Cognitive Psychology: Brain and Paradigms

Why Include the Brain in Cognitive Psychology?

Cognitive psychology initially focused on mental processes and representations, explaining how information is processed and knowledge is formed through mental activities. However, this approach left an important question unanswered: how do these mental processes occur?

One of the challenges for cognitive psychology was to shift from understanding only the functions of mental activities to understanding how these processes occur in the brain. The brain provides the structure through which the mind operates, and studying the brain helps us pinpoint the underlying mechanisms of cognition.

1. Identifying Brain Processes:

By studying the brain, we can observe specific brain regions that activate during certain mental tasks. For example, if brain region "A" activates during task "A" but not during task "B," we can establish a direct correlation between the brain's activity and the cognitive task. This provides a measurable way to study cognitive functions.

2. Challenges of Brain Study in Cognition:

However, cognitive processes can be complex, with different processes producing similar mental experiences. For instance, emotions like happiness or excitement often activate similar brain regions, making it difficult to distinguish them purely based on brain activity. This is one of the major hurdles in connecting brain function to cognition.

3. Structure-Process Trade-Off:

Saul Sternberg's experiments on how people retrieve information from memory provide an example of the structure-process trade-off. In one of his experiments, participants were asked to memorize a list of numbers and identify if a number was in the list. He found that the longer the list, the longer it took participants to verify if a number was present. This suggested a serial search process in the brain.

However, other researchers, such as Townsend, proposed that memory searches could be parallel rather than serial. Although parallel searches should be faster, they found that increasing the number of items in the list still increased response time, suggesting that multiple processes may be at work simultaneously, each contributing to the cognitive experience.

serial : single process(search)
large structure(list)

4. Adequacy of Theories:

parallel : single structure(one no.per search)
large process(many searches)

The brain helps us evaluate the adequacy of various theories on mental processing. If multiple theories propose different mechanisms for the same cognitive process, brain research can help determine which theory best fits the structural constraints of the brain.

Paradigms in Cognitive Psychology

Paradigms are sets of assumptions and methods that guide research in a particular field. In cognitive psychology, four major paradigms have shaped how researchers study mental processes.

1. Information Processing Approach:

The information processing approach views cognition as the flow of information through a system. Mental processes are likened to a computer that takes in information (input), processes it, and generates an output.

2. Connectionism (Parallel Distributed Processing):

Connectionism models cognitive processes as networks of interconnected nodes, much like neurons in the brain. These nodes activate in parallel and are weighted according to their importance in the mental process.

3. Evolutionary Approach:

The evolutionary approach suggests that cognitive abilities, such as language and depth perception, have evolved over time and are hard-wired into the brain.

4. Ecological Approach:

The ecological approach argues that cognition is shaped by the environment in which it occurs. Cultural and contextual factors play a significant role in how mental processes function.

Conclusion:

This lecture explored the role of the brain in cognitive psychology, explaining how it helps clarify mental processes. The major paradigms guiding research in cognitive psychology were also discussed, each offering a unique perspective on how cognition works.