The Effects of Generative Artificial Intelligence on Higher-Order Cognitive Functions

The integration of generative Artificial Intelligence (gAI) into our daily tasks has revolutionized how we interact with and process information. This project aims to understand the implications of relying on gAI like ChatGPT on cognitive load, learning processes, and long-term cognitive development.

The primary objective of this project is to examine how the use of gAI affects cognitive load and to assess the long-term impact on human cognitive abilities, focusing on reasoning. The project is set to deploy a series of five controlled experiments to measure the effects of gAI on cognitive load as well as functions. These include laboratory-based tasks and online assessments where participants will utilize gAI tools to execute reasoning tasks. The influence will be evaluated through task performance, knowledge retention tests, the measurement of cognitive offloading, and decision-making. Additionally, longitudinal studies will monitor the effects of prolonged gAI use on cognitive skills, such as general and domain-specific reasoning.

It is hypothesized that frequent offloading of reasoning tasks to gAI will reduce the cognitive load but may impair the formation of complex knowledge structures in long-term memory. More critical tasks are expected to be offloaded more frequently due to the perceived competence of gAI, increasing reliance on external cognitive support. Extended use of gAI is expected to affect the user's ability to perform domain-specific reasoning tasks independently, potentially degrading these skills over time while possibly not influencing general reasoning abilities (fluid intelligence).

The research anticipates demonstrating a nuanced view of how gAI affects cognitive functions. I expect to find that while gAI can reduce immediate cognitive load, it may also hinder the development of cognitive abilities and alter traditional learning processes. These findings will contribute significantly to understanding the trade-offs involved in cognitive offloading and inform the design of gAI tools to better support human cognitive capabilities without undermining essential cognitive skills.

This project is positioned at the forefront of cognitive science research by addressing the complex dynamics between human cognition and machine intelligence. Its innovative approach lies in applying empirical methods and cognitive load theory to a relatively unexplored field, providing insights that could influence future educational tools, workplace technology policies, and the broader discourse on gAI ethics and human enhancement.

As gAI continues to evolve and become more ingrained in our lives, understanding its impact on cognitive functions is crucial. This project aims to lay a foundation for how we think about and interact with gAI technologies in ways that enhance human intelligence rather than diminish it. By advancing our knowledge of these interactions, we can better navigate the balance between leveraging gAI's capabilities and maintaining our cognitive health and skills.