Summary

Cognitive psychology is the scientific investigation of human cognition, that is, all our mental abilities. This paper shows a historical overview of cognitive psychology from its ancient beginnings to today. It also shows the mental processes associated with cognitive psychology. The last chapter shows some off the applications for cognitive psychology.

Key words: cognitive psychology; psychology; mental processes

1. Introduction - historical overview

Although published inquiries of human cognition can be traced back to Aristotle’s ‘’De Memoria’’ [1], the intellectual origins of cognitive psychology began with cognitive approaches to psychological problems at the end of the 1800s and early 1900s in the works of Wundt, Cattell, and William James [2].

Cognitive psychology declined in the first half of the 20th century with the rise of “behaviourism” - the study of laws relating observable behaviour to objective, observable stimulus conditions without any recourse to internal mental processes [3]. It was this last requirement, fundamental to cognitive psychology, which was one of behaviourism’s undoing’s. For example, lack of understanding of the internal mental processes led to no distinction between memory and performance and failed to account for complex learning. These issues led to the decline of behaviourism as the dominant branch of scientific psychology and to the “Cognitive Revolution”. The Cognitive Revolution began in the mid-1950s when researchers in several fields began to develop theories of mind based on complex representations and computational procedures. Cognitive psychology became predominant in the 1960s. Its resurgence is perhaps best marked by the publication of Ulric Neisser’s book, 'Cognitive Psychology’, in 1967. Since 1970, more than sixty universities in North America and Europe have established cognitive psychology programs [4].

Today’s perspectives on cognitive psychology generally address cognition as a dual process theory, introduced by Jonathan Haidt in 2006, and expounded upon by Daniel Kahneman in 2011. Kahneman differentiated the two styles of processing more, calling them intuition and reasoning. Intuition (or system 1), similar to associative reasoning, was determined to be fast and automatic, usually with strong emotional bonds included in the
reasoning process. Kahneman said that this kind of reasoning was based on formed habits and very difficult to change or manipulate. Reasoning (or system 2) was slower and much more volatile, being subject to conscious judgments and attitudes [5].

2. What is cognitive psychology?

Cognitive psychology is the scientific investigation of human cognition, that is, all our mental abilities. The term “cognition” stems from the Latin word “cogno-scere” or "to know". Fundamentally, cognitive psychology studies how people acquire and apply knowledge or information. It is closely related to the highly interdisciplinary cognitive science and influenced by artificial intelligence, computer science, philosophy, anthropology, linguistics, biology, physics, and neuroscience. [4]

Cognitive psychology studies mental processes such as "attention, language use, memory, perception, problem solving, creativity, and thinking"[6]. The main focus of cognitive psychology is on the mental processes that affect behaviour as shown in Figure 1. Traditionally, cognitive psychology includes human perception, attention, learning, memory, concept formation, reasoning, judgment and decision-making, problem solving, and language processing. For some, social and cultural factors, emotion, consciousness, animal cognition, evolutionary approaches have also become part of cognitive psychology.

![Fig. 1. Graphic representation of mental processes associated with cognitive psychology.](image)

Perception: Perception involves both the physical senses (sight, smell, hearing, taste, touch, and proprioception) as well as the cognitive processes involved in interpreting those senses. Essentially, it is how people come to understand the world around them through interpretation of stimuli [7].

Attention: The psychological definition of attention is "A state of focused awareness on a subset of the available perceptual information" [8]. The key function of attention is to discriminate between irrelevant data and filter it out, enabling the desired data to be distributed to the other mental processes. The human brain may, at times, simultaneously receive inputs in the form of auditory, visual, olfactory, taste, and tactile information. Without the ability to filter out some or most of that simultaneous information and focus on one or typically two at most, the brain would become overloaded as a person attempted to process that information [9]. Attention solves the problem of information overload in cognitive
processing systems by selecting some information for further processing, or by managing resources applied to several sources of information simultaneously [10].

Learning: Learning improves the response of the organism to the environment. Cognitive studies of implicit learning emphasize the largely automatic influence of prior experience on performance, and the nature of procedural knowledge. Studies of conceptual learning emphasize the nature of the processing of incoming information, the role of elaboration, and the nature of the encoded representation [11]

Memory: The two main types of memory are short-term memory and long-term memory; however, short-term memory has become better understood to be working memory. Cognitive psychologists often study memory in terms of working memory.

Though working memory is often thought of as just short-term memory, it is more clearly defined as the ability to remember information in the face of distraction. The famously known capacity of memory of 7 plus or minus 2 is a combination of both memory in working memory and long term memory. One of the classic experiments is by Ebbinghaus, who found the serial position effect where information from the beginning and end of list of random words were better recalled than those in the centre. [13]

Modern conceptions of memory are usually about long-term memory and break it down into three main sub-classes. Procedural memory is memory for the performance of particular types of action. It is often activated on a subconscious level, or at most requires a minimal amount of conscious effort. Procedural memory includes stimulus-response-type information, which is activated through association with particular tasks, routines, etc. A person is using procedural knowledge when they seemingly "automatically" respond in a particular manner to a particular situation or process. An example is driving a car. Semantic memory is the encyclopaedic knowledge that a person possesses. Access of semantic memory ranges from slightly to extremely effortful, depending on a number of variables, number of associations it has to other information, frequency of access, and levels of meaning. Episodic memory is the memory of autobiographical events that can be explicitly stated. It contains all memories that are temporal in nature. Episodic memory typically requires the deepest level of conscious thought, as it often pulls together semantic memory and temporal information to formulate the entire memory. [13]

Concept Formation: Concept or category formation refers to the ability to organize the perception and classification of experiences by the construction of functionally relevant categories. The response to a specific stimulus is determined not by the specific instance but by classification into the category and by association of knowledge with that category.

Reasoning: Reasoning is the process by which logical arguments are evaluated or constructed.

Problem Solving: The cognitive psychology of problem solving is the study of how humans pursue goal directed behaviour. Problem solving may engage perception, memory, attention, and executive function, and so many brain areas may be engaged in problem solving tasks, with an emphasis on pre-frontal executive functions.

Language Processing: While linguistic approaches focus on the formal structures of languages and language use, cognitive psychology focused on language acquisition, language comprehension, language production, and the psychology of reading [14].

3. Creativity

Creativity is a phenomenon whereby something new and somehow valuable is formed. The created item may be intangible or a physical object.
Theories of creativity (particularly investigation of why some people are more creative than others) have focused on a variety of aspects. The dominant factors are usually identified as "the four Ps" — process, product, person and place. A focus on process is shown in cognitive approaches that try to describe thought mechanisms and techniques for creative thinking. The psychometric approach to creativity reveals that it also involves the ability to produce more. A focus on the nature of the creative person considers more general intellectual habits, such as openness, levels of ideation, autonomy, expertise, exploratory behaviour and so on. A focus on place considers the circumstances in which creativity flourishes, such as degrees of autonomy, access to resources and the nature of gatekeepers. Creative lifestyles are characterized by nonconforming attitudes and behaviours as well as flexibility. [15]

According to professor Stenberg from Yale, creativity is a gathering of factors that must be fulfilled for creativity to exist. According to him these factors are intelligence, knowledge, thinking styles, personality, motivation and the environment. Most of these factors are defined by the persons being. Therefore according to cognitive psychology the mental processes that define us are what define person’s creativity with regard to extrinsic stimulus.

4. Application

Cognitive psychology research has produced an extensive body of principles, representations, and algorithms. Successful applications range from custom-built expert systems to mass-produced software and consumer electronics. Development of computer interfaces that collaborate with users to meet their information needs and operate as intelligent agents. Development of a flexible information infrastructure based on knowledge representation and reasoning methods, development of smart tools in the financial industry. Development of mobile, intelligent robots that can perform tasks usually reserved for humans. Development of bionic components of the perceptual and cognitive neural system such as retinal implants. [4]

5. Conclusion

Although psychology itself is a relatively young science it is developing very rapidly. Cognitive psychology, because of its mental processes that are human perception, attention, learning, memory, concept formation, reasoning, judgment and decision-making, problem solving, and language processing plays an important role in development of humanity. It defines the interaction of mental processes that make us be. It defines the course of development for many modern systems especially those based on artificial intelligence.
REFERENCES