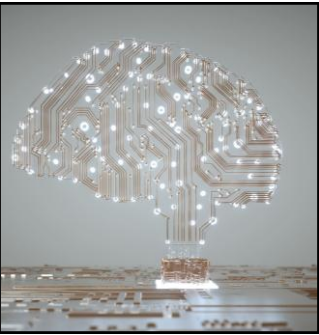


Artificial Intelligence and Human Cognition

EXPLORING THE INTERPLAY BETWEEN MACHINES AND THE MIND



1

Introduction and Theoretical Framing

2

Why Artificial Intelligence Matters for Cognitive Psychology



AI's Role in Cognitive Labor
AI shifts cognitive labor by blending internal mental processes with external technological support.

Automation vs Augmentation
Automation replaces human effort, while augmentation supports and extends active human cognition.

AI as Cognitive Partner
AI challenges traditional views on thinking, knowledge, and understanding in a technology-rich world.

Theoretical Integration in Psychology
AI demands deeper theoretical integration in cognitive psychology beyond surface-level technological views.

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Core Theoretical Frameworks: Extended Mind, Cognitive Load, and Offloading

Extended Mind Theory (Clark & Chalmers, 1998)
Cognitive processes can extend beyond the brain into the environment, integrating AI as part of distributed cognition.

Cognitive Load Theory (Sweller, 1988).
AI can reduce extraneous cognitive load, but too much reliance may hinder deep learning and schema development.

Cognitive Offloading (Risko & Gilbert, 2016)
Using external aids improves short-term efficiency but may weaken memory and internal skill development over time.



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AI and Cognitive Offloading

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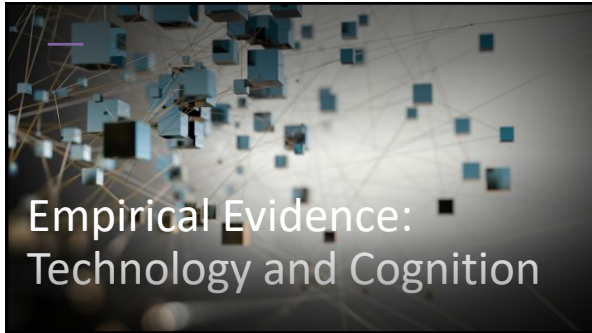
Memory, Knowledge, and the Costs of Offloading

Cognitive Offloading Impact
AI offloading reduces memory encoding by shifting recall to where information is stored rather than the content itself.

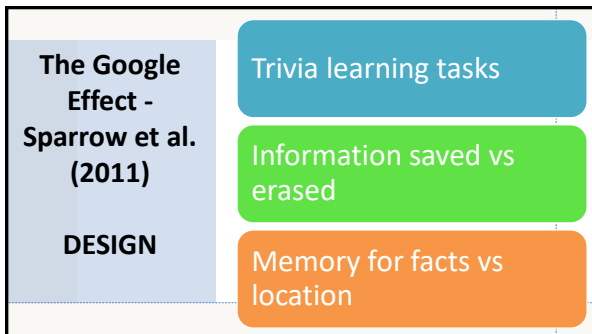
Memory's Role in Cognition
Memory underpins reasoning, transfer, expertise beyond info storage for deep understanding.

Balancing AI Use
Strategic, reflective AI use supports learning while uncritical reliance risks weakening knowledge formation.

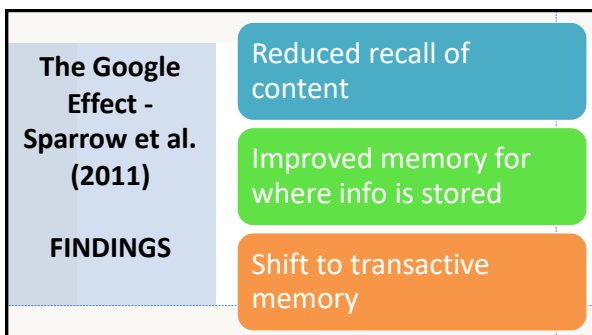
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Implications of the Google Effect



Strategic offloading,
not memory decline



Shallow processing risks



Relevance to AI-assisted learning

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GPS and Spatial Cognition - Ishikawa et al. (2008)

- Design:
 - Navigation via GPS, maps, or experience
 - Testing spatial knowledge afterward
- Findings
 - GPS users reached destinations
 - Poorer mental maps
 - Reduced landmark and route knowledge



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Why GPS Findings Matter

- Performance vs learning distinction
- Reduced engagement in cognitive mapping
- Parallel with AI decision support



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Automation Bias - Parasuraman & Riley (1997)

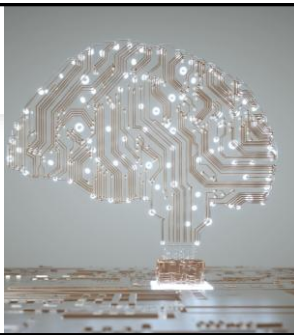
- Over-reliance on automation
- Reduced monitoring and intervention
- Errors of commission
- Errors of omission
- Increased under time pressure



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Automation Bias and Modern AI

- Fluent AI outputs increase trust
- Risk of passive cognition
- Need for metacognitive monitoring



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Synthesis – What do these studies tell us?



Memory shifts from
content to access



Efficiency can reduce
learning



Cognitive impact
depends on use

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Mini Think-Pair-Share Task:

In pairs discuss the following questions:

- Which cognitive functions are most at risk of offloading to AI?
- Which cognitive functions might be enhanced by offloading to AI?

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Interactive Group Task:

Cognitive Offloading in Action

AI vs Human Processing Simulation

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**Attention, Control,
and Metacognition**

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AI, Attention Regulation, and Cognitive Control

AI as Attention Director
AI shapes what users notice and prioritise, reducing the need for active search and decision-making.

Impact on Cognitive Control
Overreliance may weaken sustained attention & executive control due to reduced planning & monitoring.

Role of Metacognition
Metacognitive skills help users critically evaluate AI outputs and maintain control over cognitive processes.

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Applied Case Analysis and Interactive Learning

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Evaluating AI Use in Academic Contexts

Cognitive Load Effects
AI can reduce extraneous cognitive load by assisting with information organisation & aiding critical evaluation. However, AI performing interpretive tasks may limit deep learning by reducing germane load.

Metacognitive Regulation
Effective AI use requires students to monitor and regulate reliance; uncritical acceptance may cause overestimation of understanding and illusions of competence.

Conditional Reasoning Importance
AI's cognitive effects vary with task demands and user strategies, emphasising need for adaptive judgment in academic and professional settings.

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Interactive Task 2: Case Analysis

A final-year student uses AI to:

- Summarise papers
- Generate essay plans
- Suggest arguments

Group Task:

Analyse the case using **two theoretical frameworks**:

1. Cognitive Load Theory
2. Metacognition (monitoring & control)

Each group to discuss:

- What cognitive processes are supported?
- What processes may be weakened?
- Under what conditions is AI beneficial vs harmful?

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Synthesis, Debate, and Conclusions

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Does AI Enhance or Diminish Human Cognition?

Dual Effects of AI on Cognition

AI can enhance cognitive functions by reducing burdens or undermine skills by promoting dependency.

Educational Debate Importance

Debates help students synthesise theories like cognitive load and extended mind to evaluate AI effects on cognition.

Role of Human Choice and Ethics

Human decisions and policies shape AI's cognitive outcomes, emphasising ethics, agency, and intellectual growth.



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