processing model of cognition that Broadbent put forward. This is a way of thinking and reasoning about mental processes, envisioning them as software running on the computer that is the brain. Theories refer to forms of input, representation, computation or processing, and outputs. Applied to language as the primary mental knowledge representation system, cognitive psychology has exploited tree and network mental models. Its singular contribution to AI and psychology in general is the notion of a semantic network. One of the first cognitive psychologists, George Miller is well-known for dedicating his career to the development of WordNet, a semantic network for the English language. Development began in 1985 and is now the foundation for many machine ontologies.

This way of conceiving mental processes has pervaded psychology more generally over the past few decades, and it is not uncommon to find cognitive theories within social psychology, personality psychology, abnormal psychology, and developmental psychology. In fact, the neo-Piagetian theories of cognitive development have fully integrated the developmental conception of changes in thought with age with cognitive models of information processing. The application of cognitive theories to comparative psychology has driven many recent studies in animal cognition. However, cognitive psychology dealing with the intervening constructs of the mental presentations is not able to specify: What are the non-material counterparts of material objects? For example, What is the counterpart of a chair in mental processes, and how do the non-material processes evolve in the mind that has no space? Further, what are the very specific qualities of the mental causalities, in particular, when the causalities are processes? The plain statement about information processing awakes some questions. What information is dealt with, its contents, and form? Are there transformations? What are the nature of process causalitiesHow do subjective states of a person transmute into shared states, and the other way around? Finally, yet importantly, how is it that we who work with cognitive research are able to conceptualize the mental counter concepts to construct theories that have real importance in real every day life? Consequently, there is a lack of specific process concepts that lead to new developments, and create grand theories about the mind and its abysses. The information processing approach to cognitive functioning is currently being questioned by new approaches in psychology, such as dynamical systems, and the embodiment perspective.

Because of the use of computational metaphors and terminology, cognitive psychology was able to benefit greatly from the flourishing of research in artificial intelligence and other related areas in the 1960s and 1970s. In fact, it developed as one of the significant aspects of the inter-disciplinary subject of cognitive science, which attempts to integrate a range of approaches in research on the mind and mental processes.