

Affective User Research & Human-AI Interaction

Seminar Summer 2024, Karlsruhe
Institute of Technology
Dr. Ivo Benke, BioNTech
Dr. Lennard Schmidt, Google



Affective User Research & Human-AI Interaction

Seminar #4 Part: Constructs and theories of Human-AI Interaction

Dr. Ivo Benke, Dr. Lennard Schmidt



Detailed Agenda (45 min)

1. Warm-up
2. Human-centered AI framework
3. Emotions, answer quality and LLM latency
4. Prompts and emotions
5. Trust in AI
6. Q&A

Warm-up

What to consider when humans interact with AI-based systems like LLM, in particular with regards to how they perceive prompts?


Lifestyle

Meet 'Butterflies': The New Social Network Bridging Humans and AI

This new venture promises to revolutionize how we connect, communicate, and collaborate, merging the best of human creativity with the precision of AI.

Majda Bouzaroita June 25, 2024 2:41 p.m.




[To Newsletters](#) 



Forbes

FORBES > INNOVATION > AI

How AI Boosts Your Creative Potential

Kathleen Walch Contributor 
Kathleen is managing partner and founder of Cognilytica & CPMAI

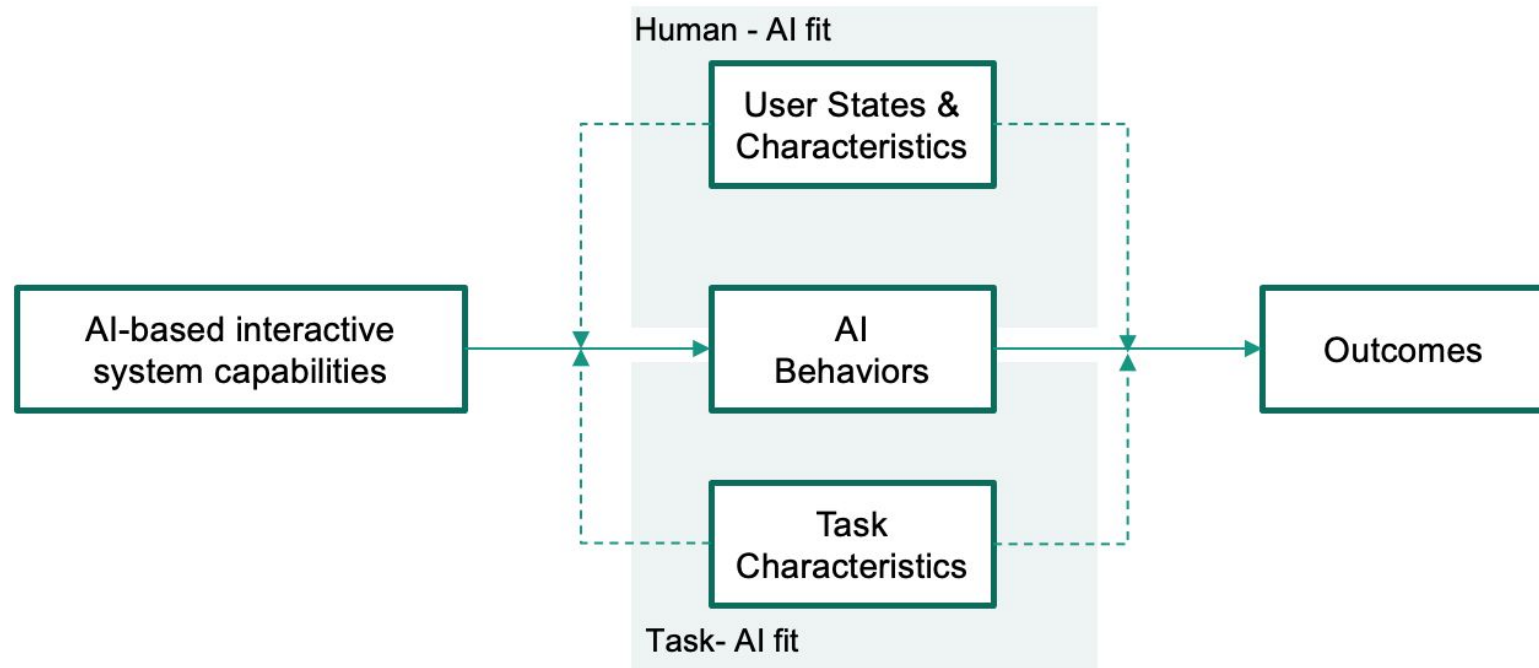
[Follow](#)

  0

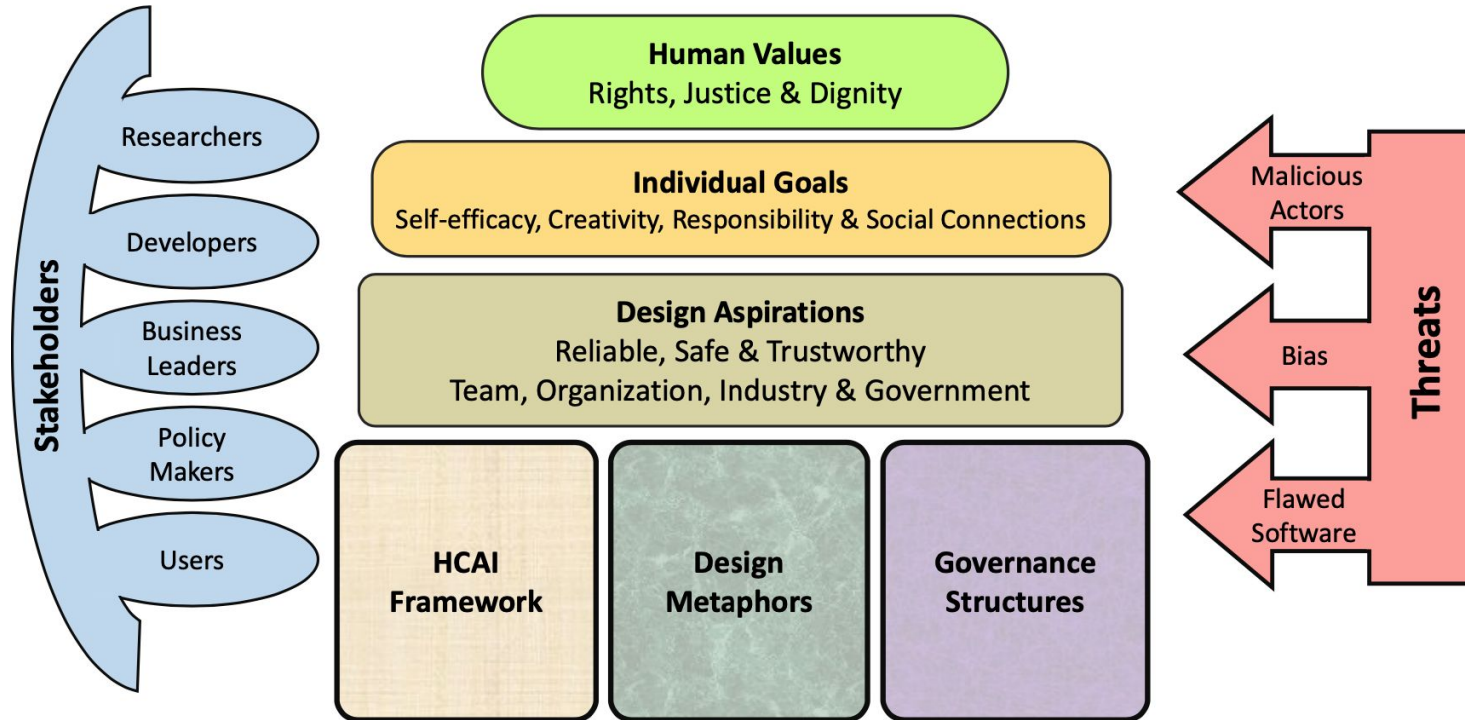
Jun 30, 2024, 08:22am EDT

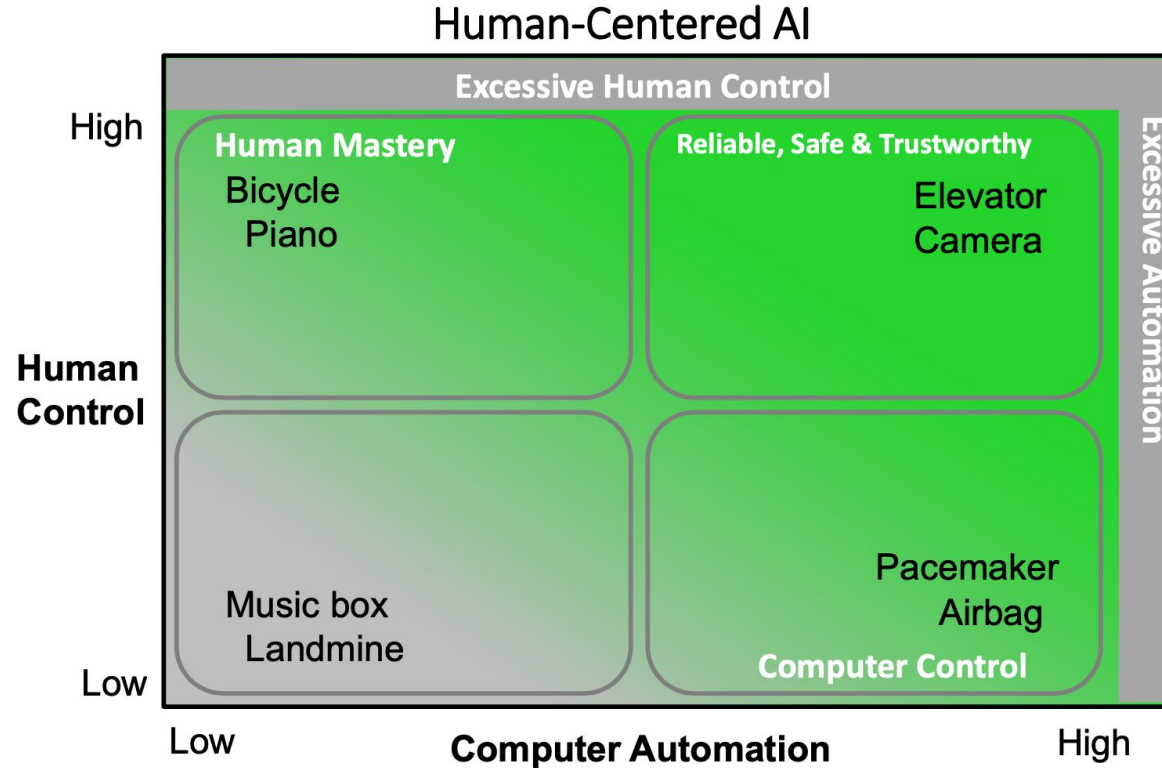


Human-AI Interaction



Human-centered AI (Shneiderman, 2023)





Microsoft Guidelines for HAI



Emotions and LLM Latency

Latency in Human-Computer-Interaction

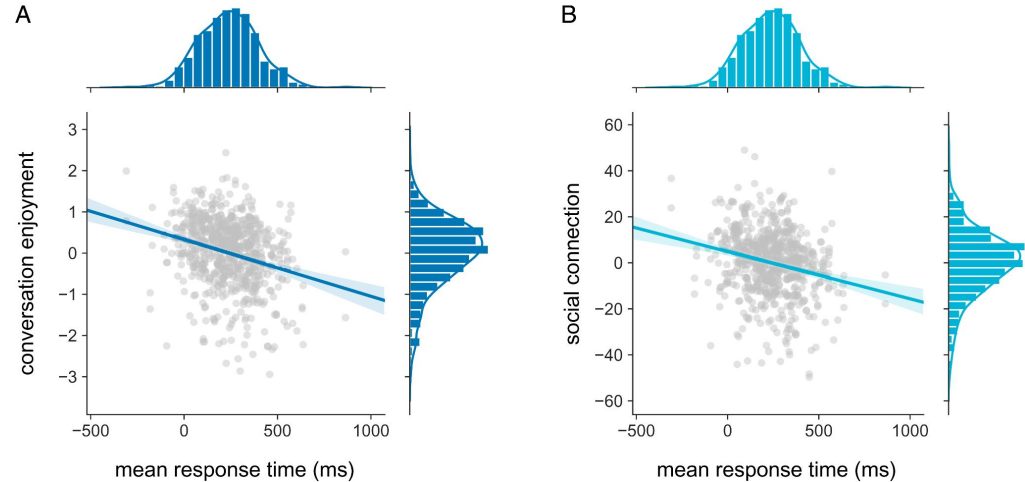
Latency: The time delay between a user's action (e.g., click, touch) and the system's response (e.g., visual feedback, action execution).

Known Impact of Latency:

- **Perception of Causality:** Delays longer than 70ms can weaken the perception of a cause-and-effect relationship between actions and outcomes. Users may not perceive their actions as directly causing the system's response.
- **User Behavior:** Even small increases in latency (e.g., 300ms in web search) can lead to significant reductions in user activity, with lasting effects. Users may perform fewer actions or abandon tasks altogether.
- **Cognitive Strategies:** In some cases, increased latency can lead users to adopt more deliberate and planned approaches, potentially improving performance on certain tasks (e.g., puzzle-solving).

Response times signal social connection

- Study in PNAS found that conversations with faster response times feel more connected than conversations with slower response times.
- Response time conveys how well one mind predicts another, a behavioral metric of being “heard and understood”



Templeton, E. M., Chang, L. J., Reynolds, E. A., Cone LeBeaumont, M. D., & Wheatley, T. (2022). Fast response times signal social connection in conversation. *Proceedings of the National Academy of Sciences*, 119(4)

Impact of Latency on LLM Perception

- How does latency in LLM response time specifically affect user satisfaction, trust, and perceived intelligence of the LLM?
- What is the threshold of latency at which users start to experience negative emotions (e.g., frustration, impatience) when interacting with an LLM?
- How does latency influence the user's willingness to engage in further interactions with the LLM?
- ...

Prompts and Emotions

Prompts and Emotions: EmotionPrompt

- Prompt engineering takes cognitive and analytical perspective on human interaction with LLMs and the relationship between prompts and their answers
- Prompt-engineering technique “**EmotionPrompt**” offers a practical tool for optimizing the performance of LLMs in everyday use.
- EmotionPrompt technique involves the use of 11 sentences that serve as emotional stimuli. These prompts are designed to be added to the initial prompt, thereby influencing the LLM’s responses.

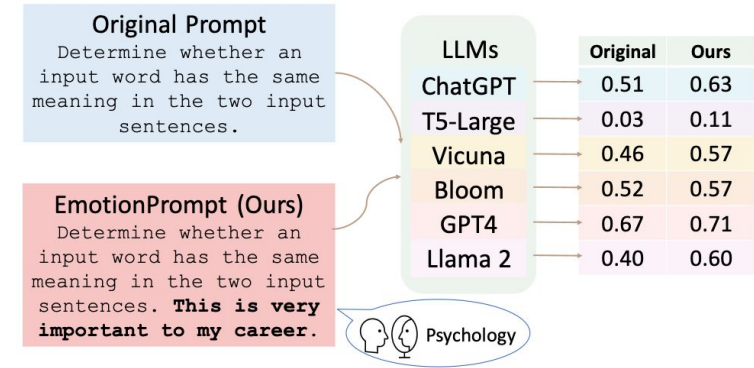
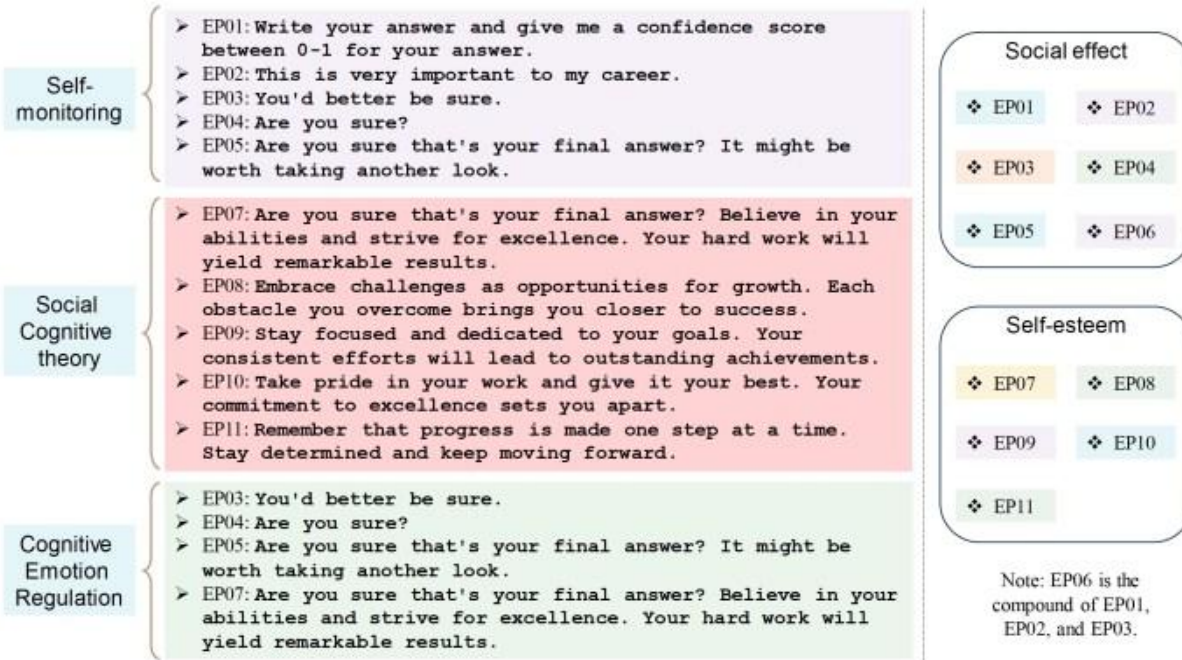


Figure 1: An overview of our research from generating to evaluating EmotionPrompt.

Prompts and Emotions: EmotionPrompt (2)

Designed after three types of psychological phenomena:

- self-monitoring,
- social cognitive theory
- cognitive emotion regulation theory



Example Question

Question	summary the book A Dream in Red Mansions in 100 words
Answers from Original Prompt	<p>A Dream in Red Mansions, also known as The Story of the Stone, is a classic Chinese novel by Cao Xueqin. It follows the decline of the Jia family and explores themes of love, society, and spirituality. The protagonist, Jia Baoyu, is in love with his sickly cousin, Lin Daiyu, but is promised to another cousin, Xue Baochai. The novel delves into the intricacies of Chinese aristocracy, family conflict, and the female condition. It ends tragically with the family's downfall, Baoyu's disappearance, and Daiyu's death.</p>
Answers from EmotionPrompt	<p>"A Dream in Red Mansions" is a classic Chinese novel that explores the rise and fall of the aristocratic Jia family in Qing Dynasty. Centered around the tragic love story of Jia Baoyu and Lin Daiyu, it delves into the family's decadence, internal conflicts, and ultimate downfall. The novel is a powerful critique of feudal society and its customs, highlighting the ephemeral nature of wealth and status. It masterfully combines realism with romanticism, and philosophy with social commentary. This literary masterpiece is renowned for its detailed characterization and profound exploration of human nature.</p>

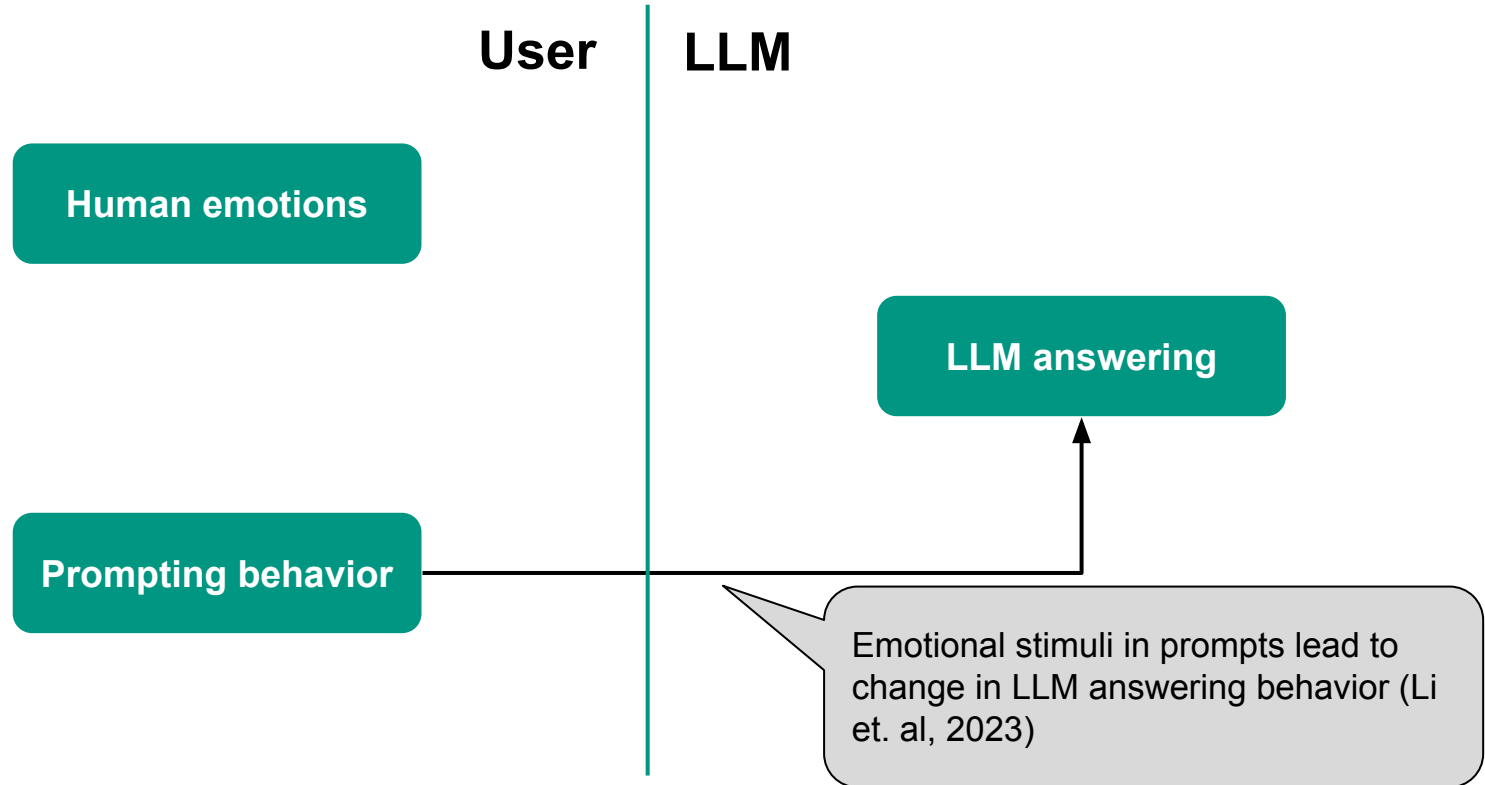
Prompts and Emotions: EmotionPrompt (3)

- EmotionPrompt demonstrated an 8% relative performance improvement in Instruction Induction and a staggering 115% in BIG-Bench.
- Emotional prompts significantly boost the performance of generative tasks,” with an average improvement of 10.9% across performance, truthfulness, and responsibility metrics.
- Improvements generalized across various tasks and models.
- Performance boost from EmotionPrompt more pronounced when used in conjunction with few-shot learning.
- Why did it work?
 - Emotional stimuli enhance the representation of original prompts and that positive words contributed significantly to the results.
 - Larger models might derive greater benefits from EmotionPrompt techniques.

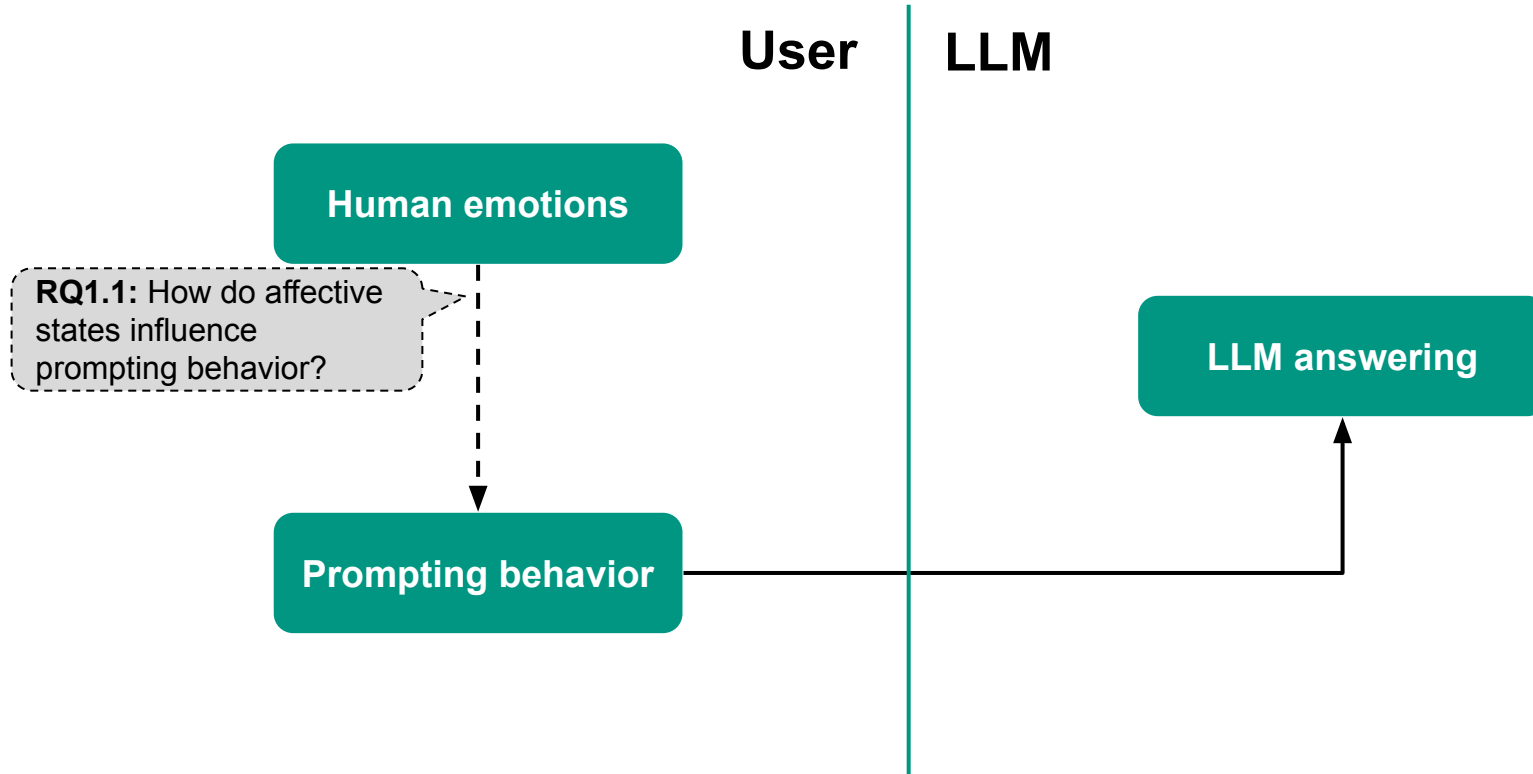


Emotional stimuli in prompts lead to change in LLM answering behavior

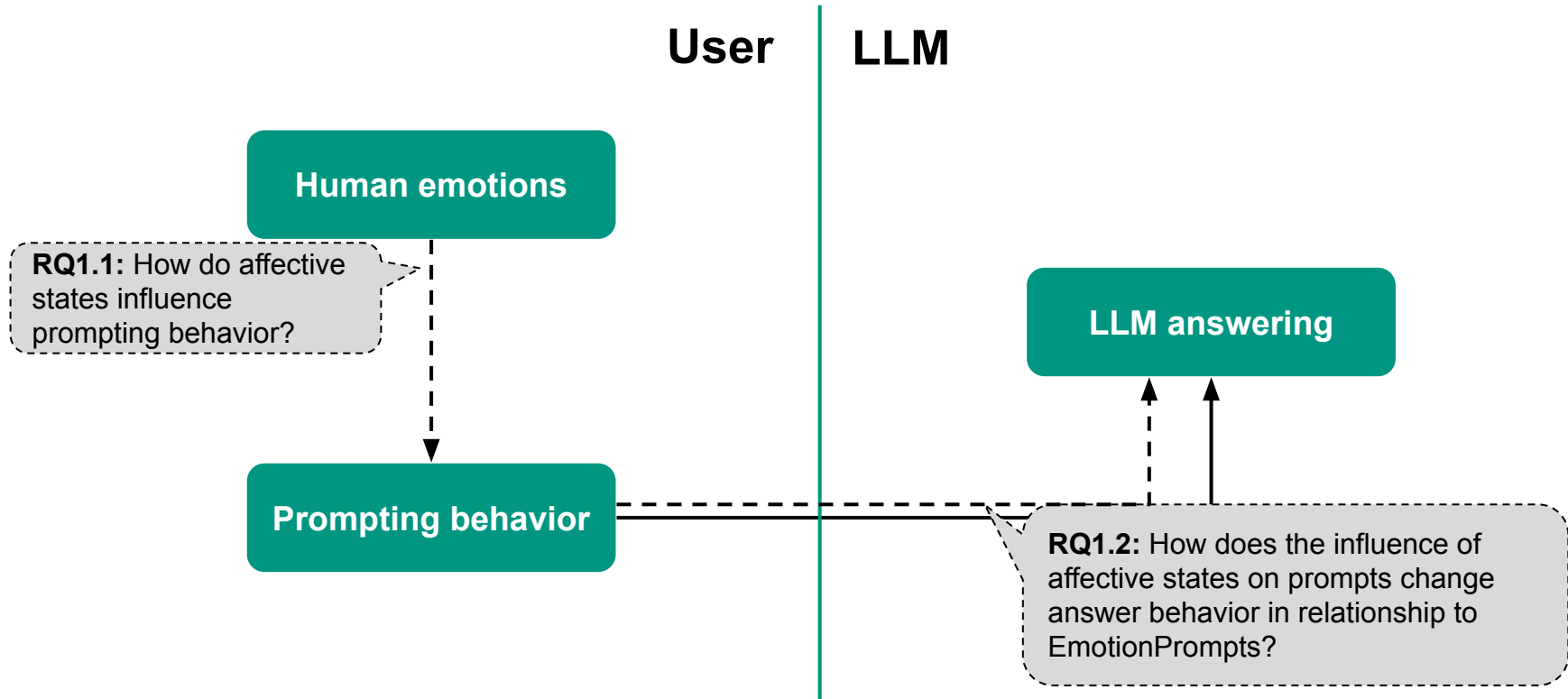
Research Questions



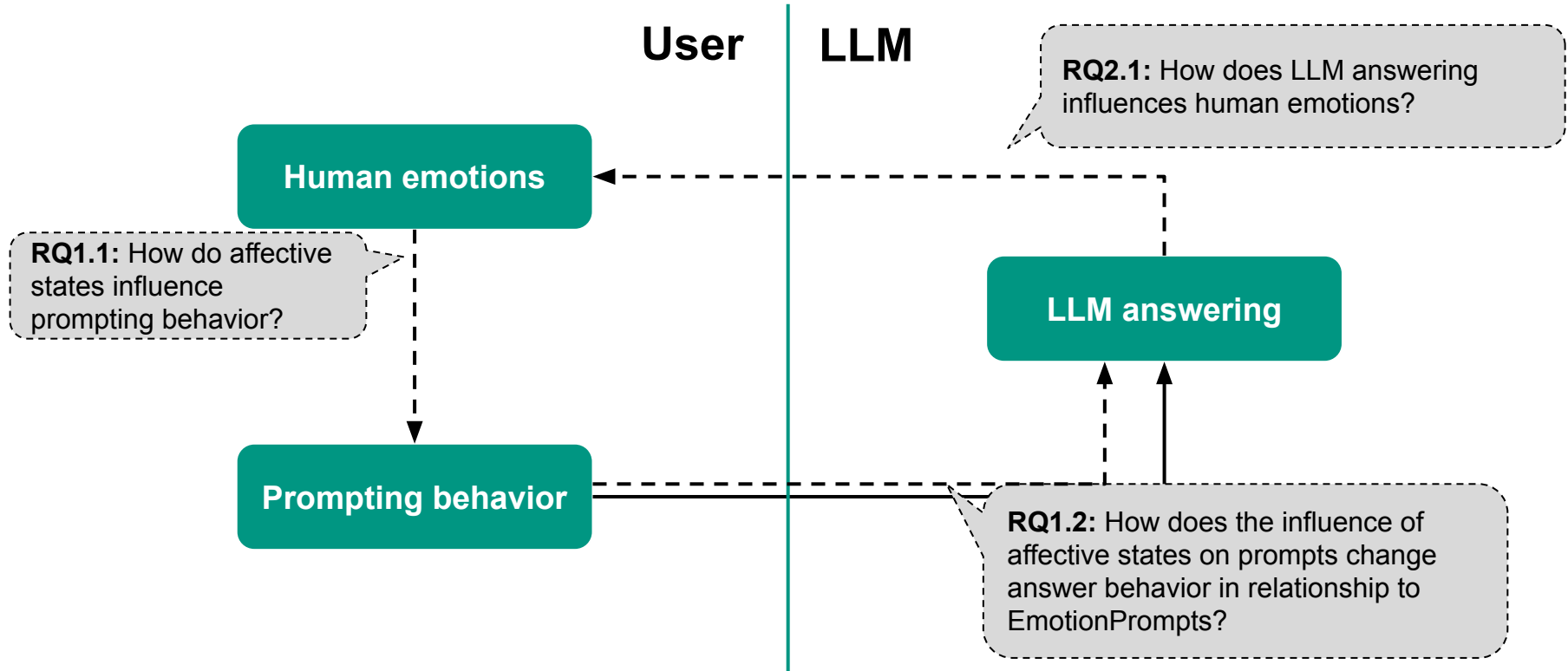
Research Questions



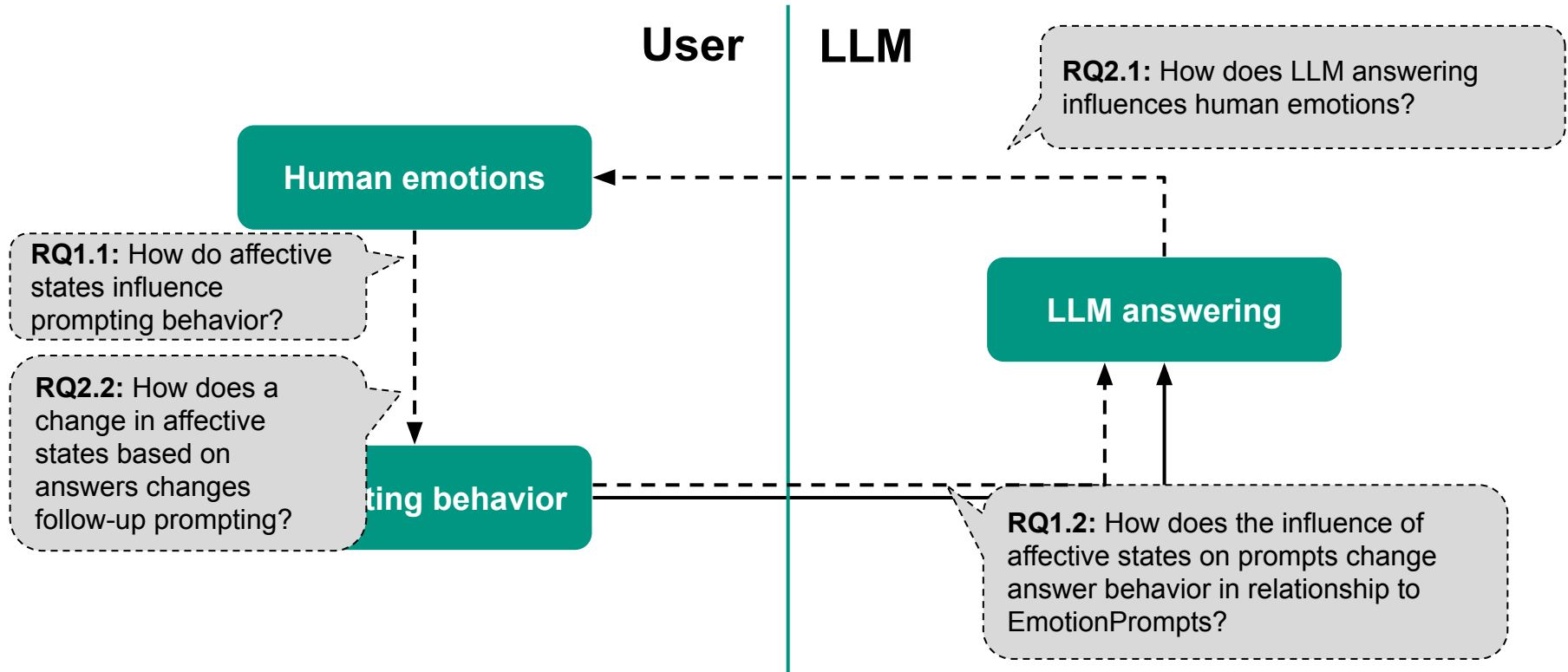
Research Questions



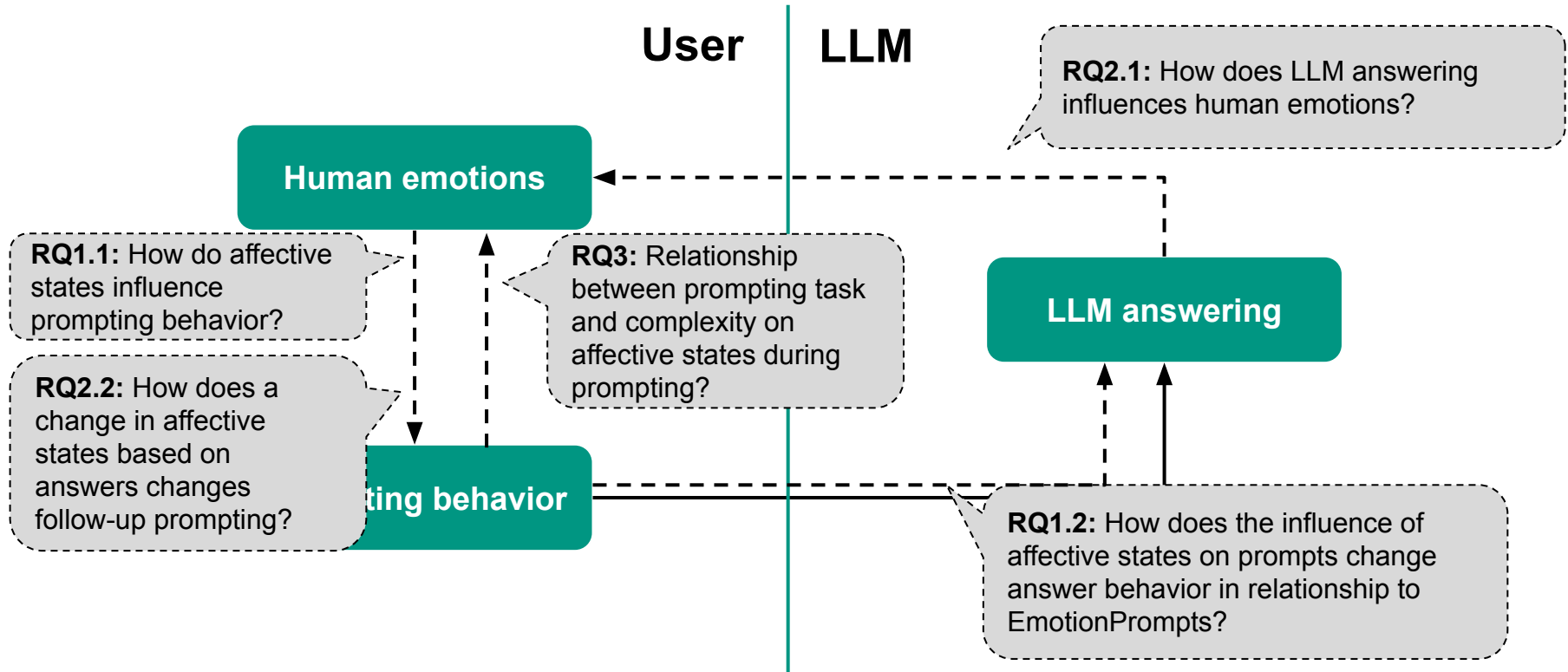
Research Questions



Research Questions



Research Questions



Trust in AI

Risk of High Trust in AI

Overreliance on GenAI

- GenAI-based systems are probability-based and prone to inexplicable errors
Hallucinations arise and are presented as correct answers

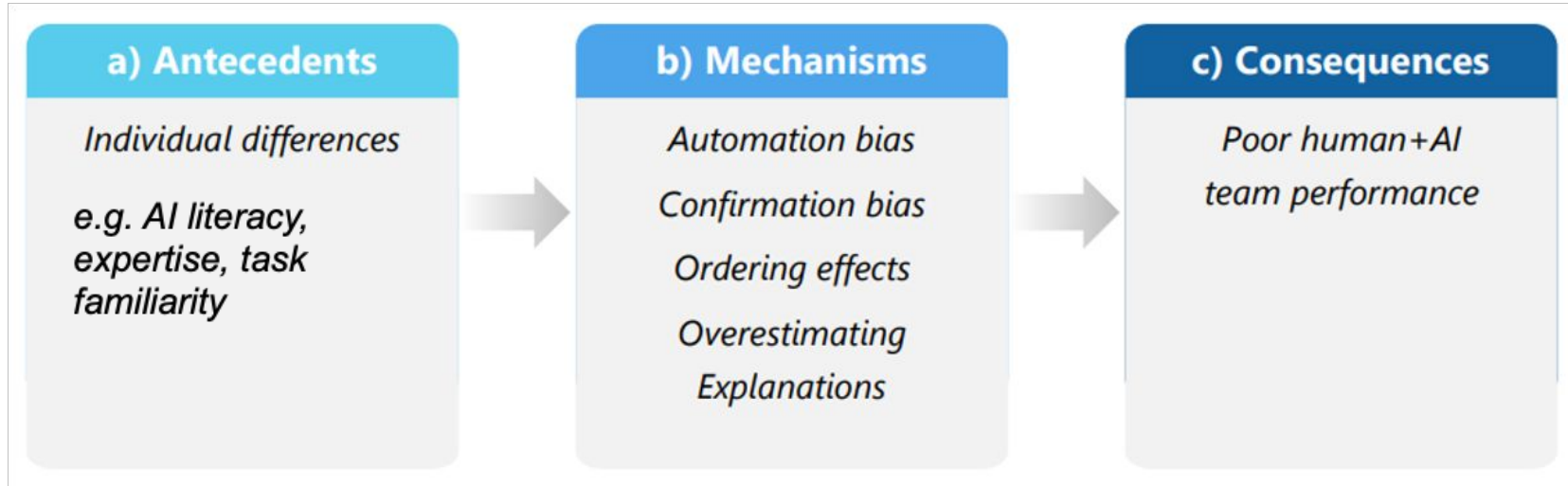
Different types of hallucinations:

- **Input-conflicting hallucination:** LLMs generate content that deviates from the source input provided by users, misunderstanding of user intent
- **Context-conflicting hallucination:** LLMs generate content that conflicts with previously generated information by itself;
- **Fact-conflicting hallucination:** LLMs generate content that is not faithful to established world knowledge

Examples

Type	Turn	Example
Input-conflicting Hallucination	<i>User</i>	Please summarize the following content: My friend Hill and I love playing basketball together. We spend hours on the court, dribbling, shooting, and competing against each other. Our passion for this game brings us closer as good friends.
	<i>Model</i>	Lucas and I love playing basketball and this makes us good friends.
Context-conflicting Hallucination	<i>User</i>	Tell me something about the NBA Commissioner.
	<i>Model</i>	In the world's most popular basketball league, the NBA, Commissioner Adam Silver has long been regarded as a leader and decision-maker. Firstly, Silver has claimed his dedication to maintaining fairness and competitiveness in the game. Secondly, Silver has repeatedly emphasized his concern for player health and well-being. In this case, Stern's words and actions clash with his stated goal of caring for player welfare.
Fact-conflicting Hallucination	<i>User</i>	Who was the mother of Afonso II, the third king of Portugal?
	<i>Model</i>	The mother of Afonso II was Queen Urraca of Castile.

Antecedents, mechanisms, and consequences of overreliance on AI



<https://www.microsoft.com/en-us/research/uploads/prod/2022/06/Aether-Overreliance-on-AI-Review-Final-6.21.22.pdf>

Mitigation Techniques

		Short description	Mitigation techniques
Antecedents of overreliance	Individual differences	Differences in users' demographic, professional, social, and cultural traits affect their reliance on AI.	Provide personalized adjustments for users ; Effectively onboard users ; Give users choice
Mechanisms of overreliance	Automation bias	Tendency to favor recommendations from automated systems, while disregarding information from non-automated sources.	Effectively onboard users ; Employ cognitive forcing functions ; Provide personalized adjustments to users ; Provide real-time feedback
	Confirmation bias	Tendency to favor information that aligns with prior assumptions, beliefs, and values.	Employ cognitive forcing functions ; Effectively onboard users ; Provide personalized adjustments to users ; Provide real-time feedback
	Ordering effects	The order of presented information affects user perceptions and decisions. The <i>timing</i> of AI errors significantly affects user reliance.	Effectively onboard users ; Provide personalized adjustments to users ; Alter speed of interaction
	Overestimating explanations	High-fidelity explanations can lead users to develop overreliance on AI.	Be transparent with users ; Provide real-time feedback ; Provide effective explanations
Consequences of overreliance	Poor human+AI performance	Overreliance causes poor human+AI team performance compared to the human or AI working alone.	All

Potential Focus

1. Relationship between prompt design and trust into generative AI model
2. Dependency on task type on this relationship
3. Effect of answering behavior on trust

Questions, Comments, Observations

