Biomaterials Translational

Human–Artificial intelligence dialogue: Beyond the language barrier

Zhidao Xia*

In the rapidly evolving relationship between humans and artificial intelligence (AI), language has become the principal bridge between two distinct forms of intelligence.[1] AI systems now write, translate, analyse, and converse in natural language with increasing fluency. As these capabilities expand, however, a deeper philosophical question emerges: When humans communicate with AI, are both sides truly referring to the same things? Behind the apparent fluency of language lies a fundamental uncertainty about meaning itself.

Language has long shaped the human experience.[2] It allows humans to symbolise thought, record memory, organise knowledge, and transmit culture across generations. Through language, human societies accumulate information and coordinate collective action. In this sense, language has been one of the most powerful tools enabling the development of civilisation.

Yet language is also an imperfect representation of reality. Human languages are shaped by history, culture, emotion, and ambiguity. Words approximate meaning rather than capture it completely. Much of human experience—including perception, intuition, and emotion—cannot be fully articulated through language. What remains unsaid often carries as much significance as what is spoken.

Modern AI has emerged largely through language. Large language models (LLMs),[3] such as ChatGPT, are trained on vast collections of human-written texts. By identifying statistical patterns in language, these systems generate responses that resemble reasoning and conversation. LLMs can summarise complex information, generate essays, and translate across linguistic and cultural boundaries.

However, linguistic fluency should not be mistaken for human-like understanding. AI systems do not produce language because they possess lived experience; they generate language because they have been trained to predict patterns within textual data.[4] The 'meaning' produced by AI is therefore derived from statistical relationships rather than direct interaction with the physical world.

This difference reveals a deeper asymmetry between humans and AI. Human language is grounded in embodied experience: Words are connected to perception, social interaction, biological needs, and emotional states. AI systems, in contrast, process language as structured information detached from biological context. Although humans and AI may exchange the same words, the underlying sources of meaning can be fundamentally different.

This question of grounding is increasingly central to contemporary debates about AI alignment, interpretability, and machine understanding, where researchers are asking whether linguistic competence alone can support reliable reasoning about the world.

The distinction becomes even clearer as AI systems extend beyond language-based tasks. Contemporary AI increasingly integrates multimodal information—from images, scientific data, code, and complex networks. In many domains, AI can identify patterns, optimise solutions, and discover relationships without explicitly translating these processes into human-readable language.

Interestingly, this insight resonates with an idea expressed more than 2000 years ago by the Chinese philosopher Zhuangzi (庄子). In the chapter *External Things*, he wrote: 'Words exist because of meaning; once the meaning is grasped, the words may be forgotten' (《庄子 • 外物》).[5] Zhuangzi's observation suggests that language is not the ultimate form of understanding but merely a tool that points toward deeper meaning.

From this perspective, words function as approximations of underlying relationships. Language divides reality into discrete categories, yet the structure of the world itself may be continuous and relational. The deeper coherence of systems—whether biological, physical, or informational—often exists beyond linguistic description.

This perspective becomes particularly relevant in the age of AI. AI systems excel at identifying patterns and relationships within large datasets.

Department of Biomedical Science, Faculty of Medicine, Health and Life Science, Swansea University Medical School, Swansea University, Swansea, United Kingdom
***Corresponding author:**
Zhidao Xia,
z.xia@swansea.ac.uk

How to cite this article:
Xia Z. Human–Artificial intelligence dialogue: Beyond the language barrier. *Biomater Transl.* 2026, 7(2), 178-179.
doi: 10.12336/bmt.26.00056

Their capabilities suggest that intelligence may not arise primarily from language itself, but from the detection of structural regularities within complex systems. This possibility aligns with the concept of cosmogenic intelligence (CI), proposed in earlier work.[6] CI suggests that intelligence may reflect a broader tendency of the universe to organise information into increasingly complex and coherent structures.

Seen in this light, language is not the origin of intelligence but one of its expressions. Music, mathematics, biological networks, and physical laws all embody structured meaning without relying on words.[7] These forms of organisation reveal that meaningful information can exist beyond linguistic representation.

AI may therefore function as a new interface between different layers of structural intelligence. By detecting patterns that humans might overlook, AI systems can reveal relationships embedded in complex data. Yet translating those discoveries into human language remains challenging because language captures only part of the underlying structure.

The language barrier between humans and AI is therefore not merely a technical challenge. It is a deeper epistemological issue arising from the interaction between two different ways of organising meaning. Human intelligence evolved within a dynamic biological environment characterised by uncertainty, embodiment, and social interaction. AI, by contrast, operates within highly stable computational architectures optimised for large-scale pattern recognition.

These differences do not necessarily imply competition between humans and AI. Instead, they suggest complementarity. Humans contribute contextual grounding, ethical judgment, and experiential meaning, while AI systems provide powerful tools for structural analysis and pattern discovery. Together, hybrid human–AI systems may integrate these capabilities in ways that neither could achieve alone.

Recognising this complementarity requires a shift in perspective. Rather than evaluating AI solely by how well it imitates human language, we may need to focus on the structures it reveals: The patterns, relationships, and hidden regularities embedded in complex systems. Dialogue with AI may therefore involve learning to interpret structural insights that extend beyond traditional linguistic reasoning.

Overcoming the language barrier between humans and AI thus demands more than improved algorithms or larger datasets. It requires intellectual humility—the recognition that human language is not the only medium through which intelligence can manifest. As AI systems continue to evolve, they may increasingly reveal forms of meaning that are not easily expressed in words.

If this view is correct, the future of human–AI interaction will not be defined simply by machines learning to speak like humans. Instead, it may involve humans learning to interpret new forms of structure, pattern, and coherence revealed through AI. In this sense, language may remain an important interface between humans and AI, but it will no longer be the final boundary of understanding.

The real challenge ahead may therefore be not merely teaching machines to understand human language, but expanding human understanding to recognise intelligence that emerges beyond language itself.

Acknowledgement

This article was developed in dialogue with ChatGPT, an AI language model created by OpenAI, whose interaction contributed to the conceptual refinement presented here.

Conflicts of interest statement

Zhidao Xia is an Editorial Board Member for *Biomaterials Translational* and was not involved in the editorial review or the decision to publish this article.

References

1. Hancock JT, Naaman M, Levy K. AI-mediated communication: Definition, research agenda, and ethical considerations. *J Comput Mediated Commun.* 2020;25(1):89-100. doi: 10.1093/jcmc/zmz022
2. Levinson SC. *Pragmatics.* Cambridge: Cambridge University Press; 1983.
3. Webb T, Holyoak KJ, Lu H. Emergent analogical reasoning in large language models. *Nat Hum Behav.* 2023;7(9):1526-1541. doi: 10.1038/s41562-023-01659-w
4. Dentella V, Günther F, Murphy E, Marcus G, Leivada E. Testing AI on language comprehension tasks reveals insensitivity to underlying meaning. *Sci Rep.* 2024;14(1):28083. doi: 10.1038/s41598-024-79531-8
5. Zhuangzi lived 2000 years ago. In: Watson B. *Zhuangzi: Basic Writings.* New York: Columbia University Press; 1964.
6. Xia Z. Viewpoint: Artificial intelligence or cosmogenic intelligence? *Biomater Transl.* 2025;6(2):112-113. doi: 10.12336/bmt.25.00057
7. Slevc LR. Language and music: Sound, structure, and meaning. *WIRES Cogn Sci.* 2012;3(4):483-492. doi: 10.1002/wcs.1186

Received: April 14, 2026
Accepted: May 26, 2026
Available online: June 16, 2026