Introduction to Working Memory

In this video, the speaker introduces working memory as a more complex model that expands upon short-term memory. Working memory allows for the active manipulation and transfer of information between short-term and long-term memory. It overcomes the limitations of short-term memory by incorporating attention and includes components like the Central Executive, phonological loop, and episodic buffer.

Working memory interacts with both short-term and long-term memory, enabling complex tasks, such as problem-solving and comprehension. The model challenges traditional ideas about short-term memory's limited capacity, revealing that working memory can borrow information from long-term memory and use it to process complex information.

The Atkinson-Shiffrin Model and Working Memory

The Atkinson-Shiffrin model proposed the idea of short-term memory (STM) and long-term memory (LTM), where information moves from STM to LTM through rehearsal. However, items in STM can be lost due to decay and interference. Working memory evolved from this model to serve as a more dynamic and interactive system that actively processes and holds information.

A key experiment by Baddeley and Hitch tested this idea by asking participants to store digits while performing another task. The results suggested that working memory is a separate system from STM and LTM, supporting the development of the working memory model.

Digit Span and Task Performance

Experiments by researchers Bradley and H revealed the impact of memory load on performance:

- When participants were asked to remember two or three digits, their performance in a letter verification task was unaffected.
- However, when the number of digits increased to more than six, performance decreased significantly.

This experiment revealed that STM has separate stores for different types of information, such as a logical code and a digit code, rather than being a single unified store. As the load increased, reasoning time also increased, further challenging the traditional view of STM.

Interaction Between Short-Term and Long-Term Memory

Experiments further revealed that STM interacts with long-term memory and borrows rules during complex verifications. It was found that different types of items are stored using different codes, reducing interference between unrelated items. This led to the conceptualization of working memory as a system that can process complex tasks by using information from both STM and LTM.

Components of the Working Memory Model

Working memory consists of several key components:

- Central Executive: Acts as the manager, distributing information to two sub-stores-the phonological loop and the visuospatial sketchpad.
- Phonological Loop: Responsible for handling auditory and verbal information through a phonological buffer and subvocal rehearsal.
- Visuospatial Sketchpad: Deals with visual and spatial information and breaks down complex visual tasks.

The Central Executive uses rules from long-term memory to make decisions and manage tasks, acting as the control center for reasoning and task execution.

Functions of the Working Memory Components

Each component of working memory serves specific functions:

- Central Executive: Manages and directs information between the STM, phonological loop, and visuospatial sketchpad.
- Phonological Loop: Rehearses and stores auditory information, allowing for repetition and

interpretation of sounds.

- Visuospatial Sketchpad: Handles visual tasks and codes, breaking down images into smaller parts for easier processing.

Working memory is much more complex than STM, as it can handle multiple types of information (auditory, visual) simultaneously.

Phonological Loop and Task Complexity

Experiments were conducted to test the phonological loop's capacity. Results indicated that the capacity of the phonological loop depends on both task complexity and comprehension. When tasks were more complex, performance decreased. Similarly, visual tasks showed that the ability to recall visual information also depends on the complexity of the visual stimuli.

Impact of Working Memory on Stimulus-Independent Thought

The speaker discusses an experiment that tested whether STM tasks interfere with stimulus-independent thought, such as daydreaming:

- Tasks involving the phonological loop (sentence verification) and visuospatial sketchpad (finding geometrical figures) interfered with daydreaming.
- The central executive was identified as the cause of this interference. However, when participants were allowed to perform routine tasks, daydreaming had less impact on their thought process.

Unlimited Capacity of Working Memory

One of the significant advantages of the working memory model is its unlimited capacity for processing time and flexibility in handling various types of coding. This allows for continuous interaction with long-term memory and facilitates the retrieval and transfer of information.

Serial Position Curve and Long-Term Memory

The serial position curve shows that items that are familiar or personally relevant are more likely to be transferred from working memory to long-term memory. This highlights how working memory works dynamically with long-term memory, creating a more accurate and nuanced understanding of

the memory process.

Conclusion

The working memory model provides a deeper understanding of memory by combining the capabilities of STM and LTM, allowing for unlimited capacities, uncapped processing times, and handling of multiple types of coding. In future lectures, the speaker plans to explore the long-term memory store in more detail.