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## Editorial

## The multimodal origins of linguistic communication



## A B S T R A C T

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Why is language unique? How and why did it emerge? Such questions are emblematic of the Western intellectual tradition, and while some even today see them as intractable, a majority consider the problem of language origins as difficult but possible to address scientifically: “the hardest problem in science”. Such questions are the domain of *language evolution*: an interdisciplinary and inclusive research area unified by a common goal: to explain the emergence and subsequent development of the species-specific human ability to acquire and use language. In this brief introduction, we describe the transition of the field from mostly theoretical “grand questions” to mostly empirical research focused on narrowly defined puzzles. Increasingly many such specific, empirically addressable puzzles revolve around the motif of *sensory modality*, which – we argue – is as central to determining the origins of linguistic communication as to understanding its present nature.

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## 1. Language evolution

Researchers in language evolution see their challenges as inferring the baseline cognitive and communicative capacities of our non-linguistic ancestors as well as reconstructing the evolutionary mechanisms and sequence of steps that transformed this baseline into language: getting from there to here. However, recent advances in the field bring an unexpected realisation: the difficulties do not stop at inferring the “there” and the path. Describing the “here” turns out to be no less problematic. One of the most striking insights afforded by the 25 or so years of modern language evolution research is that the “view from phylogeny” leads to a reassessment not only of the initial but also the end state: language as we know it today.

What is language evolution research? It is an inherently interdisciplinary and inclusive research area unified by the goal of explaining the emergence and development of the human ability to use language. Although the relevant questions have millennia of intellectual tradition behind them, many researchers are inclined to draw a symbolic line at the early 1990s, separating the glossogenetic philosophising of the past from modern, mature language evolution research<sup>1</sup>. In particular, the current *empirical* focus makes a qualitative difference thanks to which today’s research in this field can, at last, aspire to being truly *scientific*: to solve “the hardest problem in science” (Christiansen and Kirby, 2003a; emphasis ours).

This empiricism is twofold. Its bedrock is existing empirical data, synthesised from a broad range of disciplines to corroborate or falsify various language-origins scenarios. However, an increasingly important aspect of this empirical nature consists in an effort – where possible – to collect data first hand.

<sup>1</sup> Many articles offer introductions to the field: see e.g. Dediu and De Boer (2016) in the recently established *Journal of Language Evolution*. A testimony to the field’s maturation is the publication of tertiary literature in the form of synthetic monographs (Johansson, 2005; Fitch, 2010; Hurford, 2014) and handbooks (ed. Tallerman and Gibson, 2012), increasingly in languages other than English (e.g., Italian: Ferretti, 2010; Polish: Zywicki and Waciewicz, 2015).

### 1.1. Interdisciplinarity

Regarding sources of data, language evolution research has always been a thoroughly multidisciplinary enterprise (see Christiansen and Kirby, 2003a, 2003b for early overviews). The most important and long-standing elements of its disciplinary matrix include *linguistics*, with special focus on syntax (e.g., Heine and Kuteva, 2007) and phonology (e.g., MacNeilage, 2008); *primatology*: especially primate communication (including recent interest in primate multimodal communication: e.g., Liebal et al., 2014); *genetics*, mainly in relation to the genetic foundations of language (such as the role of the FOXP2 gene in deficits of language and orofacial praxis: e.g., Lai et al., 2001); *palaeoanthropology* (e.g., attempts to deduce gross cortical structures in hominins from fossil braincases: Holloway, 1983); *archaeology*, including cognitive archaeology (e.g., d'Errico et al., 2005); *neuroscience* in general and *neurolinguistics* in particular (e.g., the problem of lateralisation and language: Gazzaniga, 2000); and *simulations*, especially in the tradition of *iterated learning* (Kirby, 2001), which has developed into a successful laboratory paradigm of psychological experimentation (Kirby et al., 2008).

These areas have formed the interdisciplinary core of language evolution; however, the range of relevant topics has gradually expanded. The boundaries have been pushed by the increasing presence of neuroscience (e.g., research on the mirror neuron system: Rizzolatti et al., 1996) and by new experimental trends (especially *experimental semiotics* studies involving human subjects communicating without the use of language or other symbols: Galantucci and Garrod, 2011). Within linguistics itself, a much wider range of topics have come to be seen as relevant to language evolution: gesturology and sign linguistics (Goldin Meadow, 2003; Senghas et al., 2004), semantics (e.g., Hurford, 2007), pragmatics (e.g., Moore, 2016), conversational structure (e.g., Levinson, 2006) – even linguistic politeness (e.g., Zywickzynski, 2012; Waciewicz et al., 2014; Pleyer and Pleyer, 2016). Likewise, there is a wider scope of methods being employed, with more emphasis on quantitative analysis of large databases and making connections to other disciplines (e.g. correlating linguistic and genetic variation; Dediu and Ladd, 2007). The range of comparative studies of interest has also significantly widened: today, language evolution researchers look not only at communication and cognition in non-human primates but in many other taxa: e.g., marine mammals, dogs, or even birds (Fitch, 2010).

One of the most vivid illustrations of how such diverse data can come together to inform higher-order questions concerns the question of Neanderthal language. A conviction still widespread among linguists – mostly, it seems, due to the early study by Lieberman and Crelin (1971) that found its way into influential linguistic textbooks – is that Neanderthals lacked recognisably modern capacities for speech and language. Contrary to this view, several lines of evidence – in particular, the most recent – converge on a picture of Neanderthals as cognitively sophisticated and, most likely, articulate creatures. Neanderthals shared with us the same two derived mutations of the FOXP2 gene (Krause et al., 2007), their anatomy related to speech production and perception appears to fall within the range of modern human variation (as reviewed e.g. by Dediu and Levinson, 2013), and the record of their material culture does not differ substantially from that of contemporaneous *Homo sapiens* populations (e.g., Villa and Roebroeks, 2014) with whom they interbred. In short, palaeoanthropology, archaeology and genetics systematically point to similarities rather than differences between *neanderthalensis* and *sapiens* (Johansson, 2013). Furthermore, advances in anthropology have resulted in a revised view of behavioural modernity, in a more complete picture of the full range of variation in the material culture of anatomically modern *H. sapiens*, and in a better understanding of the dynamics of cultural evolution (revealing e.g. cases of the loss of cultural/technological complexity in human populations despite the presence of fully fledged language [Henrich, 2004]): all compatible with Neanderthals being language users.

At the least, the collective weight of converging interdisciplinary evidence supports changing the null hypothesis, from assuming difference to assuming similarity (Johansson, 2014). But did Neanderthals actually have language? The answer is as much a matter of the available definition of language as it is the available data (Barceló Coblign and Benítez Burraco, 2013). Dediu et al. (2017) comment that “such an encompassing view of language, using a sort of Bayesian view of science where all the evidence available is rationally weighted against explicit prior assumptions resulting in probabilistic conclusions, allows us to consider the possibility that language and speech are very old... and that other forms of humanity such as the Neandertals and Denisovans also probably had recognisably modern (but of course not identical to our own) speech and language”. Such a view of language – and of *science* – is a matter of near-consensus in present-day language evolution research.<sup>2</sup>

### 1.2. Data collection

The other defining aspect of modern language evolution research is the steady transition from necessarily more theoretical “grand questions” to the smaller – therefore more empirical – puzzles of Kuhnian normal science. At the turn of the millennium, the field was captivated by the old glossogenetic motif of creating *scenarios* of language emergence. By “scenario”, we mean a holistic account outlining a skeletal structure of transitions from the languageless *Pan-Homo* last common ancestor (LCA), through a series of stages, to the fully fledged language found in present-day *H. sapiens*. The transitions form a more or less coherent story, whose highlights are frequently the selection pressures – evolutionary “reasons” – precipitating

<sup>2</sup> But not unanimous: see e.g. Hauser et al., 2014.

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