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INFORMATION PROCESSING

INTELLIGENCE AND CREATIVITY

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Sample Preview of the Solved Sample Question Papers

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QUESTION PAPER

June – 2024

(Solved)

COGNITIVE PSYCHOLOGY, LEARNING AND MEMORY

M.P.C.-1

Time: 2 Hours] ***[Maximum Marks: 50***

Note: *All sections are compulsory.*

SECTION-A

Note : Answer the following questions:

Q. 1. Describe the principles of information processing. Explain Sternberg's information processing approach.

Ans. Ref.: See Chapter-2, Page No. 18, Q. No. 6 and Page No. 15, 'Sternberg's Information Processing Approach'.

Q. 2. Explain cognitive psychology with a focus of neurocognitive revolution. Discuss the key issues in cognitive psychology.

Ans. Ref.: See Chapter-1, Page No. 3, 'A Brief History of Cognitive Psychology' and 'Key Issues in the Study of Cognitive Psychology'.

Q. 3. Describe Spearman's two-factor theory of intelligence. Provide critical appraisal of his theory as given by Thorndike, Thomson and Thurstone.

Ans. Ref.: See Chapter-5, Page No. 41, 'Spearmen's Two-Factor Theory of Intelligence' and 'Critical Appraisal of Two-factor Theory'.

Q. 4. Critically analyse the innateness theory of language acquisition.

Ans. Ref.: See Chapter-9, Page No. 92, Q. No. 5.

SECTION–B

Note : Answer the following questions:

Q. 5. Describe the principal areas of research in cognitive psychology.

Ans. Ref.: See Chapter-1, Page No. 7, Q. No. 2

Q. 6. Explain the *three* components of triarchic theory of intelligence by Sternberg.

Ans. Ref.: See Chapter-6, Page No. 53, 'Sternberg's Triarchic Theory of Intelligence'.

Q. 7. Describe the stages of language acquisition and explain the building blocks of language.

Ans. Ref.: See Chapter-9, Page No. 84, 'The Building Blocks of Language' and 'Stages of Language Acquisition'.

Q. 8. Define problem solving. Describe the types of problems.

Ans. Ref.: See Chapter-13, Page No. 132, Q. No. 2 and Q. No. 3.

Q. 9. Explain the traditional approach and Gestalt's approach to problem solving.

Ans. Ref.: See Chapter-15, Page No. 150, Q. No. 1 and Q. No. 2.

SECTION–C

Note : Write short notes on the following:

Q. 10. Dyspraxia

Ans. Ref.: See Chapter-12, Page No. 121, 'Dyspraxia'.

Q. 11. Cellular bases of learning and memory

Ans. Ref.: See Chapter-3, Page No. 23, 'Cellular Bases of Learning and Memory'.

Q. 12. Bodily-kinesthetic Intelligence

Ans. Ref.: See Chapter-6, Page No. 52, 'Bodily-Kinesthetic Intelligence'.

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QUESTION PAPER

December – 2023

(Solved)

COGNITIVE PSYCHOLOGY, LEARNING AND MEMORY

M.P.C.-1

Time: 2 Hours] ***[Maximum Marks: 50***

Note: *All sections are compulsory.*

SECTION-A

Note: Answer the following questions:

Q. 1. Explain the meaning of cognitive psychology. Provide a brief history of cognitive psychology.

Ans. Ref.: See Chapter-1, Page No. 1, 'Cognitive Psychology: An Introduction' and Page No. 3, 'A Brief History of Cognitive Psychology'.

Q. 2. Discuss critically the PASS theory of intelligence.

Ans. Ref.: See Chapter-5, Page No. 43, 'Das, Nagliery and Kirby's Pass Theory' and 'Critical Appraisal of the Pass Theory'.

Q. 3. Explain Guilford's structure of intellect theory.

Ans. Ref.: See Chapter-6, Page No. 49, 'Guilford's Structure of Intellect Theory'.

Q. 4. Explain the specific techniques for problem solving.

Ans. Ref.: See Chapter-8, Page No. 78, 'Strategies of Problem-Solving'.

SECTION–B

Note: Answer the following questions:

Q. 5. Describe the *three* storage systems of memory.

Ans. Ref.: See Chapter-2, Page No. 12, 'Memory'.

Q. 6. Explain the concept of intelligence quotient (I.Q.). Discuss the contribution of Alfred Binet towards intelligence testing.

Ans. Ref.: See Chapter-7, Page No. 62, 'History of Measurement of Intelligence'.

Q. 7. Explain the *three* elements of language expression as given in the analysis by Clark and Clark.

Ans. Ref.: See Chapter-10, Page No. 97, 'Functions of Language'.

Q. 8. Analyse single-system *vs.* dual-system hypotheses of language.

Ans. Ref.: See Chapter-11, Page No. 113, 'Single-System *Versus* Dual-System Hypotheses'.

Q. 9. Describe the stages in creative discoveries.

Ans. Ref.: See Chapter-14, Page No. 142, Q. No. 14.

SECTION-C

Note: Write short notes on the following:

Q. 10. Cognitive neuroscience.

Ans. Ref.: See Chapter-1, Page No. 2, 'Domains of Cognitive Psychology' (*(i)* Cognitive Neuroscience).

Q. 11. Bloom's taxonomy of cognitive domain.

Ans. Ref.: See Chapter-2, Page No. 15, 'Bloom's Taxonomy of Cognitive Domain'.

Q. 12. Aphasia.

Ans. Ref.: See Chapter-12, Page No. 112, 'Aphasia'.

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Sample Preview of The Chapter

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COGNITIVE PSYCHOLOGY, LEARNING AND MEMORY

INFORMATION PROCESSING

Cognitive Psychology

1

INTRODUCTION

The field of cognitive psychology is related to the study of how people perceive things and what they remember. This means it involves mental processes. Since much of our behaviours are determined by the mental processes, their study has given rise to cognitive psychology. The study of cognition admits of multiple levels of analysis which interact in a myriad of ways. Defining cognitive science is surprisingly difficult. This difficulty may be attributed to several factors. In part it springs from the fact that cognitive science arose from a intermingling of several different academic disciplines, and thus encompasses a wider range of intellectual territory than other academic disciplines. In part the difficulty in defining cognitive science arises from the dynamic nature of the discipline itself. Science has progressed rapidly in the four decades since cognitive science first appeared. As a result of this rapid progress, the definitional utility of some of the original central features of the discipline have been rendered doubtful, and several features which were originally under-appreciated or simply ignored have come to play a central role in current theorizing.

CHAPTER AT A GLANCE

COGNITIVE PSYCHOLOGY: AN INTRODUCTION

We can define cognitive psychology as a field whereby people's perception, learning, remembering, and thinking about information is studied scientifically. Let us illustrate the field of psychology through everyday experiences. We can take an example of proofreading when we leave obvious errors. This is because in such cases we see not what actually exists in reality but determine it by context and overlook the error. Taking notes in class and understanding a lecture at the same time poses problems of attention. We need to repeat new telephone number in our mind until we dial it because we don't do so our short term memory would lose information. A difficult problem or puzzle is easily solved when we take a break and then try it again. It is called incubation effect and is an aspect of problem solving cognitive psychology. Further, we can experience discrepancy of perception on a foggy day when things look farther than their real distance. It is these types of experiences which form the basis of study of cognitive psychology.

The examples helps us in beginning the study of cognitive psychology by showing *(i)* difficulty or failure of mental processes; and *(ii)* mental phenomena is main domain of cognitive psychology. Thus, the scientific study of the mind is called cognitive psychology. Let us now discuss how the cognitive psychologists study mind, that is, what are its methods in the following sections of this chapter. Other relevant topics have also been discussed to give a fuller idea of cognitive psychology field.

RESEARCH METHODS IN COGNITIVE PSYCHOLOGY

A number of research methods are followed in cognitive psychology and hence there different goals to achieve by each method.

Goals of Research

A particular method has developed with a specific goal to achieve. Therefore, it is important to understand the goals of research. In short, hypothesis formulation, hypothesis testing, collection of data, its analysis, evolving theory, etc. are some of the goals in cognitive psychology. Apart from cognition, cognitive psychologists also try to understand the *how* and the *why* of thinking by describe cognition. Finally, the observations help in making inferences.

Distinctive Research Methods

The research on thinking process of human mind is done through the methods like *(i)* experiments on human behaviour, *(ii)* psychobiological research, *(iii)* self-reports, case studies, naturalistic observation, and *(iv)* computer simulations and artificial intelligence. As these methods are discussed below, we can observe their merits and demerits.

***(i)* Experiments on Human Behaviour:** These experiments are either done in laboratories or in a controlled condition by controlling as many aspects of the situation. Every experiment generally has independent (the treatment) and dependent variables (the outcome), while irrelevant variables are kept constant and are known as control variables. Based on these variables, the causality of the phenomenon is obtained. The sample of the population has to be representative and random.

***(ii)* Psychobiological Research:** The relationship between cognitive performance and cerebral events and situations is the domain of this type of research. Basically, three kinds of techniques are used in this method: studying an individual's brain post-mortem; studying images of structures or activities of the brain showing a particular cognitive deficit; and studying normal performance of a cognitive activity of an individual.

***(iii)* Self-Reports, Case Studies, and Naturalistic Observation:** To know how individuals think, or to focus on precise specification of discrete aspects of cognition across individuals, psychologists may use self-reports, case studies, and naturalistic observation methods. Such qualitative methods are useful in the formulation of hypotheses and generating descriptions of rare events, while experimental research is most useful for testing hypotheses.

***(iv)* Computer Simulations and Artificial Intelligence:** These have had a direct influence on cognitive psychology. Another influence, which is obviously indirect, is the similarity drawn between the processing of information by the brain and a computer has also played a great role in the emergence of cognitive psychology. Simulation means computers are programmed to imitate a given human function or process. Artificial intelligence achieved through computer models of the human mind. It may be noted that simulation and artificial intelligence approaches may be combined. Cognitive psychology is closely related to cognitive science, which is a cross disciplinary field using ideas and methods from psychobiology, cognitive psychology, artificial intelligence, anthropology, philosophy, and linguistics. Cognitive psychologists also take help from social psychology, engineering psychologists and motivation psychologists.

DOMAINS OF COGNITIVE PSYCHOLOGY

There are 12 main areas of research for which cognitive psychology has been working. They are as follows:

***(i)* Cognitive Neuroscience:** Of late, neurological explanations are being sought for the findings in cognitive psychology. Thus, the cognitive process is supported by basic electrochemical processes of the nervous system and the brain.

***(ii)* Perception:** It is concerned with detection and interpretation of sensory stimuli. Cognitive psychology has attempted to enhance our understanding of the sensitivity of the human organism to sensory signals received from the stimuli. Along with other cognitive systems, like pattern recognition, attention, consciousness, and memory, the study of perception provides us the idea of the expected performance.

***(iii)* Pattern Recognition:** Cognitive psychology studies pattern recognition of environmental stimuli which are part of a complex pattern of sensory stimuli. For instance, when we read our brain recognises lines and curves of letters assembles them in form of words and accesses meaning from the memory.

***(iv)* Attention:** We always pay attention to a selected piece of information or a part of information because of our limited capacity to process information at two levels–sensory and cognitive.

***(v)* Consciousness:** Although rejected and called unscientific by the behaviourists, the concept of consciousness has still stood the test of time. It is

the current awareness, of external or internal circumstances. For instance, when we glance at our watch we are conscious of external signal (watch showing time) and there is another from "inside" which may be like "It's getting late."

(vi) **Memory:** STM and LTM work in tandem with perception. For instance, we use words from the and recall a very old information from the LTM. The relationship between perception and memory has thus been an important domain of cognitive psychology.

(vii) **Representation of Knowledge:** It is the way information is symbolised and combined with the storage in the brain. Thus, the two aspects of this cognition are conceptual representation of knowledge in mind and the way the brain stores and process information. while the conceptual representation differs considerably from individual to individual, all human brains show similar structures for the storage of this content.

(viii) **Imagery:** Relatively new domain, it is linked to internal representations of knowledge or the mental images of the environment forming cognitive maps, which provide us with important cues.

(ix) **Language:** Language plays an important role in information processing and storage. Cognitive psychology studies about how language is used. Both abstractions in human language and perception, which in turn is influenced by language, are basic to cognition.

(x) **Developmental Psychology:** It is the study of how cognitive structures develop, while we grow from childhood to adulthood. This branch of cognitive psychology has been intensely studied.

(xi) **Thinking and Concept Formation:** One of the most important aspects of cognition is thinking which forms a new mental representation by transforming a given piece of information. It helps in the understanding and processing of information. The study of the laws and processes of concept formation is another important related domain of cognitive psychology.

(xii) **Human and Artificial Intelligence:** Acquiring, recalling, and using knowledge to understand different phenomena comprises human intelligence. Artificial intelligence is created through programs which are based on the way human mind processes information.

A BRIEF HISTORY OF COGNITIVE PSYCHOLOGY

Representation of knowledge in mind forms a major part of research in cognitive psychology which has three major periods in its history: traditional ideas of early period; concept of knowledge and thinking during Renaissance; and the modern period.

Early Thoughts on Thinking

Origin and represented of knowledge in the mind is fundamental to cognitive psychology. According to empiricists, knowledge comes from experience, while the nativists argue knowledge is fundamental to brain's functioning. However, these are not scientific views because neither of the two can be proved. The seat of thought and memory was the main concern of the early philosophers, whereby ancient Egyptian hieroglyphics thought that knowledge was basically in the heart. Aristotle, too, supported the Egyptian view, while Plato located the knowledge in the brain.

Cognition in the Renaissance and Beyond

During the Renaissance, the locus of knowledge was considered to be the brain. According to thought of the time, knowledge was acquired both through the physical senses as well as from divine sources. The philosophic psychology of the 18th century provided a platform for scientific psychology with the works of the British empiricists like George Berkeley, David Hume. Further, James Mill and John Stuart Mill argued that internal representation was of three types: *(a)* direct sensory events, *(b)* faint copies of percepts or contents of the memory; and *(c)* transformation of these faint copies. Finally, the 19th century witnessed the early psychologists like Gustav Fechner, Brentano (stressed processes or acts), Hermann Helmholtz, G. E. Muller, William James and Edward Titchener (emphasised the structure of mental representation) and others tried to give up speculation and relied on empirical results. rather than on speculation.

In America, James, the author of Principles of Psychology (1890), set up the first psychological laboratory saw memory as a concept where both structure and process play an important role. He developed a well-reasoned model of the mind. The contemporaries of James like F. C. Donders and James Cattell performed experiments mental operations taking place during the perception of visual displays. Thus, these early psychologist pave

the way for cognitive psychology with their subject matter, interpretation of the subject and technique.

Cognitive Psychology in Early Twentieth Century

At beginning of the 20th century, behaviourism and Gestalt psychology brought about a radical change in the representation of knowledge. While the first studied psychology in a stimulus-response (S-R) framework, Gestalt theorists explained internal representation within the context of isomorphism, that is, one-to-one relationship between representation and reality surrounding the individual. Thus, behaviourism displaced the traditional subject matter of the late 19th. Actually, the behaviourists included internal states or the mental processes under "intervening variable" and emphasized the importance of observing behaviour.

In Purposive Behaviour in Animals and Men (1932), Edward Tolman argued against the simplistic notion of a series of S-R connections citing that what rats learn in a maze is the layout of the land. Thus, the animal developed a "picture" (cognitive map) of his environment that was later used to find the goal. This encouraged the search for how knowledge is represented in a cognitive structure. Similarly, in Remembering (1932), Sir Frederick Bartlett rejected Ebbinghaus's view (19th century) that memory and forgetting can be studied by means of nonsense syllables. According to Bartlett, the research in human memory should use rich and meaningful material for better results. He came up with the concept of schema. These ideas of Tolman (America) and Barlet (England) had a great impact on cognitive psychology of the future.

Cognitive Psychology–As it is Today

After about half a century (1950s), the topics like memory, thinking, etc. of the 19th century again gained ground. The cognitive psychology got established but was different from the psychology of the 1930s and 1940s. The following factors were responsible for this neocognitive revolution:

The "failure" of behaviourism: Studying the overt responses to stimuli, behaviourism failed to account for the diversity of human behaviour, ignored some important topics like memory and thinking.

The emergence of communication theory: This theory started with signal detection, attention, cybernetics, and information theory.

Modem linguistics: This studied language and grammatical structure as part of cognition.

Memory research: The study in verbal learning and semantic organisation provided memory theories with data and hence memory models could be made.

Computer science and other technological advances: The re-examination of basic postulates of problem solving and memory processing and storage was possible with the advent of computer science along with artificial intelligence. These new devices enormously increased research capabilities in cognitive psychology.

Cognitive development: Psychologists like Jean Piaget studied how cognition power developed with maturation from childhood to adulthood.

That the knowledge relies heavily on sensory inputs has been the theme from the earliest to the contemporary times. Further, it is being found that many internal representations of reality are not isomorphic or the same as the external reality. Both the works of Tolman and Bartlett indicate an abstract representation results from information received from the senses. In addition to this, neurochemical coding of information has been discovered by neurology.

KEY ISSUES IN THE STUDY OF COGNITIVE PSYCHOLOGY

The issues or major themes in the study of cognitive psychology are discussed below.

Nature versus Nurture: We may emphasize nature, that is, innate characteristics of human cognition or nurture, that is, the environment in the study of cognition.

Rationalism versus Empiricism: The truth about ourselves and about the world around us may be approached through applying reason and logic or by observing and testing our observations.

Structures versus Processes: Psychologist may study the structures of the human mind or human thinking processes.

Domain Generality versus Domain Specificity: The processes or observations may be studied as limited to single domain apply also to all domains.

Validity of Causal Inferences versus Ecological Validity: Psychologists may use controlled experiments for valid inferences regarding causality or they may use more naturalistic techniques for ecological validity.

Applied versus Basic Research: Some research may be inclined towards practical applications and