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Basic Introduction to Cognitive Science

–Samani Sulabh Pragya

Cognitive Science: An Interdisciplinary Approach

Cognitive science is the interdisciplinary scientific study of the mind and its processes. It examines what cognition is; what it does and how it works. It includes research on intelligence and behavior, especially focuses on how information is represented, processed, and transformed (in faculties such as perception, language, memory, reasoning, and emotion).[1]

According to Oxford dictionary, it is action or faculty of knowing and in dictionary of philosophy,[2] cognition is mental processes connected with understanding, formulation of belief and acquisition of knowledge.[3] Cognitive science is the disciple studying the mind[4] and intelligence. It is interested in knowing how people mentally represent information processing.

The term cognition comes from the Latin verb "cognosco" (con + gnosco – know) it means 'to conceptualize' or 'to recognize'. It can also be defined in terms of disciples like it is coherent and integrated science of independent disciples, means it is dedication of different disciples to explain, simulate and technically reproduce the workings of human mind.[5]

Cognitive science is a major new guide to central theories and problems in study of mind and brain.[6] According to Howard Gardiner, it is a contemporary, empirically based effort to answer long-standing epistemological questions particularly those concerned with nature of knowledge, its components, sources, development and its deployment.[7]

Researchers in psychology, linguists, computer science, philosophy and neuroscience realized that they were asking many of the same questions about the nature of human mind and that they had developed complementary and potentially synergistic methods of investigation. The word 'cognitive' refers to perceiving and knowing– thus, the word cognitive science is science of mind which seeks to understand mental phenomena.[8] As the cognitive science is disciple of diverse disciples so also its definitions are diverse.

The diversification of definition can be tabulated as follow-

Faculty of knowing and perceiving (emphasis on sensory operation)	Knowing, understanding, formulating belief (emphasis on both sensory operation and mental phenomena)	Information processing (emphasis on mental phenomena)
Brain(physical)	Mind (psychological)	Intelligence (problem solving)

Conclusively, it can be said that cognitive science is study of sensory and mental phenomena.

Nature and Significance of Cognitive Science

Cognitive science aims to collect empirical evidences bearing on mental process and phenomena and to develop theories that can explain those evidences like

Psychology	Behavioral evidence
Linguists	Produce and understands sentence
Neuroscience	Neural activity
Anthropology	Nature of cognition as it is different cultural contexts
Philosophy	nature of knowledge[9]

Two beliefs of cognitive science are

(a) Mental representations have to be analyzed wholly separate from biological or neurological on one hand, sociological or cultural on the other.

(b) Understanding of human mind is electronic computers as computers are model of how human mind functions.[10]

History of Cognitive Science

At the turn of the century, in the wake of founding new human sciences, investigators had been addressing the key issues of mental life: thinking, problem solving, the nature of consciousness, the unique aspects of human language and culture.

The question which Chomsky regarded as fundamental for cognitive science is the following, "how comes it that human beings, whose contacts with the world are brief and personal and limited, are nevertheless able to know as much as they do know?" This is Bertrand Russell's formulation of a question first posed by Plato. Plato's such question is motivated by a certain notion of knowledge. This is one of the age-old problems of philosophy which was also thought on by Rationalist epistemologists pioneered by Rene Descartes. According to Descartes, mind was different from body. We have a huge material on this issue by Rationalist epistemologists like Leibniz, Kant, Frege on one hand and Empiricist epistemologists like Locke, Hume on other hand.

In 1920, Piaget's early publications launched the modern study of cognitive development in Europe and America. But in United States, its interest soon waned. Behaviorism was becoming supreme and its adherents saw little value in cognition.[11] To behaviorists, the mind which is invisible, non-material and conjectural was metaphysical concept and no talk of it was possible in experimental psychologist till 1960. However, in 1960s, when cognitivism began to regain favor, Piaget was rediscovered and intellectual development researches in his field became a booming field. [12]

In September of 1948 in the campus of California institute of Technology, a group of eminent scientists representing several disciplines met for a conference on "cerebral mechanisms in behavior". The opening speaker, John Von Neumann, forged a striking comparison between electronic computer and the brain. Then the next speaker mathematician and neurophysiologist Warren McCulloch explored certain parallels between the nervous system and "logical devices" in order to figure out why we perceive the world the way we do. The next speaker, psychologist Karl Lashley spoke on "the problem of serial order in behavior"– He challenged the existing theory (behaviorism in psychology) and laid out new agenda for research, laying a new pathways for cognitive studies.

The George Miller, a pioneer of Cognitive psychologist coincidentally came in field of psychology as a teacher. He had his graduate studies in

Harvard and received a solid grounding in behaviorist psychology. For the next 14 years, he conducted experimental studies in speech and communication. Despite his training, this work forced him willy-nilly to think about human memory and other higher mental processes. He drifted still closer to mentalism after attending a summer seminar at Stanford where he worked closely with the psycholinguist Noam Chomsky, and a sabbatical year at the center for advanced study in the behavioral sciences where he was exposed to new ways of doing research on thinking, especially the stimulation of thought processes by computer program.[13]

In the fall of 1960 Miller returned to Harvard as a changed man. He confided in his friend and colleague, the social psychologist Jerome Bruner, about his discontent and dream of a new center devoted to the study of mental processes. Bruner shared both his feelings and vision. Together they approached McGeorge Bundy, provost of the university , won his approval, , and with funding from the Carnegie Corporation established the Harvard Center for cognitive studies and became a leader of movement that radically changed the focus and methods of psychology and guided it ever since.

George Miller's coming-out typifies what was happening to experimental psychologists in the 1960s. At first a few then many and soon a majority abandoned rats, mazes, electric grids, etc. in favor of research on the higher mental processes of human being. Within the decade, the movement assumed such proportions as to earn the name "the cognitive revolution".[14]

Many forces had been building toward it. During the two previous decades, Gestaltists, personality researchers, developmentalists, and social psychologists were all, in their different ways, exploring mental processes. Coincidentally, a series of developments in several other scientific fields were producing knowledge of other kinds about how the mind works. Specifically:

–Neuroscientists, using microelectrode probes and other new techniques, were observing the neural events and cellular interconnections involved in mental processes.

–Logicians and Mathematicians were developing information theory and using it to account for both the capabilities and limitation of human communication.

–Anthropologist, analyzing the thought patterns of people in other cultures, was discovering which mental processes vary among cultures, and which are universal and therefore possibly innate.

–Psycholinguists, studying language acquisition and use, were learning how the mind acquires and manipulate the intricate symbols system we call language.

–Computer scientists were contributing a brand-new theoretical model of thinking and designing machinery that seemed to think.[15]

By the late 1970s cognitive psychology and these related fields came to be known as the cognitive sciences or collectively, as cognitive science. The cognitive revolution was more than a remarkable broadening and deepening of psychology; it was simultaneous development in six sciences of new knowledge bearing on mental processes.

Conclusion

Conclusively, it can be said as cognitive science is a new and recent branch of studies. It is rather the collective working of various branches discussing on common topic. Its main area is mind, brain, and intelligence. In other words, it is a new form of psychology affiliated to a
rtificial intelligence, philosophy, neuroscience etc. It has opened new horizon in the field of mental processes and enhanced the studies on mind. This article is the brief introduction to what cognitive science means, what nature it has and history of cognitive science as per the 'The Story of Psychology'.

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