

Reimagining language

Towards a better understanding of language by including our interactions with non-humans

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What is language and who or what can be said to have it? In this essay we consider this question in the context of interactions with non-humans, specifically: animals and computers. While perhaps an odd pairing at first glance, here we argue that these domains can offer contrasting perspectives through which we can explore and reimagine language. The interactions between humans and animals, as well as between humans and computers, reveal both the essence and the boundaries of language: from examining the role of sequence and contingency in human-animal interaction, to unravelling the challenges of natural interactions with “smart” speakers and language models. By bringing together disparate fields around foundational questions, we push the boundaries of linguistic inquiry and uncover new insights into what language is and how it functions in diverse non-human-exclusive contexts.

Keywords: language, human-animal interaction, human-computer interaction, meaning-making, large language models

1. Introduction

This proposal is a plea to reconsider what language is. We argue for a radically inclusive approach to the language sciences that takes into account both human-animal interaction and human-computer interaction. This will yield profound insights into language and communication that will shape scientific inquiry in the decades ahead and bring about new understandings of how we interact with animate and inanimate non-human beings. With this investigation, which is timely

in light of societal challenges that relate to how people interact with machines and animals, we aim to catalyze a less anthropocentric and more inclusive theory of language.

In this essay, we explore how human-animal interaction and human-computer interaction contract and extend language, shedding light on the interplay between language, perception, and action. In interacting with animals, people rely on the interactive core of their linguistic abilities, that is, the sequential organization of turns (Bangerter et al. 2022; Mondémé 2022). In today's large language models, the transformation is almost the reverse, with a surplus of passable prose obscuring a lack of true interactivity (Bender & Koller 2020; Sejnowski 2023). Both invite us to push the boundaries of linguistic inquiry. They touch on fundamental topics including meaning, understanding, agency, and theory of mind, and raise new questions, such as: what do animals and computers communicate to us, and what does it mean to listen to them (Birhane & van Dijk 2020; Meijer 2019)? How do we adjust our language towards beings with different perception-action systems, whether animals or robots? What do we do when a semblance of fluid language is not a reliable cue to the presence of a social agent?

Ultimately, these questions all point back to a bigger question: what is language, and who or what can be said to have it? The domains of human-animal interaction and human-computer interaction offer much promise for addressing this question. As with any good question, there is no single or simple answer to it, e.g. animals have language, computers do not, or the reverse (Hockett 1987). Instead, the question generates a new research programme for the language sciences. In this essay we provide some of the fundamental ingredients for such a programme, which points us to the interactional foundations of language.

2. Human-animal interaction

Most linguistic research into animal communication has drawn attention to the difference with human language and cognition (Cornips 2019; Meijer 2019). This focus on human exceptionalism is perhaps unsurprising since animals' supposed lack of language has been seen as a lack of mind ever since Descartes (Massey & Boyle 1999). Here we consider humans' ongoing interactions with animals in the wild and in captivity, including pets and livestock, in order to ask a different question: how can humans co-construct meaning *with* other animals?

A key finding from research on human-animal interaction is that it is organised into turns and sequences (MacMartin, Coe & Adams 2014; Mondémé 2020), somewhat like the coordinated exchanges in various animal species (Burkart

et al. 2022; Fröhlich et al. 2016; Fröhlich & van Schaik 2022; Heesen et al. 2022; Mondada & Meguerditchian 2022; Pika et al. 2018; Rossano 2013). This is the interactive core around which all language use is organised; it provides a key entrance into studying human-animal interaction (Mondémé 2022). By displaying and treating behaviour as turns, humans and other animals accomplish joint actions such as greeting (Cornips 2022; Harjunpää 2022), social play (Goode 2007) or walking in a park (Laurier, Maze & Lundin 2006).

To study how humans and animals can engage in these meaningful contingencies, we start from the notion of *Umwelten*, or functional life worlds, first proposed by the ethologist von Uexküll in the 1920s (Von Uexküll 1921, 1992). This framework posits that there is not just one “objective” world, but overlapping environments inhabited by different organisms. Communication within and between species is thus also communication between and across *Umwelten*. This requires a theory of semiotic meaning-making that integrates insights from multimodal interactional studies (Goodwin 2000, 1981; Mondada 2011; Stivers & Sidnell 2005), and considers how differently structured bodies, in their diversity of forms and sensoria, co-construct affordances for interaction (Gibson 1977).

Using this approach, we can study how and why human and non-human animals adapt and create signals for interspecies interactions (Brandt 2004; Krebs & Dawkins 1984; Smith 2012), and when and how they mobilise these resources. For example, human languages have expressions and gestures to summon or disperse domestic animals (Ameka 1992; Amha 2013; Bynon 1976) and cats vocalise in specific ways when socialised to people (Nicastro 2004; Yeon et al. 2011). In both cases, the expressive inventories show signs of being adapted to the other’s *Umwelt*, including perceptual predispositions.

Considering human-animal multimodal meaning-making will provide new insights that can make us rethink our notions of language, and that can revolutionise our outlook on human-animal relationships in the Anthropocene.

3. Human-computer interaction

Just as Descartes made language a criterion of mind, so Turing made it a test of machine intelligence (Turing 1950). The Turing test—a closed experimental setup in which a human interpreter judges textual output—foregrounds only the tiniest and most disembodied sliver of language (McIlvenny 1993). Today’s large language models (next-token predictors that excel at completing text prompts in plausible ways) can pass at least some forms of this test (Sejnowski 2023). What do we learn from this? Whereas some have rushed to the conclusion that this means statistical learning may explain the human capacity for language (Contreras

Kallens, Kristensen-McLachlan & Christiansen 2023), here we take a different view: it is time to rethink the disembodied, decontextualized, text-bound conception of language these models are founded on (Malinowski 1922).

Human behaviour around computers and other machines is highly embodied, flexible, and contingent. People using interactive technology (from photocopiers to smartphones to conversational agents) take their cues from the design affordances of these devices and flexibly adapt their behaviour (Suchman 2007). Users of conversational assistants like Siri or Alexa learn the basic capabilities of devices as quickly as they learn to work around their evident limitations (Mavrina et al. 2022; Porcheron et al. 2018). However, whereas in human-animal interaction there is ample evidence of reciprocal adaptation, here the adaptation is strikingly one-sided, with robots essentially helpless, requiring care (Lipp 2022) and forcing people to adapt to their constraints (Alač et al. 2020; Suchman 2019). People may start speaking differently to yield to limitations of speech-to-text modules, learn to produce their talk in short chunks, reduce complex and diffuse goals to simple intents, and may even find that their own language is not supported (Litman, Hirschberg & Swerts 2006; Swerts & Ostendorf 1997).

Meaningful interaction takes work from both sides (Voinea 2018). As conversational interfaces and social robots become more ubiquitous, the rigidity of default dialog flows and the lack of reciprocal adaptation comes to the surface more often. Here, linguists can provide critical and constructive contributions (Bender & Koller 2020; Ginzburg 2012). This will put linguistic theories to the test: are they concrete enough to operationalise notions like interactive alignment (Rasenberg, Özyürek & Dingemanse 2020) and the co-construction of social action (Sidnell & Enfield 2012)? Empirical work on how people coordinate joint action and deal with misunderstandings shifts from a relatively peripheral topic to a domain of key relevance (Ashktorab et al. 2019); likewise, for technology, work on error analysis and the measurement of performance becomes only more urgent (van Miltenburg et al. 2023). With the recent surge in attention surrounding “language models”, linguists need to reconsider the technological and theoretical models of language at play.

4. Discussion

Let us now return to the (metaphorical) elephant in the room: what is language and who or what “has” it? Traditionally, animals have been treated as “mute” (Cohen 2016), a term with questionable ableist implications. In contrast, and predictably given the Cartesian legacy of the cognitive sciences, computers are looked at with veneration as soon as they produce well-formed output

(Weizenbaum 1976). This reveals a mental model of language that revolves entirely around words and who can utter them.

Recent developments, some of which we have reviewed above, mark an upheaval in scientists' ideas about what is and is not language, and about what it means to interact with non-human agents and entities. We have shown that a consideration of the *Umwelten* of humans and animals will require theoretical work on how we assign meaning to observable behaviour in interactive sequences. Meanwhile, work on human-computer interaction shows the limits of fixating on well-formedness and the need to account for the fluid and flexible meaning-making that living beings excel in. The research programme sketched here offers new opportunities for probing these matters. Alongside rethinking key concepts such as meaning, agency and intention, this calls for a methodological broadening: from studying language as a disembodied system to studying it in situated interaction (Keevallik 2018; Laurier, Maze & Lundin 2006; Tuncer et al. 2023).

At first sight, the fields of human-animal interaction and human-computer interaction could not seem to be more disparate. Located at opposite ends from mainstream conceptions of language, they provide alternating lenses through which we can examine and reimagine language (Bateson 1972). A more holistic and inclusive field of linguistics that involves these domains alongside human-human interaction will usher in profound understandings of the diversity of meaning-making, which includes, but is not limited by, contemporary linguistic theory (Ginzburg & Poesio 2016; Hockett 1987; Schlenker et al. 2022). This, in turn, will fuel new lines of linguistic inquiry and interdisciplinary interfaces (Moore, Marxer & Thill, 2016), for example with ethology, philosophy, computer science, AI, and more. Ultimately this pluralistic perspective will position the field at the cutting edge of science and pave the way for more inclusive theoretical frameworks of language.











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