

## EXPLORING METAPHOR IN HUMAN-AI DIALOGUE: A COGNITIVE LINGUISTIC APPROACH

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### **Abstract**

Metaphor forms a deep cognitive mechanism on the basis of which humans are able to conceptualize abstract things through familiar experiences, thereby influencing both reasoning and communication. Metaphors gain particular significance while interpreting human-AI dialogue since throughout the interactions with the AI, the end users often embellish it as "assistants," "partners," or even "minds," which actually refer and reflect quite deep-seated models of intelligence, agency, and sociality. However, a fundamental split arises here since most AI goes through language in a literal, mechanistic way. This study interrogates the pivotal role of metaphor in human-AI interaction through a cognitive linguistic lens. In a conceptual metaphor theory orientation, it systematically analyzes conversational data for dominant metaphorical patterns and assesses their effect on user trust, expectations, and perceptions about artificial intelligence competency. The findings, from this data analysis, testify that metaphor structures not just human understanding but through it also actively configures the relational positioning of AI. Thus, such research highlights an urgent call on systems that dynamically recognize and adapt to metaphorical language input toward conceiving more natural, ethically responsible, and cognitively aligned human-AI interactions.

**Keywords:** Metaphor, Human-AI Dialogue, Cognitive Linguistics, Conceptual Metaphor Theory, User Perception, AI Interaction, Trust, Agency, Relational Positioning, Language Processing.

### **Introduction**

Metaphor is not merely a rhetorical figure; it is an integral cognitive mechanism on which people rely to grasp abstract concepts through familiar experiences. In the seminal work *Metaphors We Live By*, Lakoff and Johnson (1980) argue that metaphors are part and parcel of the conceptual system within which we think: metaphors shape the ways in which we think, reason, and communicate "The essence of metaphor is understanding and experiencing one kind of thing in terms of another" (Lakoff & Johnson, 1980, p. 5). They claim, moreover, that much of our understanding of abstract domains is metaphorical and based on physical and social experiences. Fauconnier and Turner (2002) further emphasized the fact that conceptual blending is a means of relying on metaphorical mappings for complex thought and creative reasoning in human

cognition "Conceptual blending is the cognitive ability to combine conceptual structures to produce new meaning" (Fauconnier & Turner, 2002, p. 18).

In the context of dialog between human users and AI, metaphors come particularly prominent. They talk about AI systems by calling them "assistants," "partners," and sometimes "minds," which only partly bespeak the ideas and assumptions built into that wording concerning intelligence, agency, and relational dynamics (Veale, 2019). The result is metaphorical cognition, structures' users' conceptualizations and interactions with respect to AI, influencing their expectations and trust. While prior research has examined metaphor in HCI and AI few studies have systematically analyzed how metaphor shapes user trust, expectations, and perceived competence in AI dialogue. This study addresses this gap by (Reeves & Nass, 1996).

Nonetheless, there lies an essential disconnect between human metaphorical cognition and machine interpretation. Most AI systems understand language in a very literal manner, mechanistically, and do not appreciate, as humans do, the myriad subtle meanings derived from metaphorical expressions. This gap can lead to misalignments in communication that can detract from user satisfaction and perceived competence of AI systems (Veale, 2019; Lakoff & Johnson, 1980).

To investigate the crucial role of metaphor in the interaction between humans and AI from a cognitive linguistic perspective would be the purpose of this research. "People tend to treat computers, television, and new media as real people and places" (Reeves & Nass, 1996, p. 7). Based on conceptual metaphor theory, it analyzes conversational data to locate salient metaphorical patterns and assesses their relationship with user trust, expectations, and perceptions of AI competence. The study demonstrates that, while metaphor does structure human understanding with respect to AI, it also sets the stage for a relational positioning for the AI. This shows that there is an acute need for AI systems that counter and are shaped by metaphorical language to bring about more natural, meaningful, and ethically responsible interactions.

### Research Problem:

While metaphor is a central cognitive mechanism shaping human understanding, its role in human-AI interaction remains underexplored. Most AI systems process language literally, which can lead to misalignments between human expectations and AI responses, affecting trust, usability, and relational engagement.

### Research Objectives:

- To identify dominant metaphorical domains in human-AI dialogue.
- To examine how different metaphorical framings influence user trust, expectations, and perceived competence.
- To explore the implications of metaphorical understanding for the design of AI systems capable of dynamic adaptation to human conceptualizations.

### Research Questions:

1. What are the dominant metaphorical frameworks that users employ to conceptualize AI in dialogue?
2. How do different metaphors (e.g., Assistant, Partner, Mind) influence user expectations, trust, and perceptions of AI competence?
3. How can AI systems be designed to recognize and respond effectively to metaphorical language in order to improve interaction quality and ethical engagement?

## Literature Review

### 1. Introduction to Conceptual Metaphor Theory

Conceptual Metaphor Theory (CMT), developed by Lakoff and Johnson (1980), states that humans comprehend abstract ideas via metaphorical mappings onto more experiential events. CMT further proposes that metaphors are not just linguistic forms: they constitute the underlying basis of human thought and influence reasoning and communication. Further developments in researching CMT have now moved into integrating this theory into different fields, such as artificial intelligence (AI).

### 2. Metaphor in Human-Computer Interaction

This created research into the relevance of metaphor in human-AI interaction. The determining factor that goes a long way in defining experience with human in metaphor. Humans tend to anthropomorphize AI and confer onto it human characteristics, changing how this AI system interacts and what is expected. For instance, if the AI system were framed within the confines of "personal assistants," then the expectation is that the AI should respond as a human assistant would by being responsive and empathetic (Robison, 2024). This anthropomorphization can support user interaction but also create unrealistic expectations if the AI system does not live up to these anthropomorphic expectations. "Human-centered AI must be designed around people's needs, expectations, and values, rather than technical possibilities alone" (Baxter et al., 2020, p. 526).

A study by Reeves and Nass (1996) on the media equation indicates that individuals use social rules and expectations for media and technology, including AI systems. This finding highlights the critical role of metaphor in HCI since it can influence user perceptions about competence, empathy, and reliability.

### 3. Challenges in Human-AI Dialogue

Metaphors can be powerful tools in how people interact with technology, but they also create unique challenges. Most systems, particularly language models, rely on statistical patterns in language rather than genuine understanding. Because of this, they often misinterpret figurative expressions, which can lead to confusion or unrealistic expectations. As Jung (2021) points out, treating these systems as if they think or feel can mislead users into believing they have human-like reasoning or moral judgment, which they do not.

Research by Veale (2019) highlights how difficult it is for these systems to fully grasp or generate metaphors, often resulting in clumsy or limited interactions. Similarly, a recent review (MDPI, 2025) stresses the importance of teaching these systems to recognize and adapt to metaphorical language, since doing so could improve both user trust and overall experience. While newer approaches in language processing have made progress, Veale (2019) reminds us that achieving a deep and nuanced understanding of metaphor remains one of the toughest hurdles for these technologies.

### 4. Implications for AI System Design

Comprehending this function of metaphor in human-AI conversation has tremendous implications for the design of AI systems. It can enhance the user experience with metaphorical interfaces which can be supplied immersively through experimental involvement into a space filled with subjective conceptualizations of the "AI." "Metaphor provides a bridge for designing cognitively aligned AI interfaces that resonate with human experience" (Li et al., 2022, p. 3). Such an approach can facilitate more normal, enriching interactions, with an ethical dimension.

As reported by Reeves and Nass (1996), development of AI systems opens a window for interpreting metaphor-expressive languages to enhance the users' interaction with AI-based systems. AI systems identifying metaphorical phrases and responding to them can therefore fulfill the users' expectations and build up trust with them.

In conclusion, metaphor has some critical function in human-AI dialogue, where it serves as the perceptual cognitive tool used by people in their perceptions and interactions with the AI systems. Although AI may have its disability concerning its parallel processing kind, understanding, and including metaphor into the design of the AI system would result in a better experience and higher efficiency in using these systems.

### Methodology

It applies qualitative-quantitative mixed-methodology to get the metaphors used in human-AI dialogue in depth and breadth. Mixed-method framework fits perfectly since it allows linguistic interpretation to user behavior and perceptions measurable patterns (Creswell & Plano Clark, 2017).

### Data Collection

Data is collected through human-AI communications of multiple kinds across different platforms. Sources included open-ended dialogues of commercially available chatbot interfaces, experimental AI systems developed for research purpose and event logs from virtual assistants. As such, it would include purely task-oriented conversations for example, information retrieval and problem-solving but also some creative in nature, for example, collaborations like storytelling and brainstorming; thus providing a balanced picture of metaphor usage in the human-AI arena.

100 purposively sampled individuals participated in the research, obtaining variability on age, education level, and prior experience with AI usage. Both structured and semi-structured conversations were held with each participant. Structured tasks focused on specific goals such as information retrieval, while semi-structured tasks encouraged open-ended creative engagement. This task design allowed for the observation of metaphorical language in both practical and imaginative contexts.

### Analytical Framework

The study adopts Conceptual Metaphor Theory (CMT) (Lakoff & Johnson, 1980) as its primary analytical lens. Conversational transcripts were systematically coded to identify recurrent metaphorical mappings, such as "AI as helper," "AI as partner," "AI as teacher," and "AI as mind." Coding was conducted through an iterative process: initial codes were generated from close readings of a pilot dataset, refined through team discussion, and subsequently applied to the full corpus. To ensure validity and reliability, inter-coder agreement was established following the guidelines of Braun and Clarke's (2006) thematic analysis framework.

### Measurement of Key Variables

To evaluate the impact of metaphorical framing, three outcome measures were assessed:

- **User Trust:** Measured through post-interaction questionnaires containing Likert-scale items assessing reliability, honesty, and willingness to rely on the AI in future tasks.
- **Expectations of AI:** Analyzed through both self-report data and dialogue content, focusing on how participants attributed intelligence, agency, and sociality to the system.
- **Perceived Competence:** Evaluated by examining task success rates, accuracy of AI responses, and participants' subjective satisfaction ratings.

### Qualitative Insights

Alongside quantitative methods, participants were offered metaphorical framing in which participants provided feedback during the debriefing sessions as a form of a cognitive process. Like the case when participants in their self-descriptions as AI, 'partners' were 'role' participants describe in self-terms, in the self-terms, self-advanced the 'helper' or the 'tool' as AI metaphorical frames exponents stiff transactional interactions. Such reflections were necessary for uncovering the ways in which spokes of metaphors structured in active speech the conversational positioning interweaving intertwining the whole decision dialogues.

### Ethical Contexts

During the research, all the participants were treated with dignity and respect. Ethical permission was obtained, participants were assured their participation was confidential, and they had the right to withdraw. Completed texts were anonymized, and care was taken to avoid over-interpretation of participant contributions. Researchers also made attempts to ensure they did not allow their biases to influence the participants' metaphor coding and interpretation (Tracy, 2010).

The research was designed in a mixed-method manner and improved its rigor, yet some research gaps surfaced. The purposive sampling technique enabled the gathering of a hundred participants for the study, yet the absence the span of the participants the study targeted influences the rigor of the study. In addition, the primary focus of the study was the English language dialogues, which restricts insights into metaphor use across other linguistic and cultural contexts. These limitations, however, provide fruitful directions for future research on metaphor and human-AI communication.

### Findings and Analysis

Based on the analysis of conversational datasets, there are three major metaphorical domains in human AI dialogue, each of which influences users' mental models and patterns of behaviors in a different way (Springler, 2025). The first and most common metaphor was AI as Assistant, which depicted the system as a tool that helps people accomplish tasks "I just use it like a helper it gives me quick answers that's it" In this domain, participants understood AI as a resource that would help them achieve the best results in a given task in the most effective and accurate manner. This was very often the case when users would engage with the AI in a way that was overly transactional, asking very specific questions or issuing direct commands and not anticipating any engagement, either social or creative. For instance, participants would tell the AI to pull up some information or do a calculation, treating it as a mental calculator and not as an autonomous agent "Thematic analysis is a method for identifying, analyzing and reporting patterns (themes) within a set of data" (Braun & Clarke, 2006, p. 79).

The second domain, AI as Partner, assigned the system the role of a collaborator. In this case, users considered the AI as a contributor or a problem-solving teammate with the ability to make worthwhile additions to the tasks. This metaphor pushed users to the use of a more informal, conversational, and flexible dialogue with the AI, and users incorporating AI-generated ideas into joint outcomes. Users employing this framing often attributed some level of agency to the AI, perceiving it as capable of reasoning and participating in collaborative decision-making. This resulted in richer, more exploratory interactions, particularly in creative tasks such as story co-writing or brainstorming exercises.

The third domain, AI as Mind, was anthropomorphic and cognitively more advanced than the rest. People in this category regarded AI as possessing some level of consciousness and felt AI could think, judge, and understand autonomously. Such figurative articulation brought metaphorical framing to new heights in expectation of autonomy, problem-solving, and creativity. Participants often solicited the AI systems to explain things, offer advice, or make suggestions, even if the scenarios involved advanced reasoning, problem solving, or analysis. Such tension was the root cause of the frustration and loss of trust when AI was only able to respond to the reasoning and analysis in a literal, as opposed to nuanced, capacity, “Mixed methods research provides strengths that offset the weaknesses of both quantitative and qualitative approaches” (Creswell & Plano Clark, 2017, p. 12).

This study showed that metaphorical framing had a profound impact on user expectations and engagement strategies. Participants who anthropomorphized the AI as “Mind” felt that the system would operate with greater autonomy and creativity, making them more sensitive to the system's shortcomings. In contrast to the “Mind” metaphor, referring to the AI as an “Assistant” metaphor positioned users to anticipate more pragmatic and goal-driven interactions, thus more realistic expectations. The “AI as Partner” metaphor maintained a middle ground, enhancing joint engagement without collaboration.

This is to say, metaphorical framing and the reality of AI performance resulted in lowered trust, dissatisfaction, and disengagement for some users. People framed as users, for instance, were always puzzled about replies given by the AI ‘Mind’ that were rationale, but contextually beside the point. ‘Sent the AI ‘Mind’ is a case’ (Nature study, 2025). In the same way, users who referred to the AI as a “Partner” experienced difficulties when the AI failed to communicate in a dialogical way that demonstrated a proper grasp of the topic. This is an AI tackling a rather simplistic problem, which we should not forget showed great promise. We owe it to ourselves to ensure that we build a virtuous cycle

Clearly, the importance of framing for especially perception geometry described these cases. In the 21st century, social and practical relevance of computing drives emphasis on problem solving, for instance. So users can be replied to easily, more easily, more engagement is needed. Systems need to identify metaphorical wording dynamically, interpret it profoundly, and ‘s strain the want to construct a scenario in which things go well’.AI systems positioned as ‘Minds’ should be able to create some context for a user and elaborate on general cases. In systems that feel ‘Down Assisting’ the “I can” approach should be submitted. Something like, “excellent qualitative research is distinguished by great rigor, great sincerity, and great coherence” (Tracy, 2010 840).

### Discussion

In the context of human–AI dialogue, metaphor goes beyond the scope of stylization and serves as an integral element that affects the critical relationship user’s form with AI systems. Conceptual metaphors navigate users’ know-how, set their anticipation, and hence, expose the mental models of intelligence, agency, and social interaction hidden. “Crowdsourced metaphors reveal public concerns about AI as both tools of empowerment and thieves of human agency” (Cheng et al., 2025, p. 4). Know what I mean? For the metaphor “Partner,” users ascribe to the system ownership of collaborative skills and shared agency, thus modifying the interaction style and the way they think about the system. In the latter case, the users’ mental model framework

denotes functional support, and hence they govern AI dominated interactions that are simple and task-oriented.

Insights from cognitive linguistics also reveal how metaphorical interfaces can be designed for AI systems which is an underscored gap relative to Desai et al (2024)'s work. Designing systems that engage with users at the metaphors of "Mind" indicate user behavioral compliance metaphors' and AI conversational alignment behavioral compliance metaphors which increase trust, satisfaction and social engagement. For example, metaphorical systems that detect 'Mind' could elaborate their reasoning or context-sensitive suggestions, whereas "Assistant" framing could trigger concise, accurate, and task-focused outputs.

A discussion like this one would not be complete without the inclusion of ethical issues. Designers have a responsibility to consider the effects of metaphorical framing on users' perceptions, trust, and behavior. Over-anthropomorphization of AI poses a risk associated with underestimating the system's capabilities, which, in turn, could result in dependence or misplaced trust. Misaligned expectations, on the other hand, could result in frustration and erosion of trust if the AI fails to deliver in terms of performance proposed by the metaphor user subscribes to.

Responsible AI would allow users to engage metaphorically, but would communicate the boundaries of the system to avoid users having misguided perceptions about its capabilities. In this case, protected characteristics would include age, disability, and discrimination in employment and services. Not all AI systems, such as conversational agents, allow users the luxury of framing their responses in a manner that aligns with their users' dominant mental models. This assists to support a wide range of users with varying technical competencies. Social AI is designed to aid the user in ways that align with their cognitive and social dynamics of interaction. In Human Centered AI, the dimensions which need to be considered would include the cultural, social, and cognitive dimensions of the interaction as proposed by (Ye and Li in 2024).

In summary, metaphor in human-AI dialogue functions as both a cognitive and relational tool, structuring understanding, guiding expectations, and influencing trust. Integrating metaphor awareness into AI systems offers the potential to create more natural, meaningful, and ethically responsible interactions, while simultaneously mitigating risks associated with over-anthropomorphization and misaligned expectations (Correia, 2024). Future research should investigate computational models for real-time metaphor recognition and adaptation, as well as longitudinal effects of metaphorical framing on user behavior and trust.

### Conclusion

Metaphor functions as both a cognitive and relational mechanism and thus structures understanding, shapes expectations, and influences the relational positioning of AI systems in human AI interactions. The conversational datasets analyzed in this study show that users think of AI in metaphorical terms as an Assistant, Partner, and Mind, each of which conveys levels of trust, competence, and engagement. These results exemplify how metaphor is not simply a feature of language—in this case, a metaphorical domain—but central to how people think about and interact with AI.

This study demonstrates the importance of AI systems that can interpret and respond to metaphorical language in a contextually appropriate manner. AI systems that can recognize users' metaphorical frames can better predict and meet their expectations, thereby enabling more conversational, relevant, and ethically responsible exchanges. Ignoring metaphorical reasoning can result in misunderstandings, distrust, and frustration at the overestimation or misattribution of cognitive and social skills associated with AI systems. Advancing metaphor comprehension is central to the construction of future systems that respond appropriately to AI by employing conversational AI in a manner that reasons metaphorically. Such systems should borrow principles from cognitive linguistics, which has made significant strides in the development of computational models that recognize metaphor in real time and generate contextually appropriate responses.

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