

# Cognitive Load Distribution in Multistep Problem Solving Among Adults

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## DESCRIPTION

Complex problem solving often requires individuals to manage multiple pieces of information at once while maintaining coherence across sequential steps. Cognitive psychology has examined how mental resources are distributed when individuals engage in multistep tasks, particularly in environments where decisions must be made under time constraints or informational uncertainty. The concept of cognitive load provides a framework for understanding how mental effort is allocated and how this allocation influences performance quality.

Cognitive load refers to the amount of mental effort required to process information at any given moment. When individuals engage in problem solving that involves several steps, they must hold relevant details in working memory while simultaneously processing new information. If the load exceeds available cognitive capacity, performance may decline. This can result in incomplete solutions, errors in reasoning, or difficulty maintaining logical consistency across steps. Managing this load effectively is therefore essential for accurate and efficient problem resolution.

Multistep problem solving often involves three types of cognitive load: intrinsic, extraneous, and germane. Intrinsic load is associated with the inherent complexity of the task itself. Problems that require multiple logical operations or integration of diverse information naturally impose higher demands. Extraneous load arises from the way information is presented. Poorly organized or unclear instructions can increase unnecessary mental effort, making it harder to focus on the core problem. Germane load relates to the mental effort dedicated to constructing understanding and forming coherent solutions. Balancing these types of load is important for optimizing performance.

Working memory capacity plays a central role in determining how effectively cognitive load is managed. Individuals with greater working memory capacity are often better able to hold intermediate steps in mind while processing new information. However, even those with strong cognitive capacity can experience overload when tasks become excessively complex or poorly structured. This suggests that task design is as important as individual ability in determining success. Simplifying presentation and breaking problems into manageable segments can help reduce unnecessary

strain on cognitive resources.

Strategies for distributing cognitive load effectively include chunking information and externalizing intermediate steps. Chunking involves grouping related pieces of information into meaningful units, reducing the number of elements that must be actively maintained in memory. Externalization, such as writing down intermediate calculations or steps, allows individuals to offload cognitive demands onto external supports. These strategies free up mental resources for higher-level reasoning and decision-making.

Attention control is another factor that influences cognitive load distribution. When attention is easily distracted, individuals may lose track of problem-solving steps, leading to increased mental effort required to reorient themselves. Sustained attention allows for more stable processing and reduces the likelihood of errors. Training in attentional control has been shown to improve performance in tasks requiring complex reasoning, suggesting that cognitive load management can be enhanced through practice.

Task familiarity also affects how cognitive load is experienced. Individuals who have prior experience with similar problems often require less mental effort to solve new but related tasks. This is because they can rely on previously established patterns or strategies, reducing the need for step-by-step analysis. In contrast, unfamiliar tasks require more active processing, increasing cognitive demand. This difference highlights the importance of experience in shaping cognitive efficiency.

Technological tools have become increasingly relevant in managing cognitive load. Software that organizes information, performs calculations, or structures tasks can reduce the burden on working memory. However, overreliance on such tools may limit the development of independent problem-solving skills. Effective use of technology requires a balance between support and active engagement, ensuring that cognitive effort is still directed toward understanding rather than passive reliance.

## CONCLUSION

Cognitive load distribution plays a significant role in multistep problem solving. The balance between mental capacity, task complexity, attention control, and environmental conditions

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determines how effectively individuals can process and solve complex problems. By applying strategies that manage cognitive load efficiently, performance can be enhanced across a wide range

of contexts. Continued research in this area offers valuable insights into optimizing human reasoning under conditions of complexity and constraint.