

# International Journal of Innovative Research in Computer and Communication Engineering

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# Data: The New Fuel Driving AI and Data Science in the Digital Race

Shreya Mishra

Analyst, Data Enthusiast, Frankfurt am Main, Germany

**ABSTRACT:** Artificial Intelligence (AI) and Data Science have dramatically transformed modern industries by automating decision-making and boosting efficiency. In earlier times, however, people were deeply motivated to complete tasks by applying their cognitive abilities and creativity. Individuals would invest significant time and energy into thinking critically, solving problems, and generating innovative ideas—skills that promoted personal growth and intellectual development.

With the rise of AI, many of these tasks are now automated, leading to increased productivity but raising concerns about the decline of human cognitive engagement. As AI systems take over decision-making processes, there is fear that humans may lose essential thinking skills, such as problem-solving and creativity, which were once central to task completion.

This study explores how AI affects human decision-making. Participants were divided into two groups: one relied on AI-based assistance, while the other made decisions independently. The collected data was analyzed based on accuracy, time efficiency, and confidence levels.

The results revealed that AI assistance improved time efficiency but reduced critical thinking and problem-solving capabilities. Those using AI made faster decisions, but their involvement in the decision-making process was lower, and their critical thinking was diminished. Moreover, while they were more confident in their choices, this confidence was often not matched by a deeper understanding or engagement with the task.

This paper discusses the implications of AI dependency and the need for strategies that balance the use of AI with the preservation of human intelligence. By maintaining cognitive engagement alongside technological advancements, we can ensure that humans continue to develop and apply their thinking abilities even as AI systems grow more prevalent.

**KEYWORDS:** Artificial Intelligence, Data Science, AI Dependency, Human Cognition, Automation

## I. INTRODUCTION

The analogy of data as the "new fuel" highlights its vital role in powering AI-driven technologies. Just as fuel is essential to machines, data drives AI systems, enabling them to process information, learn, and make decisions. From search engines offering instant answers to self-driving cars navigating roads, AI is revolutionizing human interactions, commerce, and creativity. It plays a key role in everything from personalized shopping experiences to the creation of music and art, influencing many aspects of our daily lives.

However, this growing reliance on AI raises a critical question: Is AI making people less intelligent by reducing cognitive engagement? As AI takes over more tasks, people may be engaging less with problem-solving and critical thinking. The convenience of AI tools could lead to a decline in the need for deep mental effort, potentially weakening cognitive skills.

To investigate this, I conducted an **AI Dependency Experiment** where participants were tested on their problem-solving skills with and without AI assistance. By analyzing their performance, decision-making speed, and confidence levels, the aim was to understand how AI affects human intelligence and cognitive engagement.



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### II. EXPERIMENTAL METHODOLOGY

#### A. Participants :

A total of 20 participants were selected from diverse educational and professional backgrounds to represent a range of experiences. They were divided into two groups:

1. **AI-Assisted Group (10 participants)** – This group used AI-based tools, including **ChatGPT, Google, and AI calculators**, to complete the tasks. The aim was to assess how AI influences decision-making speed, accuracy, and efficiency.
2. **Independent Group (10 participants)** – This group completed the same tasks without any AI assistance, relying solely on their own knowledge and traditional tools. The goal was to observe how individuals performed using only their cognitive abilities and problem-solving skills.

By comparing these two groups, the experiment aimed to measure the effect of AI on cognitive engagement and decision-making, focusing on efficiency, accuracy, and mental effort.

#### B. Task Design

Each group was given three categories of tasks to assess different aspects of cognitive abilities:

1. **Logical Puzzles** – These tasks tested **problem-solving skills and logical reasoning**. Participants were asked to solve puzzles that required critical thinking and strategy. This helped determine if AI assistance affected their ability to reason and work through complex problems independently.
2. **Research Questions** – This category assessed **independent research skills**. Participants were tasked with gathering and synthesizing information to answer questions, using either AI tools or their own knowledge. The goal was to evaluate how AI influenced efficiency and the depth of research.
3. **Creative Writing** – This task measured **originality and creativity**. Participants wrote short pieces on given topics, with the goal of evaluating how AI assistance, which can generate or suggest ideas, might impact the originality of their work.

These tasks were designed to measure logical thinking, research ability, and creativity, allowing the study to explore how AI influences cognitive engagement in different areas.

#### C. Data Collection Parameters

The experiment measured three key parameters:

1. **Task Completion Time (seconds)** – This measured how long it took participants to complete each task. By comparing the time for both groups, the study assessed how AI affected the speed of task completion, with faster times indicating increased efficiency, but potentially reduced cognitive effort.
2. **Accuracy of Responses (percentage of correct answers)** – This parameter evaluated the **correctness** of the participants' answers. It helped determine whether AI tools improved accuracy or if independent thinking led to better results.
3. **Confidence Level (self-reported on a scale of 1-10)** – Participants rated their **confidence** in their responses, helping assess whether AI usage led to higher confidence levels, even if the answers were not entirely accurate.

These parameters provided insight into how AI influenced efficiency, accuracy, and confidence in decision-making.

### III. RESULTS & DATA ANALYSIS

#### A. Task Completion Time :

Task Type	AI-Assisted(Avg. Time in sec)	Independent(Avg. Time in sec)	% Difference
Logical Puzzles	45.2	88.5	+96%
Research Questions	62.4	140.7	+125%
Creative Writing	210.3	290.4	+38%

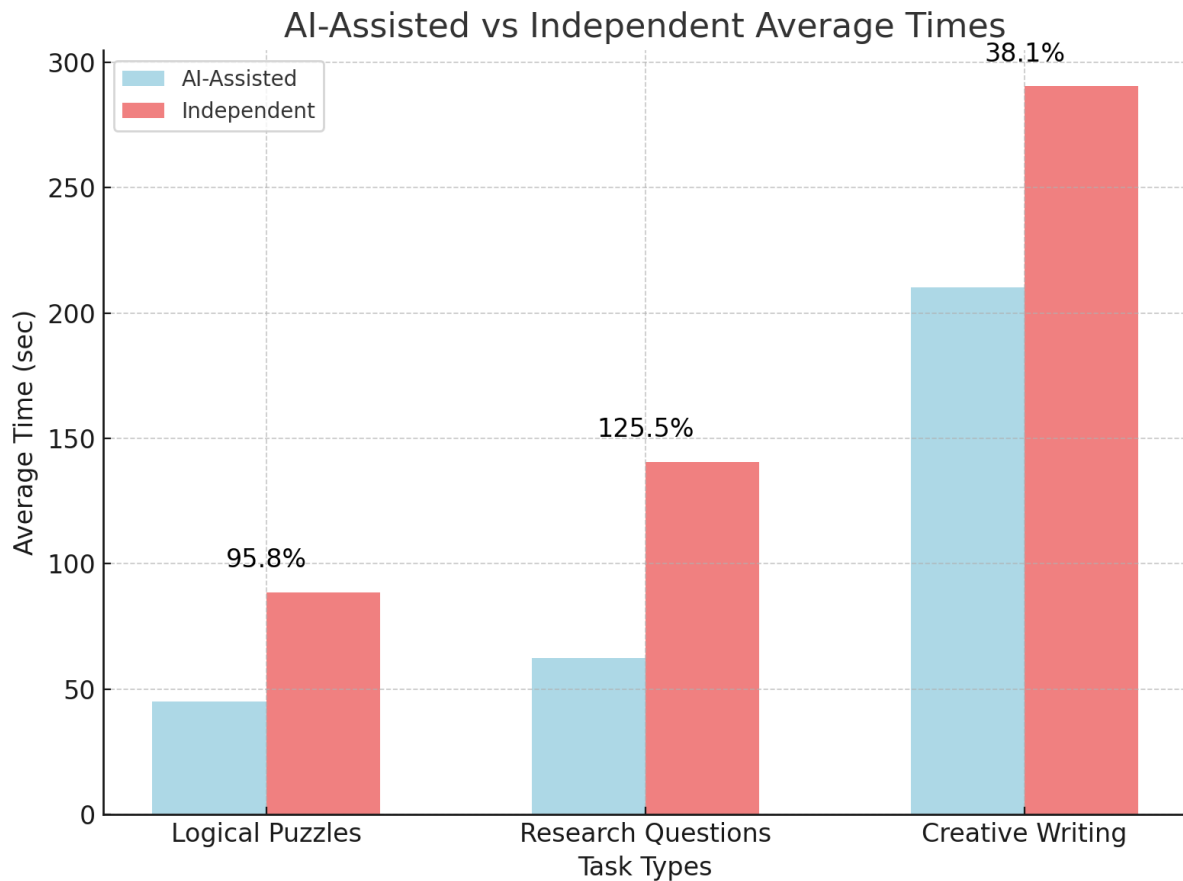




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### Graphical Representation :



**Analysis :** The **AI-Assisted group** completed tasks **significantly faster** than the Independent group, particularly in tasks that involved **research-related questions**. For these tasks, the AI tools, such as **Google** and **ChatGPT**, allowed participants to quickly retrieve relevant information, offering direct answers and suggestions. This reduced the time spent on searching and analyzing resources, enabling participants to bypass much of the cognitive effort typically required for independent research.

The immediate access to precise information through AI systems allowed the AI-Assisted group to work more efficiently, drastically reducing the time needed to gather data and formulate responses. This was especially evident when participants had to answer complex or fact-based questions, where AI could supply answers almost instantly, leaving little room for the participants to engage in deeper information evaluation or synthesis.

However, the speed advantage came at a cost, as the AI-Assisted group was often less involved in the critical thinking processes that typically accompany thorough research. While this accelerated task completion, it also highlighted the potential trade-off between efficiency and cognitive engagement in research-oriented tasks.

### B. Accuracy of Responses :

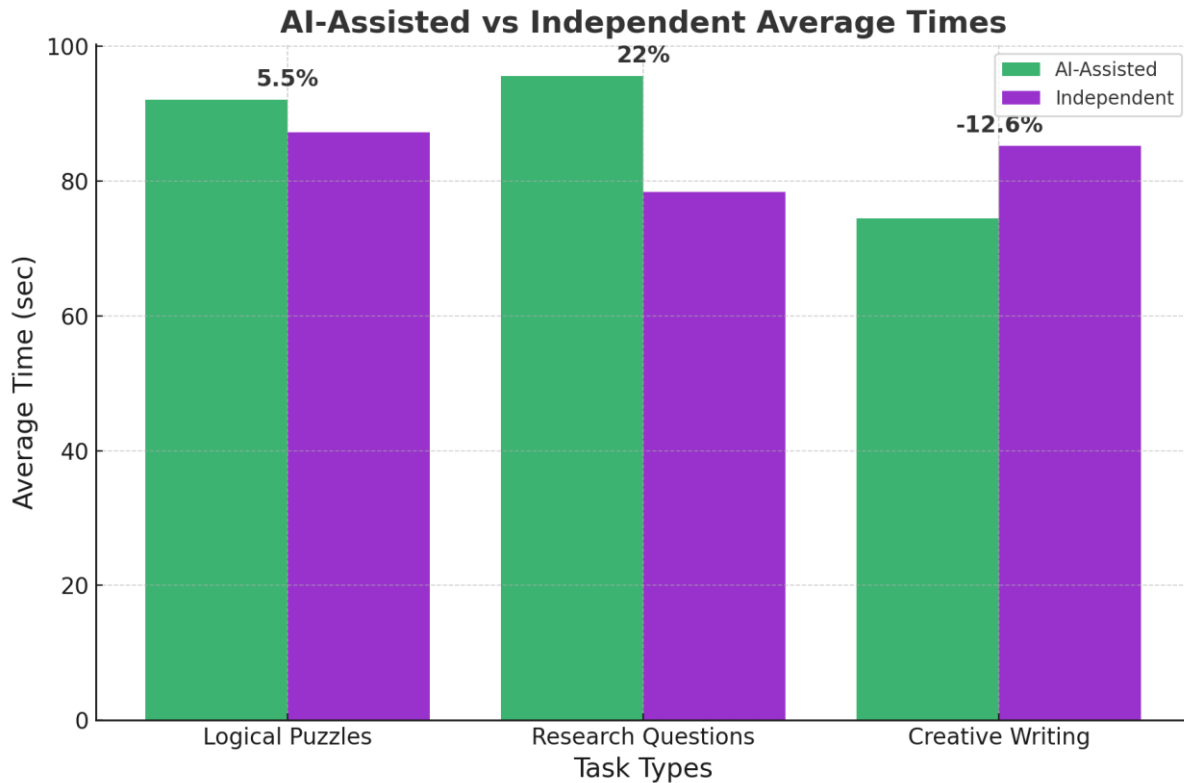
Task Type	AI-Assisted(Avg. Time in sec)	Independent(Avg. Time in sec)	% Difference
Logical Puzzles	92.1	87.3	+5.5%
Research Questions	95.6	78.4	+22%
Creative Writing	74.5	85.3	-12.6%



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### Graphical Representation :



**Analysis:** Participants in the **AI-Assisted group** provided **more accurate factual responses** compared to those in the Independent group, particularly when it came to tasks that required **fact-based answers** or **research**. The use of AI tools like **ChatGPT** and **Google** allowed them to quickly access reliable and up-to-date information, which contributed to more precise answers. AI’s ability to instantly retrieve correct data likely led to higher accuracy, especially in areas that demanded factual knowledge or data-driven solutions.

However, the **AI-Assisted group** performed **worse in creativity-based tasks**, such as **creative writing**, where originality and novel thinking were crucial. AI tools, while useful for generating ideas, often offered suggestions that were predictable or formulaic, which may have stifled the participants' ability to think freely and creatively. The immediate availability of AI-generated content might have made it easier for participants to rely on these suggestions rather than pushing their own creative boundaries. As a result, the participants appeared less engaged in the process of crafting unique, original work, reflecting a potential downside of heavy reliance on AI—a **reduction in originality and creative thinking**.

These findings suggest that while AI can enhance **accuracy** and **efficiency**, it may also hinder human **creativity**, particularly when tasks require novel, out-of-the-box thinking.

### C. Confidence Level :

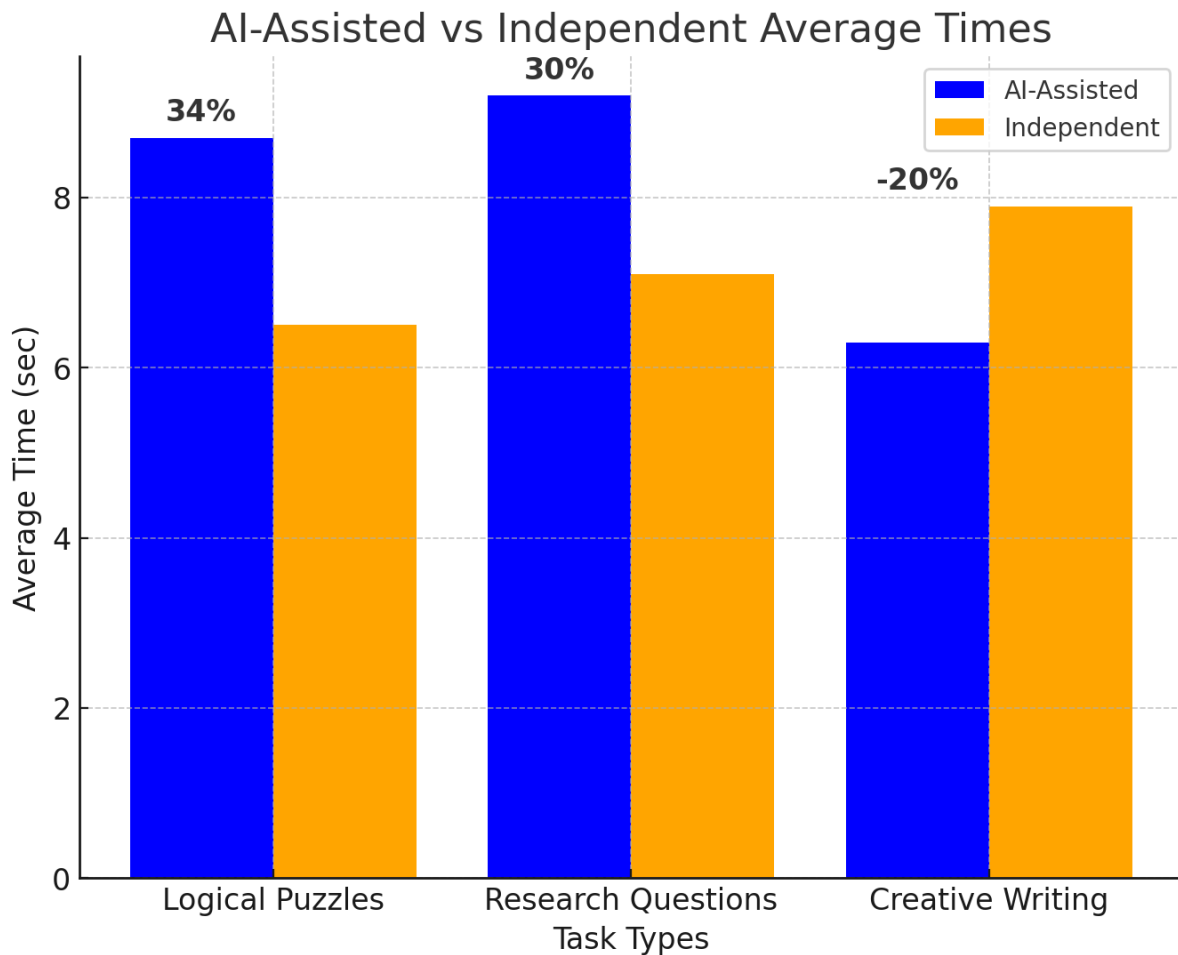
Task Type	AI-Assisted(Avg. Time in sec)	Independent(Avg. Time in sec)	% Difference
Logical Puzzles	8.7	6.5	+34%
Research Questions	9.2	7.1	+30%
Creative Writing	6.3	7.9	-20%



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### Graphical Representation :



**Analysis:** Participants in the **AI-Assisted group** reported feeling **more confident** when completing **factual tasks**, such as research questions and logical puzzles, where AI tools like **ChatGPT** and **Google** provided direct, reliable answers. The instant access to accurate information gave them a sense of certainty and security, as they could quickly verify their responses or confirm facts. This confidence was likely fueled by the fact that AI could perform much of the heavy lifting, reducing the mental effort required to gather and analyze information, leading participants to feel more assured in their answers.

However, when it came to **creativity-based tasks**, such as **creative writing**, the confidence levels of AI-Assisted participants were notably lower. Despite having access to AI-generated ideas and suggestions, many participants felt less confident in their own creative decisions. The reliance on AI for inspiration or guidance may have led to a sense of dependency, causing them to second-guess their originality and feel uncertain about the uniqueness of their work. This shift in confidence suggests that while AI can provide helpful direction, it may also inhibit participants' trust in their own **creative abilities**, as they may rely too heavily on AI suggestions rather than developing their own novel ideas. This contrast in confidence levels highlights how AI tools can positively influence confidence in tasks requiring factual accuracy but might reduce self-assurance in more subjective, creativity-driven tasks.



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### IV. DISCUSSION: THE PARADOX OF AI DEPENDENCY

The results highlight a paradox:

1. **AI enhances efficiency and factual accuracy but weakens original thought and self-reliance.** AI tools, such as **ChatGPT** and **Google**, have demonstrated a clear ability to improve **efficiency** and **factual accuracy** in various tasks. These tools can quickly provide verified information, streamline complex processes, and offer direct answers to questions, which significantly speeds up task completion. For instance, participants using AI for research could access accurate data in a fraction of the time it would take to manually search through multiple sources. However, while AI excels in offering precision and speed, it can undermine **original thought** and **self-reliance**. With AI providing ready-made answers or suggestions, users may begin to rely less on their own critical thinking skills and problem-solving abilities. This shift reduces their engagement in developing creative solutions and synthesizing information independently. As a result, AI's efficiency benefits may come at the expense of **independent cognitive effort** and **creative engagement**, which are essential for cultivating deep thinking and innovation.
2. **AI boosts confidence in structured tasks but reduces creativity and problem-solving confidence.** One of the key effects of AI on participants was the **boost in confidence** when completing **structured tasks**—those with clear, objective solutions, such as research questions or logical puzzles. AI tools, which provide quick access to information or guide users through problem-solving steps, can make participants feel more certain about their answers, knowing they have a reliable source to confirm their responses. This **confidence** is particularly evident when tasks require factual accuracy or routine processing. However, when participants faced **creativity-based tasks** (such as writing or brainstorming), AI's influence on confidence appeared less positive. Despite having access to AI-generated suggestions, participants often felt **less confident** in their creative output. The presence of AI suggestions might diminish their trust in their own **creative instincts** and original ideas, as they become more dependent on AI's prompts, which can sometimes feel formulaic or predictable. This reliance leads to a reduction in confidence in their **problem-solving abilities**, especially in tasks requiring novel thinking or innovation.
3. **Over-reliance on AI may reduce human cognitive abilities over time.** Prolonged and excessive use of AI tools raises concerns about their potential impact on **human cognitive abilities**. As individuals increasingly turn to AI for assistance with tasks—whether it's research, problem-solving, or even creativity—they may engage less in the **mental effort** required to think critically, analyze information, or generate new ideas. Over time, this growing reliance on AI could result in **cognitive atrophy**, where individuals' problem-solving and creative skills begin to decline due to the reduced mental exercise they experience. For example, if individuals consistently use AI to perform tasks that they could do themselves, they may find it harder to engage in similar tasks without AI assistance, leading to a **loss of cognitive flexibility**. This shift could reduce individuals' ability to **adapt** to new challenges, **think critically**, or come up with **innovative solutions**. In the long term, this reliance may hinder the development of essential cognitive skills, resulting in a more passive approach to learning and problem-solving.

### V. CONCLUSION

AI and data science have dramatically transformed industries, driving significant improvements in efficiency and accuracy across various sectors. From automating routine tasks to providing data-driven insights, AI has made complex processes faster and more precise. However, while AI offers undeniable benefits, there are growing concerns about the long-term consequences of excessive reliance on these technologies. Specifically, overuse of AI can:

1. Reduce human cognitive engagement in problem-solving – As AI handles more tasks that require critical thinking and analysis, individuals may become less involved in the mental processes of identifying problems, evaluating solutions, and developing strategies, leading to a decline in cognitive engagement.
2. Weaken independent research skills – With AI providing instant answers and quick access to vast amounts of information, individuals may become less inclined to engage in the effort of independent research. This can erode the ability to critically analyze and synthesize information from various sources, undermining the development of research skills.
3. Lower creativity levels – AI-generated suggestions or content, while efficient, can diminish original thought. When AI tools are used to generate ideas, solutions, or even creative works, humans may rely too heavily on these outputs, leading to reduced creativity and a lack of novel thinking.



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**To ensure that human intelligence is preserved in the age of AI, it is crucial to adopt a balanced approach. This includes:**

1. Using AI as an assistant, not a replacement for thinking – AI should complement, not replace, human cognitive abilities. It should be used to enhance decision-making and efficiency, while leaving room for humans to engage in critical thought and problem-solving.
2. Encouraging critical thinking and independent research in education – Educational systems should prioritize the development of independent research and analytical thinking. By encouraging students to question, explore, and create, we can ensure that they retain essential cognitive skills, even in a world dominated by AI.
3. Regulating AI in creative fields to ensure originality – In creative domains, it is important to set boundaries for the use of AI, ensuring that it serves as a tool for enhancement rather than a substitute for human creativity. Regulations and guidelines can help safeguard the authenticity and originality of creative work.

In conclusion, while AI undeniably enhances efficiency and accuracy, a balanced approach is essential to avoid long-term cognitive decline. By integrating AI thoughtfully into daily life, we can reap its benefits without sacrificing the critical thinking, independent research, and creativity that define human intelligence.

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