

# The Impact of Cognitive Biases in AI Project Development

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# Cognitive Biases in AI Development

1. **Focus:** 6 key cognitive biases affecting AI projects.
2. **Tool:** Cognitive Bias Awareness Mind Map.
3. **Goal:** Enhance ethical AI development & decision-making.
4. **Findings:** Increased bias awareness & potential for improved AI project outcomes.



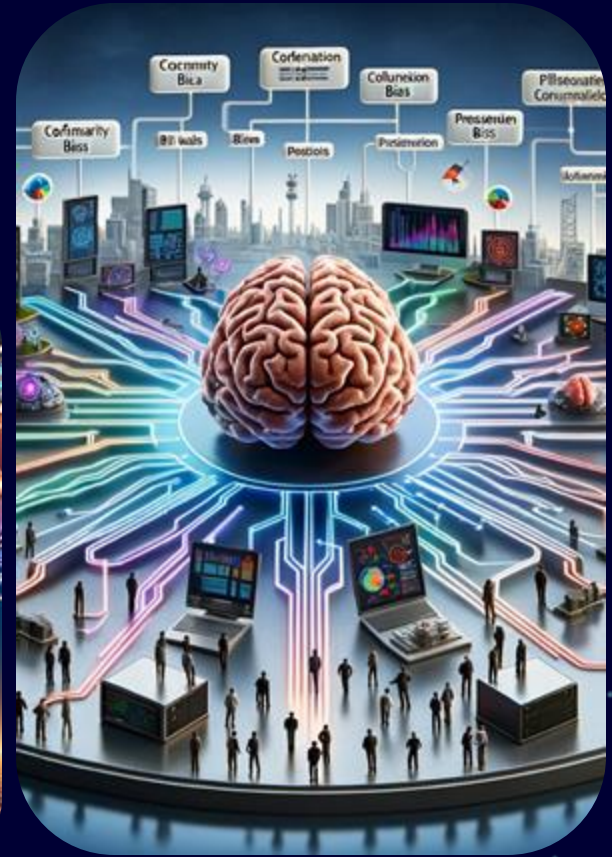


02

Relation with  
fairness in AI



# Main Strong Points



# Main Strong Points

## Focus on Cognitive Biases

This work zeroes in on cognitive biases, which are less explored in the context of AI development

## Evaluation through TAM

The effectiveness of the mind map tool is rigorously evaluated using semi-structured interviews and Technology Acceptance Model (TAM) questionnaires.

## Selection of Biases

Six cognitive biases - Conformity, Confirmation, Illusory Correlation, Measurement, Presentation, and Normality

## Contribution to Fairness in AI

By raising awareness of cognitive biases among AI professionals, the study indirectly contributes to the development of more ethical and fair AI systems

## Development of an Awareness Tool

A major contribution of this work is the creation of a mind map as a cognitive bias awareness tool for AI professionals

## Interdisciplinary Approach

The study's interdisciplinary approach, situated at the intersection of cognitive science and AI project management, highlights the importance of considering human factors in the development of AI systems.

# Limitation & Challenges

1. **Scope of Cognitive Biases:** The study focuses on six specific cognitive biases.
1. **Generalizability of Findings:** The methodology, which includes semi-structured interviews and the use of Technology Acceptance Model



# Limitation & Challenges

1. **Domain-specific Considerations:** The study primarily focused on professionals in the field of statistical AI, with limited representation from other AI domains such as symbolic AI
1. **Ergonomics and Interaction (challenge):** Focus on enhancing the user experience and usability of the awareness tool





Table 1: Descriptive characteristics of the participants in Experiment 1

Id subject	Gender Male/Female	Age	Experience level	Job title	Field of expertise
1	F	30-40 years	10 years	Data scientist	Statistical AI
2	M	30-40 years	4 years	Data scientist	Statistical AI
3	F	18-30 years	2 years	Data scientist	Statistical AI
4	M	40-65 years	4 years	Data scientist	Statistical AI
5	M	30-40 years	3 years	AI Engineer	Statistical AI
6	M	18-30 years	1.5 years	AI Engineer	Statistical AI
7	M	18-30 years	1 year	AI Engineer	Statistical AI
8	M	18-30 years	1.5 years	AI Engineer	Statistical AI
9	M	40-65 years	1 year	AI Engineer	Statistical AI
10	M	30-40 years	8 years	AI project manager	Statistical AI
11	M	40-65 years	10 years	AI project manager	Statistical AI
12	M	40-65 years	6 years	AI project manager	Statistical AI
13	M	40-65 years	2 years	AI project manager	Statistical AI
14	M	40-65 years	34 years	AI project manager	Hybrid AI

The size of sample.  
Gender bias.  
Field of expertise.

Table 2: Descriptive characteristics of the participants in Experiment 2

Id subject	Gender Male/Female	Experience level	Participate to experiment 1	Trained in cognitive biases
1	M	3 years	yes	no
2	M	3 years	no	yes
3	F	1 year	no	no
4	M	6 years	no	yes
5	F	2 years	yes	no
6	M	3 years	no	no
7	M	1 year	no	yes
8	M	6 years	yes	no

# Societal Implication

1. Raise awareness of cognitive biases through the proposed mind map tool

1. Integrate cognitive science and human factors into AI project management

•**Concerning the usefulness of the MM2 mind map in their work:** For 62.5% of the participants (5 people) the MM2 mind map would be very useful in their work (6 or 7 on the LS). For the other 3 people, the MM2 mind map would perhaps be useful (4 or 5 on the LS). Above all, it would improve the performance and efficiency of AI professionals with an average of 4.5 out of 7.

•**Concerning the contribution of the mind map to facilitate work:** For two people, the MM2 mind map would not facilitate their work at all (1 out of 7 on the LS) because it requires constant back and forth between the work done and the mind map. 50% of the participants think that the MM2 mind map will slow down their work and will not improve their productivity even if it can be very useful.

•**Regarding perceived ease of use and ease of learning to use:** Regarding perceived ease of use, 87.5% of the participants (7 people) found the tool clear and understandable (6 or 7 on the LS). Of these 87.5%, 42% even thought it was extremely clear and understandable (7 on the LS). The statistics are the same for the ease of learning to use. However, for only 62.5% of the participants (5 people), the interaction with the tool is clear and understandable.

# Influence

*The influence of the original paper in research based on at least two research papers that cite the original paper*

## 200 bias already identified [1] , why choose these 6 cognitive biases?

Based on the study in [2], authors chose **conformity bias**, **confirmation bias** and **illusory correlation bias**. And conformity and confirmation biases come into play during the personal choices of the different actors and during interactions within the team [3].

### *Cite:*

1. Mohanani, R., Salman, I., Turhan, B., Rodríguez, P., Ralph, P.: Cognitive biases in software engineering: a systematic mapping study. IEEE Transactions on Software Engineering 46(12), 1318–1339 (2018)
2. Cazes, M., Franiatte, N., Delmas, A., André, J., Rodier, M., Kaadoud, I.C.: Evaluation of the sensitivity of cognitive biases in the design of artificial intelligence. In: Rencontres des Jeunes Chercheurs en Intelligence Artificielle (RJCIA'21) Plate-Forme Intelligence Artificielle (PFIA'21) (2021)
3. Kahneman, D., Lovallo, D., Sibony, O.: Before you make that big decision. Harvard Business Review (2011)

# Influence

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**Conformity bias:** refers to the modification of an individual's behavior or judgment to bring it into harmony with the behavior or judgment of the majority. This bias can significantly influence decision-making and has been identified as a powerful mechanism in the context of AI system design.

**Confirmation bias:** refers to the tendency to explain facts with consistent stories and neglect facts that contradict them. This bias can lead to the reinforcement of initial hypotheses and can have different consequences depending on the context in which it is embodied.

**Illusory correlation bias:** involves individuals attributing cause and effect relationships to correlated events, even when the meaning of the correlation may be erroneous or illusory. This bias can lead to the misinterpretation of relationships between events, potentially impacting decision-making in the design of AI systems.



# Future Works

## 1. Long-term Impact Assessment:

Only 4-month experiment limited the ability to measure the long-term impact of the awareness of cognitive biases on the quality of work of AI professionals from an ethical point of view.

## 2. Comparative Study Across AI Domains:

Comparative analysis could provide insights into the unique cognitive biases and challenges faced by professionals in different AI domains, leading to the development of tailored awareness tools and strategies for each domain.

