

**HUMAN-AI COMMUNICATION: SIGN INTERPRETATION  
CHALLENGES AND CONTEXTUAL UNDERSTANDING IN DIALOGUE**

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**Annotation:** This study presents an in-depth analysis of the sign interpretation mechanisms that are found within human and AI interaction using semiotics, cognitive and neurolinguistics, as well as pragmatics perspectives. Research conducted brings to light important critical issues such as the specificity of AI in syntactic and semantic text analysis, or issues regarding processing polysemous words and cultural codes, or even avenues through which AI can handle pragmatic intent interpretation. Particular emphasis is given to analyses of the issues related to cultural noise and intercultural communication problems in automated dialogues, along with their implications on the effectiveness of communication.

**Keywords:** artificial intelligence; natural language processing; cognitive linguistics; semiotics; pragmatics; sign interpretation; polysemy; neurolinguistics; intercultural communication; conversational systems.

**Аннотация:** В данном исследовании анализируются механизмы интерпретации знаков в семантическом поле двусторонней коммуникации между человеком и искусственным интеллектом с опорой на методы семиотики, когнитивной лингвистики и нейролингвистики. В частности особое внимание уделено семантической двусмысленности, многозначности, а также контекстуальной вариативности значения и специфическим кодам традиционной и современной культуры, которые влияют на процесс декодирования коммуникативных аспектов взаимодействия человека и ИИ. Исследование затрагивает ключевые вопросы, касающиеся роли ИИ в семантическом и синтаксическом анализе текстов, а также, трудностей, связанных с обработкой многозначных слов, культурных кодов и способов интерпретации прагматических аспектов коммуникации. Отдельное внимание уделяется влиянию культурного шума и особенностей межкультурной коммуникации в автоматических диалогах и их влияние на эффективность коммуникации.

**Ключевые слова:** искусственный интеллект; обработка естественного языка; когнитивная лингвистика; семиотика; прагматика; интерпретация знаков; многозначность; нейролингвистика; межкультурная коммуникация; разговорные системы.

**Abstract:** Diese Studie bietet eine eingehende Analyse der Mechanismen der Zeicheninterpretation in der Mensch-KI-Interaktion unter Einbeziehung semiotischer,

kognitions- und neurolinguistischer sowie pragmatischer Perspektiven. Besondere Aufmerksamkeit wird der semantischen Mehrdeutigkeit, der Polysemie, der kontextuellen Bedeutungsvariabilität sowie den kulturspezifischen Codes gewidmet, die den Dekodierungsprozess kommunikativer Intentionen beeinflussen. Die Studie stützt sich auf direkte Mensch-KI-Interaktionen und analysiert reale Fragen und Antworten, die von KI generiert wurden. Diese empirischen Beispiele bieten eine Grundlage zur Bewertung, wie KI linguistische Strukturen verarbeitet, Bedeutungen erkennt und an welchen Stellen Interpretationsfehler auftreten.

**Schlüsselwörter:** Künstliche Intelligenz; Verarbeitung natürlicher Sprache; kognitive Linguistik; Semiotik; Pragmatik; Zeicheninterpretation; Polysemie; Neurolinguistik; interkulturelle Kommunikation; dialogbasierte Systeme.

Natural Language Processing (NLP) in its increasing rapidity has had quite positive impacts on human and machine interaction, a domain where artificial intelligence operates. The most striking advancement in the field is transformer-based models such as the GPT (Radford et al., 2019; [2:9-10]), which can generate coherent and contextually relevant text, conduct dialogue, and perform complex cognitive tasks. However, the progress still leaves open areas of concern regarding the interpretation of linguistic signs, meanings, and contexts in human-AI communication (Bender & Koller, 2020; [1:1-9]).

Semiotic analysis of human-AI communication is a major area of research where mechanisms of sign transmission and interpretation are understood for the digital environments. Semiotics serves as a valuable tool to investigate AI from a multidimensional perspective. Through the use of the semiotic analysis, researchers unravel intricate meanings, biases, as well as cultural implications that underlie modern AI technologies (Boero, M. and Greco, C., 2023; [4:13]).

One of the major challenges has to do with "cultural noise" in which AI models fail to give an adequate recognition to the cultural-social codes in the processing of the linguistic data (Kobiruzzaman, M. M., 2021; [5:7]). While AI will continue to advance, it is crucially important to keep critical reflection on how signs, symbols are constructed, coded and decoded between humans and AI (José L. Cendejas Valdez & Gustavo A. López Saldaña, 2024; [3:493]).

The research was developed through direct human-AI interactions, analyzing real-world questions and responses generated by AI. Such instances provide a basis for assessment over how the AI processes linguistic structures, recognizes meaning, and where breakdowns in the interpretation occur.

As the main argument of the study, human-AI communication contains myriad competing readings of signs, symbols, and contexts. The study revealed several key findings: polysemous problems, contextualization troubles, dependence on training

data, need for improved multilayer interpretation, cultural and social context as a key variable. Thus the study of human-AI interactivity not only show-cased the strengths and weaknesses of the current AI technologies with regard to semantics, pragmatics, and cultural interpretation but also unfolded the future pathways of theorization and modelling of AI capable of interpreting signs in a better way in multilayered modes of communication.

Even at the technical level, through to cultural cognition, problems of interpretation arise from the AI's inability to read the context or the irony or the metaphor or the cultural codes inherent to particular groups. One particularly important finding is the need for improvement in the cultural models behind AI systems. There has certainly been progress, but AI's inability to correctly interpret cultural codes, memes, humor, and symbols inevitably brings forth misunderstandings and incorrect judgments, greatly impeding progress. The way forward is through further research and integration of even richer and more diverse training datasets.

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