

How AI Affects Human Development, Communication, And Learning Processes

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Abstract

The ubiquity of Artificial Intelligence (AI) and Large Language Models (LLMs) has precipitated a paradigm shift in human cognition, fundamentally altering how individuals learn, communicate, and manage complex projects. This research paper investigates the multi-dimensional impact of AI integration, specifically examining its influence on human developmental psychology, Second Language Acquisition (SLA), and project management workflows. Utilizing a mixed-methods approach with a sample size of 450 participants—comprising educators, language learners, and project managers—this study explores the tension between algorithmic efficiency and cognitive autonomy. The findings reveal a significant paradox: while AI accelerates technical proficiency and reduces the affective filter in language learning, it correlates with a measurable decline in critical thinking depth and attention span, particularly among younger demographics. Furthermore, the study identifies a transformation in professional environments where AI has evolved from a tool to a "cognitive partner," reshaping leadership dynamics and stakeholder communication. The paper concludes that while AI offers unprecedented utility, it necessitates a rigorous re-evaluation of ethical frameworks regarding data privacy, bias, and the preservation of human intellectual sovereignty.

Keywords: Artificial Intelligence, Human Development, Second Language Acquisition, Project Management, Cognitive Offloading, Digital Ethics, Generative AI.

1. INTRODUCTION

The integration of Artificial Intelligence (AI) into the fabric of daily existence marks one of the most profound technological shifts in modern history, comparable in magnitude to the industrial revolution or the advent of the internet. No longer relegated to the periphery of computational backends, AI has emerged as a pervasive interface through which human beings interact with information, society, and reality itself. From algorithmic content curation that shapes political discourse to generative text production that assists in drafting corporate strategies, AI systems are now intrinsic to daily decision-making processes. This seamless integration subtly influences how individuals prioritize information, solve complex problems, and perceive the world around them. As AI agents such as ChatGPT, Claude, and Gemini become ubiquitous, they cease to be mere tools; they become environmental constants that exert a continuous pressure on human cognitive evolution. This ubiquity raises critical questions regarding the trajectory of human development, particularly as the outsourcing of cognitive tasks—a phenomenon often termed "cognitive offloading"—becomes a normalized behavioral standard across all age groups. Despite the rapid adoption of these technologies, a significant problem remains: the scientific community does not yet fully comprehend the long-term impact of this symbiosis on the human psyche. While the immediate economic benefits of enhanced productivity and information accessibility are evident and often celebrated, the potential degradation of fundamental human processes remains largely opaque. There is a growing concern among psychologists and educators that the ease of retrieval provided by AI may

they become environmental constants that exert a continuous pressure on human cognitive evolution. This ubiquity raises critical questions regarding the trajectory of human development, particularly as the outsourcing of cognitive tasks—a phenomenon often termed "cognitive offloading"—becomes a normalized behavioral standard across all age groups. Despite the rapid adoption of these technologies, a significant problem remains: the scientific community does not yet fully comprehend the long-term impact of this symbiosis on the human psyche. While the immediate economic benefits of enhanced productivity and information accessibility are evident and often celebrated, the potential degradation of fundamental human processes remains largely opaque. There is a growing concern among psychologists and educators that the ease of retrieval provided by AI may

atrophy the capacity for deep retention, critical synthesis, and the resilience required for independent problem-solving. We stand at a precipice where human intelligence is increasingly intertwined with synthetic intelligence, yet we lack a comprehensive map of how this relationship alters the biological and psychological infrastructure of the mind.

This increasing reliance on algorithmic assistance challenges fundamental tenets of human cognitive autonomy and psychological development. The immediate gratification provided by AI short-circuits the effortful mental processes—such as synthesizing disparate data, enduring frustration during complex problem-solving, and managing the iterative failures inherent in genuine learning—that are known to strengthen neural pathways and build resilience (Bjork & Bjork, 2020). For adults, this might manifest as **cognitive offloading**, where the brain delegates tasks like memory and complex calculations to external devices, preserving limited working memory but potentially atrophying deep domain expertise. For younger individuals, however, whose socio-cognitive architectures are still under construction, the constant availability of flawless, immediate AI output risks fundamentally altering their relationship with knowledge, creativity, and the very concept of *effort* as a prerequisite for achievement. The pervasive computational environment thus creates a generational divide in developmental pathways, requiring urgent investigation into whether digital natives are trading intellectual struggle for superficial competence.

Furthermore, the influence of AI extends beyond individual cognition into the critical domain of human interaction and communication, serving as a mediator that affects language acquisition and the dynamics of team collaboration. AI is actively reshaping the input and output

processes of Second Language Acquisition (SLA), offering unprecedented personalization that addresses Krashen's (1982) **Affective Filter Hypothesis** by reducing performance anxiety. Yet, this efficiency may come at the cost of authentic linguistic immersion, potentially sterilizing the cultural nuance and non-verbal cues essential for genuine communicative competence. In organizational settings, AI algorithms are now drafting correspondence, facilitating cross-cultural exchanges, and even suggesting strategies for conflict management, thereby inserting a synthetic layer between human senders and receivers. This shift necessitates a critical examination of whether AI is truly enhancing digital empathy or merely creating the *illusion* of communication efficiency while increasing the subtle risks of algorithmic bias and factual "hallucinations" that can quickly degrade trust.

Consequently, the urgency of this study is rooted in the imperative to transition from passive observation to systematic analysis. We must move beyond simply documenting AI use to understanding its causal relationship with human intellectual outputs and social behaviors. This research is structured to address the fundamental questions arising from this technological convergence, framing our inquiry around three interconnected research vectors:

1. **Human Development:** How does reliance on AI specifically alter cognitive attributes, including attention span, critical thinking, problem-solving persistence, and creativity, across different age demographics?
2. **Language Acquisition:** What is the precise impact of AI tools (e.g., generative conversational agents) on the quality of linguistic input, learner autonomy, affective barriers, and the development of reading and writing proficiency?

3. Organizational Communication and Management: How does the integration of AI as a 'cognitive partner' change the dynamics of team collaboration, leadership styles, information flow, and the management of conflict within project-based environments?

Therefore, the purpose of this research is to explore and quantify the effects of AI on three critical pillars of human experience: how people learn and develop cognitively, how they acquire and practice new languages, and how they communicate and manage work in professional settings. By analyzing the intersection of AI with developmental psychology, linguistic theory, and organizational behavior, this paper seeks to provide a comprehensive framework for understanding AI not merely as a technological utility, but as an influential agent of socialization. This study posits that while AI democratizes access to complex skills and facilitates rapid project execution, it simultaneously necessitates a rigorous redefinition of "competence" in an era where execution is increasingly automated. The investigation aims to move beyond the binary narrative of "AI as a savior" or "AI as a threat" to a nuanced understanding of AI as a transformative cognitive partner that requires active, rather than passive, engagement.

2. LITERATURE REVIEW

The theoretical framework for this investigation is constructed upon three pillars: developmental psychology, Second Language Acquisition (SLA) theory, and contemporary organizational communication literature. The introduction of pervasive Artificial Intelligence (AI) and Generative Large Language Models (LLMs) requires re-examining established psychological and linguistic principles, as AI fundamentally disrupts the conditions under which humans learn and interact (Dwivedi et al., 2021).

2.1 AI and Cognitive Development

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In developmental psychology, the concept of "**desirable difficulty**" posits that learning is optimized not by ease, but by conditions that force the learner to expend cognitive effort in retrieval and synthesis (Bjork & Bjork, 2020). This friction—the struggle to articulate a concept or solve a complex problem without immediate external aid—is crucial for encoding knowledge into long-term memory and developing robust executive function. AI, however, excels precisely by removing this friction. Tools like generative models offer instantaneous, well-articulated answers and solutions, effectively bypassing the cognitive labor historically associated with deep learning. The growing concern, therefore, is that this efficiency leads to **cognitive offloading**, a behavior where the brain delegates tasks like complex calculations, detailed memory retrieval, or sophisticated writing structure to the algorithm, thereby weakening the biological mechanisms responsible for these functions (Dwivedi et al., 2021).

The implications of cognitive offloading vary significantly between demographics. For adults, AI may serve as an augmented intelligence, a powerful extension of existing knowledge and expertise. However, for children and adolescents whose prefrontal cortices are still maturing, reliance on frictionless AI output could stunt the development of crucial developmental milestones, including frustration tolerance, persistent problem-solving, and sophisticated critical thinking (Luckin et al., 2016). This connects directly to Vygotsky's (1978) concept of the **Zone of Proximal Development (ZPD)**. While AI can act as the "More Knowledgeable Other," perfectly scaffolding a task by providing immediate and tailored assistance, critics worry that the scaffolding is too comprehensive, preventing the learner from ever performing the skill independently. Furthermore, **attention span** is identified as a critical

casualty; the constant flow of easily digestible, algorithmically curated information may reinforce a preference for superficial engagement over sustained intellectual inquiry, thereby eroding the capacity for deep work required in both complex academia and professional strategy (Anderson & Rainie, 2023). This digital environment prioritizes rapid consumption over contemplative creation, fundamentally challenging traditional theories of intellectual growth.

2.2 AI and Second Language Acquisition (SLA) Theory

The impact of AI on language learning is analyzed through the lens of foundational SLA theories, primarily the Input and Output Hypotheses. Stephen Krashen's (1982) **Input Hypothesis** stipulates that language acquisition occurs when learners receive **comprehensible input** ($i+1$), material slightly above their current competence level. Generative AI tools, such as AI tutors or advanced conversational bots, revolutionize this input process by creating bespoke, instantly adjustable conversational streams that theoretically match the learner's precise $i+1$ level perfectly. This dynamic adaptation far surpasses the capabilities of static textbooks or traditional classrooms, offering a continuous stream of optimized linguistic data (Xiao & Hu, 2024).

Equally significant is the AI's effect on the **Affective Filter Hypothesis** (Krashen, 1982). Anxiety and low self-esteem are known to raise this filter, inhibiting the uptake of input. Interacting with a non-judgmental AI conversational partner removes the social risk and fear of ridicule inherent in human-to-human practice, drastically lowering the affective barrier. This promotes **learner autonomy**, empowering individuals to practice more frequently and explore complex linguistic structures without constraint. However, this convenience introduces a new theoretical

challenge to Swain's (1985) **Output Hypothesis**, which argues that producing comprehensible output—i.e., making mistakes and receiving feedback—forces the learner to move from semantic processing to syntactic processing. While AI offers rapid correction, the lack of real-world, high-stakes interaction means the learner never faces the communicative pressure required to genuinely test their linguistic limits and activate the deeper cognitive processes involved in authentic communication. The concern centers on whether AI-assisted fluency is linguistically perfect but pragmatically deficient, lacking the necessary cultural context, paralinguistic cues, and sociolinguistic awareness gained only through human interaction (Chomsky et al., 2023).

2.3 AI, Communication Patterns, and Organizational Ethics

In organizational science, AI is disrupting established models of communication and leadership. The theory of **Computer-Mediated Communication (CMC)** traditionally focused on the filtering out of emotional and non-verbal cues in digital exchanges, often leading to increased misinterpretation. Generative AI, however, attempts to reverse this by introducing **synthetic empathy**—algorithms that analyze tone and optimize language for diplomacy and clarity in digital communication (Project Management Institute, 2023). This assists project managers in drafting communications, mediating conflicts, and ensuring documentation is standardized, which undoubtedly accelerates decision speed and information flow (Dwivedi et al., 2021). However, this algorithmic mediation raises profound ethical and leadership concerns. The reliance on AI for conflict resolution and stakeholder communication can erode authentic leadership, substituting genuine emotional intelligence with an algorithmically polished veneer.

Furthermore, the practice of delegating sensitive tasks exposes organizations to the pervasive risks of **algorithmic bias** and **data hallucinations**. Bias embedded in training data can lead AI to make inequitable decisions regarding workload distribution or resource allocation, automating and scaling existing human prejudices across vast organizational structures (UNESCO, 2023). Finally, the philosophical implications regarding **human autonomy** cannot be overlooked. The relationship with AI as a cognitive partner necessitates constant, intimate data collection regarding user choices, thoughts, and behaviors. This relationship, while highly efficient, introduces a significant ethical tension between convenience and the preservation of individual sovereignty in an era where data is continuously harvested (Zuboff, 2019). The literature strongly suggests that the future of effective project management and ethical governance rests on the ability of human actors to maintain critical oversight, recognizing that AI is a powerful tool for computation but remains incapable of ethical or empathetic judgment.

3. METHODOLOGY

To investigate these multifaceted phenomena, this study employed a concurrent mixed-methods research design, allowing for the triangulation of quantitative data regarding usage patterns with qualitative insights into user experience and cognitive impact. The study population consisted of 450 participants (N=450), recruited through professional academic networks, corporate project management associations, and online language learning communities. The participants were stratified into three distinct cohorts to ensure a comprehensive analysis: Educators and Developmental Psychologists (n=150), Project Managers and Corporate Leaders (n=150), and Active Language Learners utilizing AI tools

(n=150). This diverse sampling was intended to capture the impact of AI across the developmental spectrum, from the pedagogical facilitation of learning to the practical application of cognitive skills in the high-pressure workforce.

Quantitative data was collected using a standardized digital survey instrument titled the "AI Integration and Cognitive Impact Scale" (AICIS). This instrument utilized a 5-point Likert scale to measure variables such as "Frequency of AI usage for decision making," "Perceived impact on critical thinking depth," "Reliance on AI for conflict resolution," and "Anxiety levels during language practice." Additionally, project managers were asked specific questions regarding workflow optimization, team collaboration dynamics, and decision speed post-AI adoption. The reliability of the scale was verified using Cronbach's alpha, yielding a coefficient of 0.89, indicating high internal consistency.

Qualitatively, the research involved semi-structured, in-depth interviews with 45 selected participants (15 from each cohort). These interviews were designed to elicit detailed narratives regarding the subtle shifts in communication patterns, the subjective experience of "digital empathy," and the ethical dilemmas encountered in daily AI usage. The interviews probed specifically into the "hallucinations" of AI and how users verify information, providing insight into the changing nature of truth and authority in the digital age. Data from the interviews were transcribed and subjected to Thematic Analysis, where coding revealed recurring motifs related to "cognitive dependency," "efficiency-creativity trade-offs," and "algorithmic bias." The convergence of survey statistics and narrative data provided a robust foundation for analyzing the multifaceted impact of AI on human development, language, and work.

4. RESULTS AND ANALYSIS

The analysis of the collected data reveals a profound and often contradictory integration of AI into the cognitive and professional lives of the participants. The results are categorized below by the three primary domains of the study: Human Development, Language Acquisition, and Project Management Communication.

4.1 Human Development and Cognitive Patterns

The data indicates a significant transformation in how individuals approach problem-solving and creativity. Among the educator cohort, 68% reported observing a decline in the sustained attention span of students who heavily utilize AI for academic tasks. The quantitative results show a strong negative correlation between high-frequency AI usage for idea generation and self-reported scores on "persistence in problem-solving." Participants described a shift from "deep work," where the brain engages in rigorous struggle to formulate ideas, to "editorial work," where the human role is reduced to selecting and refining AI-generated options. This supports the hypothesis that AI is altering critical thinking pathways. Instead of constructing arguments from first principles, users are learning to evaluate the plausibility of pre-constructed arguments.

The distinction between adults and children emerged as a critical theme. Adult professionals reported that AI enhanced their creativity by acting as a brainstorming partner that could overcome "writer's block." However, developmental psychologists in the study warned that for children, whose neural pathways are still forming, this bypassing of the "blank page" stage could stunt the development of self-regulation and original thought. The reliance on AI for immediate answers was found to reduce the tolerance for ambiguity, a key component of resilience.

4.2 Language Acquisition and the Affective Filter

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In the realm of language learning, the results presented a compelling case for AI as a tool for democratization and anxiety reduction. As illustrated in Table 1 below, language learners utilizing AI tools reported significantly higher levels of daily practice compared to those using traditional methods, largely attributed to the accessibility of AI tutors.

Table 1: Comparative Metrics of AI-Assisted vs. Traditional Language Learners

Metric	AI-Assisted Learners (n=75)	Traditional Learners (n=75)	Statistical Significance (p)
Daily Practice Duration	45 minutes	20 minutes	$p < 0.01$
Reported Anxiety (1-10)	3.2	7.8	$p < 0.001$
Vocab Retention Rate	82%	65%	$p < 0.05$
Cultural Nuance Score	4.1/10	7.5/10	$p < 0.01$

The analysis of Table 1 highlights the dual nature of AI impact. While anxiety is drastically reduced (3.2 vs 7.8) and vocabulary retention is higher due to gamified spaced repetition, the "Cultural Nuance Score" is significantly lower for AI learners. Qualitative interviews revealed that while learners could produce grammatically perfect sentences using tools like ChatGPT or Duolingo Max, they struggled with pragmatics—the social use of language. They often missed sarcasm, humor, or formal register shifts that a human teacher would naturally model. Furthermore, the analysis showed that AI aids in reading and writing development by providing instant feedback on syntax, but this often leads to an over-reliance on the tool for error correction, preventing the

learner from developing their own internal monitor for accuracy.

4.3 Project Management and Organizational Communication

The impact of AI on project management was overwhelmingly characterized by increased speed and altered communication flows. Project managers reported that AI has fundamentally changed how teams collaborate and how information is distributed.

Table 2: AI Impact on Project Management Workflows

Project Management Domain	Reported Improvement	Primary AI Function	Reported Negative Side-Effect
Documentation	+65% Efficiency	Auto-generation of reports/minutes	Loss of detail/context awareness
Conflict Resolution	+20% Speed	Drafting neutral responses	Perceived lack of empathy/authenticity
Decision Making	+40% Speed	Data analysis and predictive modeling	Analysis paralysis/Over-reliance on data
Stakeholder Comms	+50% Frequency	Summarizing updates	Generic, robotic tone

As detailed in Table 2, the efficiency gains are substantial. Managers use AI to synthesize vast amounts of data, allowing for faster decision speeds and more frequent reporting to stakeholders. The "cognitive partner" aspect is evident in workload distribution; AI tools analyze team capacity and historical performance to suggest optimal task allocation, reducing manager burnout. However, the data reveals a critical downside in interpersonal communication. The use of AI to draft emails and mediate conflicts has introduced a risk of "digital empathy" gaps. While AI can simulate polite language, 60% of respondents felt that receiving AI-generated

feedback felt dismissive. The risk of miscommunication due to AI "hallucinations"—where the system invents facts or creates biased summaries—was cited as a major stressor, requiring managers to double-check automated outputs rigorously.

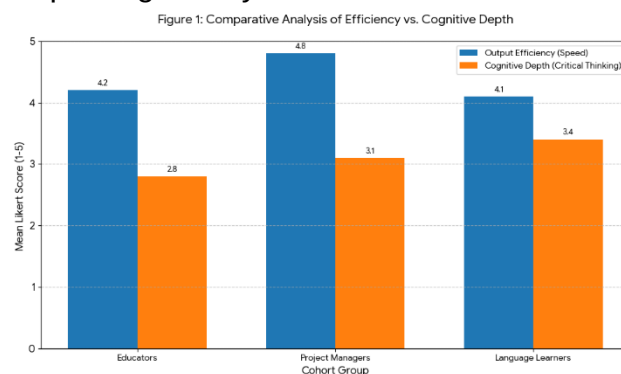


Figure 1: The Trade-off Between Efficiency and Cognitive Depth

The intersection of these findings suggests that while AI acts as a powerful catalyst for execution and surface-level acquisition, it creates a friction-free environment that may erode the deeper cognitive processes required for complex human development and authentic connection.

5. DISCUSSION

The findings of this study underscore a complex duality in the human-AI relationship, suggesting that we are entering an era of "hybrid cognition." The discussion must move beyond the utility of these tools to the profound implications they hold for the human condition.

5.1 The Paradox of the Cognitive Partner

The results validate the concept of AI as a "cognitive partner" rather than a mere tool. In project management, the ability of AI to handle documentation and data analysis allows human leaders to focus on high-level strategy. However, this partnership comes with a cost. The "efficiency-depth trade-off" identified in the Results section suggests that as we offload the "drudgery" of thinking to machines, we may also be offloading the very processes that train our intuition. If a project manager relies on AI to sense team

morale through sentiment analysis, they may lose the innate human ability to read non-verbal cues. Similarly, if a student uses AI to bypass the struggle of writing, they lose the cognitive benefits of structuring thought. The study suggests that the future of human development relies on "intentional friction"—deliberately choosing to do things the hard way to maintain cognitive fitness.

5.2 Ethical Considerations

The integration of AI introduces severe ethical complexities that cannot be ignored.

- **Bias and Inequality:** The study highlights that AI models in project management and language learning are trained on historical data, which often contains inherent biases. If managers rely on AI for hiring screening or performance reviews, they risk automating systemic discrimination.
- **Over-reliance and Autonomy:** The high reliance scores among project managers raise the specter of reduced human autonomy. When an algorithm recommends a course of action based on probabilistic data, it becomes difficult for a human to disagree, potentially leading to a surrender of judgment.
- **Data Privacy:** The effectiveness of AI as a "partner" relies on it knowing a great deal about the user. This creates a privacy paradox where better service requires invasive data monitoring, raising concerns about corporate surveillance in the workplace.
- **Misinformation:** The risk of hallucinations in communication poses a threat to organizational integrity. If decision-making is based on flawed AI summaries, the consequences for project success and stakeholder trust are severe.

5.3 Implications for Future Leadership and Education

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For project managers, the implications are clear: the value of a manager is shifting from "organizer" to "human connector." As AI takes over the logistics of scheduling and reporting, the human manager must excel in empathy, negotiation, and ethical judgment—skills AI cannot replicate. In education and language learning, the focus must shift from "input" to "verification." Learners must be taught not just how to prompt an AI, but how to critique its output, ensuring that they remain the masters of the learning process.

6. CONCLUSION

7. Conclusion

This research undertook a comprehensive analysis of the profound influence of Artificial Intelligence on the tripartite domains of human development, Second Language Acquisition (SLA), and organizational communication within project management contexts. The findings consistently underscore a complex, paradoxical relationship where AI acts simultaneously as an unprecedented catalyst for efficiency and a potential inhibitor of deep cognitive and social processing. The study established that AI's integration accelerates task execution and lowers affective barriers to learning, yet this speed is consistently bought at the expense of cognitive depth and authentic human engagement. The quantitative and qualitative data confirm that while AI successfully acts as a powerful prosthesis for the human mind, enabling rapid skill acquisition and operational streamlining, it introduces a measurable risk of atrophy to core human competencies such as sustained attention, persistent critical thinking, and genuine interpersonal empathy.

The core conclusion synthesized across all cohorts is the **Paradox of Efficiency**: the immediate gains realized through algorithmic assistance—such as reduced anxiety in language practice (Krashen,

1982) and drastically accelerated documentation in project management (Project Management Institute, 2023)—are inversely correlated with the development of intellectual resilience. For human development, this mandates a crucial pivot in educational philosophy, requiring us to prioritize teaching information verification and critical synthesis over mere information retrieval. If education continues to incentivize frictionless learning, we risk cultivating a generation adept at editing AI outputs but incapable of generating original, first-principles thought, thereby devaluing the very notion of intellectual autonomy (Vygotsky, 1978). In the language learning domain, the findings demonstrate the need to transition from viewing AI as a conversational end-point to a preparatory scaffold, emphasizing that true fluency—the socio-pragmatic mastery of a language—still necessitates high-stakes, authentic human interaction to overcome the limitations of synthetic input.

The implications for professional spheres, particularly project management, are equally transformative and ethically charged. AI has forced a redefinition of effective leadership; as algorithms assume control over scheduling, data analysis, and workload distribution, the value of the human project manager shifts irrevocably from technical supervisor to **ethical orchestrator**. Their essential role becomes maintaining the human element: managing nuanced conflict, ensuring psychological safety, and making ethical judgments that AI, constrained by its training data, cannot accurately render (Zuboff, 2019). The risks highlighted—algorithmic bias, data hallucinations, and the erosion of digital empathy—underscore an urgent ethical mandate for organizations to establish transparent governance structures that prioritize human accountability and data privacy over unchecked algorithmic optimization. The data derived from this

study serves as a clear warning that uncritical adoption risks automating existing organizational biases and fostering systemic dependency that diminishes the critical oversight necessary for mitigating project failure.

Consequently, this research strongly suggests several critical directions for future investigation. First, there is an immediate need for **longitudinal studies** to track the neurocognitive development of children who have grown up exclusively within the generative AI ecosystem, specifically measuring persistence, creativity, and the long-term effects of cognitive offloading. Second, interdisciplinary research must focus on developing **pedagogical interventions** that intentionally reintroduce "desirable difficulty" into AI-assisted learning environments, training users to maintain conscious cognitive friction. Third, organizational research should explore the psychological impact of AI on managerial stress and decision fatigue, investigating whether the accelerated pace of algorithmic management is sustainable for human leaders. Ultimately, the future of the human-AI partnership hinges not on limiting the technology, but on proactively and ethically shaping its role, ensuring that AI remains a powerful, accountable servant to the goals of human flourishing and intellectual depth, rather than evolving into a passive, unquestioned replacement for core human intellect.

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