

NON-LINEARITY IN HUMAN LANGUAGE EVOLUTION: A GENERAL ECOLOGY PERSPECTIVE GROUNDED IN PLEISTOCENE ARCHAEOLOGY

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This paper reconsiders the emergence of language in the hominin lineage from the perspective of general ecology, multispecies theory, phenomenology, and semiotics. We propose that changing communicative environments and their shifting foci of hominin-animal and hominin-hominin interaction are fundamental to understanding the evolution of language in the hominin lineage. After reviewing the available contextual evidence on the nature and transformation of communicative ecologies in the deep-past, we pledge for interpretive conservatism and argue that an “extended short chronology” for the evolution of human language is currently best supported by the archaeological data (in sync with a prolonged period of intensified “indexical” communication). We further propose that this evolutionary trajectory is best understood as a form of non-linear “co-evolution” and hence interlaced with key developments in multiple hominin behavioral arenas and material registers, such as animal relationships, technical behavior, artistic expression and the modalities and scale of social life. Systematically mapping and exploring this broader “general ecology” of communicative needs, concerns, functions, and horizons minimally requires the integration of archaeology, ethology, linguistics, and phenomenology.

1. Introduction: Shifting the Theoretical Focus

Asking for the origins and evolution of human language is a long-standing conundrum. The available evidence is necessarily indirect – language does not “fossilize” – and assumptions about what precisely constitutes evidence for language in the first place – and more difficult even, language evolution – differ vastly across disciplinary and theoretical spectra. Accounts of the evolution of human language range from cognitive approaches, localizing language as an extension or foundation of generalized capacities for symbolic thought (e.g., Noble & Davidson, 1991; Donald 1991; Henshilwood & d’Errico, 2011;

Tattersall, 2019), over cultural semiotic, mostly Piercean, ones (Kissel & Fuentes, 2017; Barham & Everett, 2021) to ethologically-founded communication studies arguing for deep-historical roots of complex communication systems in diverse animal taxa, especially birds, and the co-evolution of “speech”, tool-use, social behavior, and potentially aesthetic display, in a number of unrelated species (Menninghaus, 2011; Stout, 2018). Yet, the main sources of evidence for human evolutionary studies of language are material culture assemblages and specific types of artefacts uncovered by archaeologists and millennial-scale changes in hominin bio-cognitive makeup documented by paleoanthropologists, cognitive scientists, and primatologists (Dediu & Levinson, 2018). The Darwinian optic that goes together with these disciplinary configurations has vindicated the idea that the emergence of language – because it “makes us human” – is a watershed event or turning point in hominin evolution, dividing the past into a “before” and “after”. The result has been a tendency to promote unilineal models of language evolution rooted in persistent notions of progress, leading from the first representatives of the *Homo* lineage to the only surviving hominin taxon, *H. sapiens*. We suggest that the problematic vision of a set language threshold that isolates a so-called “archaic” from a “modern” stage in human prehistory, where full-blown humanity is achieved, is linked to an overemphasis, and at times fetishization, of intrinsic “capacities” at the expense of *context* and *communicative ecologies* in hominin evolution.

Definitions and conceptual baselines: we here retain the conceptual distinction between “language” as a fully-fledged symbolic sign system in the Saussurian sense, where each sign obtains its meaning by virtue of its relation to other signs, and “communication” as “[a] process involving signalling between a sender and receiver, resulting in a perceptual response in the receiver, which extracts information from the signal, potentially influencing the receiver’s behavior” (Stevens, 2013: 73). Communication in this view is a more basal and far-flung phenomenon than language and as such deeply involved in most life-processes and inter-organismic relations (Barbieri, 2008). Language can then be said to respond to specific communicative needs and serves particular functions, which may in turn also change the total architecture of broader *communicative ecologies* – i.e., the contexts and relations that frame communicative processes at large. This perspective shifts the attention to the social, cognitive, and environmental embeddedness of language as a specific form of communication rather than reducing it to a mere question of “language ability” (Lieberman, 2006).

2. The Big-Picture Perspective: Changing Niches and “Ecologies of Communication” over the last 2 Million Years

This paper reconsiders language evolution among hominins in the framework of general ecology, multispecies theory, phenomenology and biosemiotics (meaning-making in living organisms). We contend that previous approaches have paradoxically endorsed a human-centered point of departure with often quasi-orthogenetic implications. Our advocated approach flips this perspective on its head. We draw attention to the fact that early hominins were an extraordinarily rare sights in Plio-Pleistocene landscapes, and in turn primarily had to grapple with nonhuman-dominated life-worlds (Rodríguez et al., 2015). The communicative needs and concerns in these contexts are fundamentally *multispecies*: early hominin foraging niches relied on the coordination with other animals, especially predators and key scavengers, and biosemiotic relationships at the hominin-animal interface were thus of key existential concern. Communication systems therefore likely evolved in tandem with such broader interspecies niche conditions as well as the changing demographic and social contexts hominins found themselves in. Drawing on ethological data demonstrating structured relationships between different niche-types and communicative environments, we explore the consequences of broad “human niche” trajectories – with spatiotemporally divergent patterns of evolving carnivory and generalist foraging (Ben-Dor et al., 2020) – and highlight the importance of the Middle Pleistocene (ca. 600-130,000 years ago) associated with flourishing, wide-spread archaeological evidence for novel forms of social organization rooted in “soft” communicative technologies such as hearth-centered life, meat sharing and big-game hunting (Kuhn & Stiner, 2019).

The Middle Pleistocene not only documents important changes in the hominin body plan including marked expansions in cranial capacity, but the archaeological record also points to significant reconfigurations of hominin social and technical ecologies. At Qesem cave in modern-day Israel, hominins were roasting and dining on tortoise shells about 400,000 years ago and differential ungulate bone representation in the same layers indicates selective movement of meat-rich body parts to “homebase”-like places equipped with hearths (Stiner et al., 2011). Such places not only promote and intensify social interaction among peers, but they also generate novel contexts for the sharing of experience and what has been referred to as “gossiping” (Dunbar, 2017), and thus ultimately precipitate the evolutionary dynamics between hominin place-making and storytelling resulting

in the diagnostic “storied” landscapes documented among contemporary forager groups. Evidence for the emergence of hafted spear tips used for hunting larger animals, although sporadic, also reaches back ca. 500,000 years (Wilkins et al., 2012). Generally speaking, the Middle Pleistocene sees the proliferation, diversification and formalization of so-called “prepared core technologies” based on the principle of anticipated morphotechnical control over stone knapping products as well as different forms of technical “predetermination”, often with a notable “division of technical labor” among varying coexisting technologies.

This goes hand in hand with the development of (non-linear) production trajectories comprising “intermediate” products which in principle allow for the separation of blank (unmodified artefacts) and stone tool production chains. This phenomenon is for example signaled by erupting evidence for tool hafting at the end of the Middle Pleistocene, and paves the ground for task differentiation in both tools and tool users and thus the promulgation of “communities of practice” with new requirements for social coordination beyond the spatiotemporal horizon of the “here and now“. We propose that such developments have re-directed the communicative foci of hominins from the wider more-than-human world to their hominin peers. The development of taxing stone technologies such as “Levallois”, which depend on faithful horizontal and vertical transmission of technical knowledge and its cross-generational stabilization in the timeframe between 400 and 300,000 years ago has, consistent with this view, recently been interpreted as evidence for a new quality of hominin intergroup interaction and sociotechnical information exchange (MacDonald et al., 2021).

The Middle-to-Late Pleistocene transition (ca. 300-100,000 years ago) corresponds to the crystallization of new hominin behaviors linked to the collaborative stalking and intercepting of isolated large animals such as rhinos and bears or entire groups or even herds of animals such as horse or reindeer. The implicated hunting tactics have been argued to require planning and cooperation, and hence reliable intragroup communication, even though collective hunting is generally consistent with “language-free” explanations, as for example shown by lions, orcas and many other animals exerting cooperative foraging. Yet, it is notable that the Middle-to-Late Pleistocene interface is also linked to a mosaic of varying hominin taxa populating different landscapes, and possibly coexisting in some, providing a new context of “multispecies” interaction and communication (Wood & Boyle, 2016). That these different hominin forms at least occasionally encountered and interacted with each other is demonstrated by aDNA research

(Liu et al., 2021). This “pluralism” of hominin contexts and their overlap or intersection as well as the coercing climatic envelope of the developing Middle Pleistocene bringing about high-amplitude 100,000-year warm-cold cycles with often rapid transitions speaks to the dynamic and unsteady character of the associated communication ecologies, so that hominin extinctions and dislocations were probably not the exception (Hussain & Riede, 2020). The diverse physical anthropological record of Eastern Eurasia and Africa not only suggests amplified gene-culture coevolution but simultaneously points to novel and increasingly existential requirements of navigating landscapes frequented by other hominins, and to communicatively attend to them.

As hominins become more frequent on the landscape – starting perhaps as early as 100,000 years ago in some areas – and as they begin to increasingly rely on each other across vast geographic distances, communicative ecologies presumably change once more and communication transcends its sole information-conveyor service, developing into a medium of cultural signposting and identity-formation within interconnected human-concentrated worlds (Roberts, 2013). Anthropological and philological observations indicate that such communicative ecologies are prone to promote multi-linguality, and we may surmise that such conditions were in place at least since the Late Pleistocene. The Late Pleistocene (ca. 125-11,000 years ago), non-coincidentally, is associated with the emergence of forms of visual culture indicating a consequential role of material objects in grounding social memory and relaying storied worlds (Porr, 2010). The development of broadly delimited cultural geographies rooted in distinct artefact designs (lithic tools, personal ornaments, ochre and ostrich shell engravings) has traditionally been linked to this timeframe as well (Vanhaeren & d’Errico, 2006; Brooks et al., 2006; Ruebens, 2013; Tylén et al., 2020; Hussain & Will, 2021). At the end of the Pleistocene, stone artefact forms begin to enact group awareness and possibly embody what Wiessner (1983) has called “emblematic style”. Bow-and-arrow technology which, based on current knowledge, makes its first appearance in the archaeological record around 70,000 years ago has been argued to depend on complex technical knowledge and “delayed” problem-solving (Lombard & Haidle, 2012) and thus similarly supports the idea that both the contents and the contexts of hominin communication were subjected to transformative change in the Late Pleistocene.

We suggest it is no coincidence that such social learning-dependent technologies flourish in the context of “generalist” hominin niches which depart from earlier

carnivory-reliant hominin foraging strategies (Roberts & Steward, 2018; Ben-Dor et al., 2021). Such “niche broadening” at the end of the Pleistocene has important consequences for ecologies of communication since foragers rely on a deeper and broader vocabulary of places and resources, which promotes the development of differentiated zoo- and pythotaxonomies and has implications for the communicative needs of task allocation.

3. Conclusion: Non-Linearity, Interpretative Conservatism and an “Extended Short Chronology” of Language in the Hominin Lineage

Searching for the origins of human language in the archaeological and paleoanthropological records may be a futile exercise since it simply remains unclear what constitutes unambiguous evidence for language *vis-à-vis* merely indexical communication. Perhaps more importantly, the lines of evidence traditionally linked to language evolution are greatly staggered in time, rather than being correlated or chronologically “packed”, and thus suggest a gradual language *continuum* rooted in changing ecological conditions, rather than a set of mysterious hominin predispositions. The indirect archaeological evidence available is additionally patchy and thus generally supports a non-linear evolution of hominin communicative environments instead of a single context of language “origin”. Given these conditions, we pledge for interpretive conservatism and conclude that an “extended short chronology” for the evolution of language in the hominin lineage is currently best supported by the archaeological evidence (in sync with a prolonged period of “indexical” communication). We propose that this evolution is best understood as a form of “co-evolution”, and thus tied to key developments in multiple behavioral arenas and material registers such as hominin-animal interaction, technical behavior, artistic expression, and social life. Systematically mapping and exploring this broader “general ecology” of communicative needs, concerns and functions requires at least the integration of archaeology, ethology, linguistics, semiotics, and phenomenology. This coupled perspective makes room for variously emerging and collapsing ecologies of communication without losing sight for the general lines of development in hominin evolution. The result is a more realistic, yet intricate picture of human language evolution giving rise to an original compromise between radical “short” and “long” chronology renderings of language evolution.

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