The first words ever spoken

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Abstract

I argue that ontologies of words should engage with the emergence of lexical communication in the deep history of our line. It may seem that the evolutionary origins of words are orthogonal to the analytical project of establishing the defining features of wordhood, and that an adequate ontology of words requires nothing more than an observation of the properties of modern languages. I suggest instead that models of the initial stages of language evolution can offer valuable insights into the matter. There is consensus that lexical communication was an early achievement in the phylogeny of our language capacities, and that words became available to our ancestors before the maturation of other components of the grammar. At the beginning of their evolutionary trajectory, words are thus likely to have been significantly different from the vocabulary items of contemporary languages. Careful appreciation of such differences could be instrumental to a complete theory of the hallmarks of wordhood.

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1. Introduction

We are linguistic creatures. We vow, bond, make promises, coordinate with one another, express our desires, structure our thoughts, using words. Mundane as they may look in the haze of our everyday distractions, the invention of words is an extraordinary achievement in the history of our species – and a recent one. It is an extraordinary achievement because words provide us with a technology of communication which, barring an argument to the contrary, is nowhere to be found in the signaling repertoires of non-human animals, including those of our closest neighbors in the tree of life (i.e., non-human primates). And it is a recent achievement because no matter how far back in the past one chooses to position their emergence, and no matter how remote that event might seem relative to the ecological timescales of our lives, the appearance of words must have been preceded by a considerably longer history where our ancestors lacked the possibility of communicating through them.

In recent years, philosophers have become increasingly concerned with the ontology of words. Once an underappreciated subject, there is now consensus that stating an adequate ontology of words is both an interesting project in its own right, and an endeavor with multiple implications for adjacent work in philosophy and elsewhere.[1] Parties to the debate over the ontology of words rely on a shared methodological blueprint, nicely summed up by Miller (2020a). We begin by acknowledging that ordinary speakers talk and think of words as entities that are part of the furniture of reality. We then identify what set of characteristic properties ordinary speakers ascribe to such entities. Whatever they

[1] See, among others, Kaplan (1990; 2011), Cappelen (1999), Cappelen and Dever (2001), Alward (2005), Wetzel (2009), Hawthorne and Lepore (2011), Bromberger (2011), Gasparri (2016; 2021), Irmak (2019), Nefdt (2019), Miller (2020b; 2021), Juvshik (2021), and Stojnić (2022). For simplicity, I use "ontology of words" as an umbrella label for the combined project of providing a characterization of the metaphysical typology of words (whether words are concrete entities, abstract individuals, bundles of properties, or something else) and a characterization of their "ontology" in the strict sense of the term (e.g., assuming that words are individuals, whether they should be treated nominalistically, be viewed as spatio-temporally unbound denizens of a Fregean heaven, or something else).

are, words are entities we can create; they are entities we can externalize through speech and writing; they are entities that can change their meaning while retaining their numerical identity. Next, we combine ordinary parlance with the demands of sophisticated linguistic generalizations about words. Whatever they are, words must individuate interesting units of memorization in a mental lexicon; they must mark the highest level of detail visible to syntactic operations; they must be tagged with morphological features and participate in derivational processes (e.g., Di Sciullo and Williams 1987; Bromberger 2011). Finally, we turn to philosophical inquiry to determine what type of entity, if any, could possibly fulfill the conjunction of these roles, or a sufficient subset thereof.

This paper is inspired by a simple observation, and makes an equally straightforward suggestion. The observation is that the evolutionary origins of words are rarely considered in the debate over their ontology. The suggestion is that this gap should be filled. Ontologies of words would benefit from engaging with the emergence of lexical communication in the deep history of our line, and should incorporate evolutionary wisdom. In arguing this much, I will not counter the consensus that ontologies of words should be informed by ordinary intuitions about, and by linguistic work on, the lexical bricks of contemporary languages. I will argue, more conservatively, that ontologies of words should combine the evidential benchmark of modern languages with reflection on the properties that lexical communication had when languages were *not* fully formed, and words had just emerged from the modes of communication available to prelinguistic hominins.[2]

[2] For an analogous suggestion, see Munroe (2016) on the neglect of psycholinguistic evidence in the debate on word individuation. Also, I anticipate that a variant of points I will make could be generalized to lexical acquisition in children and to the emergence of new languages in groups of adults without a shared code for communication (e.g., the invention of pidgins). See Dennett (2017) for some exploratory suggestions in this vein. An in-depth analysis of the ontological lessons we may draw from these contexts would require another paper, but I will mention some connections as the argument unfolds. Thanks to a reviewer for encouraging me to announce this from the get-go.

The bulk of my argument will be metatheoretical. Rather than defending a comprehensive set of evolutionary takeaways about wordhood, I will primarily concentrate on why an attempt to do so would constitute a productive agenda, on the assumptions required to bring evolutionary insights to bear on the endeavor at hand, and on how these insights may complement or challenge the received approach. As we are about to see, the claim that ontologies of words should interface with work on the phylogeny of our language capacities raises a few tricky questions of relevance and method. I am not aware of other papers that have made this claim and addressed its potential pitfalls in comparable detail, so we will have to tread lightly and first make sure that the approach itself is pertinent and builds on plausible premises. The readers looking for a practical illustration of the fecundity of the approach, however, will not leave empty-handed. After laying the groundwork, I will put the approach in motion and pin down some immediate lessons we might draw from thinking about words from this particular angle.

The plan is as follows. Section 2 previews the relevance of the evolutionary origins of words to work on their ontology. Section 3 defends the interest of interfacing these two lines of research against complaints of change of topic and circularity. Section 4 gives a primer of the style of reasoning required to reconstruct the early stages of language evolution. Section 5 describes the competition between lexical and holistic models of protolanguage, and extracts from it three evolutionary takeaways about the hallmarks of wordhood. Section 6 concludes.

2. Times unlike the present

As I noted, ontologies of words tend to follow a three-step blueprint. Step one is to collect evidence about the properties ascribed to words in ordinary parlance. Step two is to add to the equation the properties attributed to words in linguistic research. Step three is to identify a bearer capable of instantiating the largest possible portion of that spectrum of properties. Overwhelmingly, the branches of linguistic research to which ontologists defer in step two of the process belong either to the large

family of synchronic theories of grammar and use (formal linguistics, experimental linguistics in its various flavors), or to the equally encompassing domain of diachronic work on language change. I will not delve into the specific contours of these approaches, nor into the commitments of their styles of explanation, both because the matter is tangential, and because it has been investigated by others (e.g., Egré 2015). However, these approaches have one feature in common: they focus on the grammatical dynamics (synchronic or diachronic) of evolutionarily mature languages. The tacit methodological agreement that fuels work on the ontology of words, then, appears to be that the conjunction of ordinary parlance with the evidence provided by mature languages, is a necessary and sufficient foothold for a theory of wordhood.

There are three immediate ways to press pause on this agreement: (a) denying the necessity claim of the first conjunct; (b) denying the necessity claim of the second conjunct; and (c) denying the sufficiency of their conjunction. That is: (a) denying that the vindication of lay parlance about words is necessary for an adequate ontology of words; (b) denying that the vindication of linguistic work on the vocabulary items of mature languages is necessary for an adequate ontology of words; and (c) denying that the vindication of lay parlance about words, and the vindication of linguistic work on the vocabulary items of mature languages, are jointly sufficient for an adequate ontology of words.

Move (a) entails that ontologies of words should be allowed to deviate massively from lay thought and talk about words. Move (b) entails that linguistic work on the vocabulary items of mature languages does not place (defeasible) constraints on what an ontology of words should look like. I will assume that neither of these moves is attractive. Thus, I will grant that ontologies of words should be informed by ordinary talk about words, and that they should be informed by linguistic work on the vocabularies of mature languages. The concession is not meant to obliterate the possibility of counterarguments against both claims. Perhaps ontologies of words should have a revisionary attitude towards lay word-talk because pre-theoretical intuitions about wordhood are scientifically

unserviceable. And perhaps we should be wary of the ontological commitments we seem in a position to derive from linguistic inquiry, so even if our best linguistic models establish that words (necessarily) bear some property P, the ontologist may not have to *ipso facto* accept that words (necessarily) bear P.[3] That said, I will grant the productivity of the heuristic. All else being equal, an ontology of words should vindicate as much as possible (and reasonable in light of defeating evidence) the conjunction of folk parlance and linguistic generalizations about the vocabulary items of mature languages.

Let us focus on (c) instead: the idea that the vindication of lay parlance about words, and the vindication of linguistic work on the vocabulary items of mature languages, are jointly sufficient for an ontology of words. A quick look at the literature should suffice to attest that ontologies of words have paid little attention to language evolution. The oversight may not be fortuitous. Historically, analytic philosophy of language has interfaced primarily with linguistic inquiry of generative descent, and "orthodox" generativists have long regarded the origins of language either under an aura of mysterianism, or as an issue falling outside the proper bounds of the scientific study of language (e.g., Chomsky 1988).[4] However, there are legitimate questions one can raise about whether systems like English, Swahili or Cantonese exhaust the data that an ontology of words should aspire to reflect. Suppose we grant that the words of modern languages do bear the rich array of formal properties linguistic inquiry ascribes them: syllable structure, grammatical class, theta roles, and so forth. Did words always bear these properties?

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[3] For some work on the complex relationship between grammatical and ontological theorizing, see Yalcin (2014; 2018), Ritchie (2016), Collins (2017), and Balcerak Jackson (2021). Cautionary recommendations in this vein have also been voiced by linguists. Anderson (1985: 9) famously warned linguists against being "misled in [their] ontology by the possibilities provided by [their] metalanguage".

[4] Some "non-orthodox" generativists subscribe in full to the generativist methodology in matters of grammatical analysis while distancing themselves from the Chomskyian positions on language evolution. See, e.g., Progovac (2015).

Jackendoff (2002), Fitch (2010) or Bickerton (2014), to name just a few, would not seem to concur. For instance, in discussing Piattelli-Palmarini's (2010: 160-161) claim that it is impossible to define words "in the absence of syntactic criteria", Bickerton (2014: 104-105) observes that it is unrealistic to think that words jumped out of the cauldron of evolution with the grammatical features they have in the languages of our evolutionary present. Instead, it is much more likely that our first words lacked the advanced functional traits of modern words, and acquired such features through the "numerous, successive, slight modifications" (Darwin 1852) common to all evolutionary processes. When, some million years ago,[5] lexical communication first set foot in hominin culture, its units probably resembled the words of early-stage pidgins: nouns without number, adjectives without declension, verbs without tense, and large pools of words whose very grammatical class, instead of being fixed offline as part of the standing resources of the idiom, was decided on the go in situated communication.[6]

Now, when we embark in philosophical projects seeking to determine the essence of some (natural) kind K, we tend not to consider our task accomplished if the generalizations we produce capture only a temporal slice of K. For instance, someone setting out to determine what makes an entity a living organism would hardly consider her task accomplished if her theory provided criteria for the individuation of living organisms between 0.5 mya and the present, but remained silent about the demarcation between life and non-life before the 0.5 mya threshold. In the pursuit of projects in this spirit, our goal is typically to establish a generalization about the kind that holds true of its entire temporal distribution. Ontologies of words are comparably ambitious, at least on paper. They are

[5] About 2 mya according to some estimates, which would situate the rise of lexical communication around the emergence of the *Homo erectus* in the Pleistocene. See Tallerman (2012) and Fitch (2017).

[6] On pidgins, see Parkvall (2020). See Pinker and Bloom (1990) for a *locus classicus* on the idea that language evolution through selection entails a continuum of systems with intermediate degrees of grammatical complexity and expressive power; and on the idea that pidgins, contact languages, Basic English, the language of children, tourists, and aphasics, all provide proof of such a continuum.

framed as enterprises seeking to reveal the essence of wordhood *simpliciter*, rather than the hallmarks of a temporal slice of the kind. Here is where language evolution becomes relevant. Evidence suggests that human signals satisfied early on several conditions for wordhood, even if they instantiated a number of otherwise unfamiliar properties, or failed to instantiate a number of familiar properties because the grammar was still a work in progress. If this is correct, ontologists should be wary of making generalizations based solely on the properties words have in mature languages, and should make sure that their claims about wordhood pass the test of the early history of the kind.

3. Two problems

I have concluded with a conditional ("if this is correct"). I did not add the caveat to be defensive or indulge in rhetorical restraint. I did because the reasoning, straightforward as it may sound, rests on two covert premises that we need to make explicit and defend. The first premise is that the evolutionary origins of words can be brought to bear on the debate over their ontology while preserving the subject matter of the debate. The second premise is that the move does not entail explanatory or descriptive circularity. Let me unpack the two premises, explain why one may be skeptical about them, and offer instead reasons to think they can be accepted.

First, the issue of subject matter. Ontological work on words is primarily motivated by a desire to illuminate the vocabulary items of contemporary languages. However, it is impossible to feed evolutionary considerations and pre-modern words into the debate while keeping it targeted at the words of contemporary languages. Thus, the invitation to consider the properties that words had in the early stages of their evolutionary trajectory cannot be presented as a vanilla plea for an expansion of the evidential benchmark of the debate. It must be presented as a revisionary plea for a renegotiation of what the debate is about. Now, there are good reasons to restrict ontologies of words to modern words. Not only they are *de facto* the core explanandum of this line of research, but broadening the subject

matter in the proposed direction could be overambitious, and render the playing field of the debate prone to instability. Therefore, if we accept that the core explanandum of an ontology of words are, and should be, the words of grammatically mature languages, the origins of words are just a red herring.

I believe this reservation has a limited strength. To begin with, while the words of mature languages are indeed the core explanandum of current ontologies of words, we are entitled to an open meta-ontological conversation about what, on top of what the debate *does* seek to capture, it *should* seek to capture. As was mentioned, I take it that most of the actors involved would readily concede that their efforts are aimed at revealing the foundations of wordhood *simpliciter*, rather than of some historically qualified form of wordhood (e.g., contemporary wordhood). Hence, at illuminating the kind in its generality rather than a temporal slice of the kind – slice which may have contingently recurrent properties which, however, are not truly definitional of the category. So even if the evolutionary proposal entailed a redefinition of the subject matter of the debate, the adjustment in play could be, instead of a dispensable diversion, a way of doing justice to the original ambitions of this line of work. Second, the proposition that the origins of words may have something to tell us about their ontology can be pursued even under the premise that ontologies of words should illuminate only the units of mature languages. Granting that the proper epistemic target of ontologies of words are the words of mature languages is consistent with the idea that the way contemporary words evolved could reveal surprising facts about their essence. We can stipulate (however controversially, in my opinion) that pre-modern words are not part of what an ontology of words should capture, and still ask ourselves what pre-modern words can contribute to an account of their contemporary successors.

Next, the issue of circularity. Suppose you are satisfied with the above on the hazards of changing the topic of the discussion. You may worry that evolutionary considerations can contribute to ontologies of words only by means of a *petitio principii* of some sort. Suppose, as seems plausible, that a system of communication can inform an ontology of words provided it contains words. It follows that

the systems of communication that preceded mature languages can inform ontologies of words provided they contained words. If so, we have two problems. First, the matter is debated. Some grant that late pre-modern communication did feature *words*, others appeal to the intermediate category of *protowords*, others advise caution (Everett 2017), or grant word-talk but warn that their use of the term *word* is informal and intuitive (e.g., Hurford 2007).[7] After all, the temptation to regard the signal types available to our hominin ancestors as words may rest on a fallacy of retrospective coronation (Dennett 1995). We know they led to words, and thus have a bias in favor of granting them *ex post* membership to the kind even if their intrinsic features would not justify the gesture. Second, assuming that a system can inform an ontology of words provided it contains words, how do we decide whether a system contains words? To establish whether a system contains words, we need an antecedent set of criteria for wordhood. But these criteria are precisely what we expect an ontology of words to establish. Thus, how are we to make any non-circular decision about whether some long gone system of communication can inform an ontology of words?

My response is that the objection rests on a spurious requirement. It is not the case that a system of communication can inform ontological work on words on condition that it (definitely) featured words. The processes that lead to the formation of a kind K can inform us about K even if at the occurrence of those processes K was not yet established. Similarly, early lexical communication can serve the ontologist even if we have reasons to refrain from regarding it as populated by instances of the kind that the ontologist is after – and, say, we adopt the conservative stance that protolanguages were not word-infused, or wish to remain agnostic about where to position the graded transition between the pre-

[7] I will not go into the force of the arguments behind these choices. For present purposes, let me just reiterate that a system cannot be prevented from featuring words simply because the grammatical phenotype of its units diverges from the grammatical phenotype of modern words, as everybody accepts that the cluster of signature properties of a kind may change over time.

word and the word. Furthermore, I see no reason to think that classificatory uncertainty about the units of pre-modern communication should discourage the ontologist from paying attention to evolutionary topics. Quite the opposite. The specter of circularity disguises the possibility of a virtuous cross-disciplinary feedback loop, from evolutionary linguistics to philosophy and back. On the one hand, surveying the parallels and non-parallels between the units of early protolanguages and modern words can help ontologists refine their checklists of the essential characteristics of the kind. On the other hand, evolutionary linguists can harness the results of the exercise to screen their conceptual choices in the description of hominin semiosis, and further fine-tune their terminological policy for reference to the constituents of prelinguistic and protolinguistic communication.

4. The protolinguist's toolkit

So far, so good. If an ontology of words is supposed to identify the set C of signature characteristics of words; and if the evolutionary history of words can inform the definition of C; then the evolutionary history of words can inform work on their ontology in at least two senses. First, we can use it to determine whether some of the properties words bear in mature languages define the kind or boil down to a contingent regularity, and, if the latter, remove those properties from C. Second, we can mine the deep history of words to add new items to C. Assuming a reasonably stable picture of hominin signals, we can reconstruct what was added to this baseline as language evolution advanced; thus the features that human semiosis had to gain to transition towards contemporary languages; and thus the properties words had to acquire to differentiate themselves from previous signaling technologies. But how are we to formulate hypotheses about the deep history of words in the first place?

Reverse-engineering will not do the job, at least not alone. We cannot begin with a snapshot of the end product of the transition and draw conclusions about its intermediate stages based solely on armchair reasoning (Tomasello 1999). Granted, the observable properties of contemporary words and

the dynamics of lexical change found in the most recent chapters of our linguistic history (say, the development of Romance languages from Latin) can teach us a lot about the origins of words. However, as is generally the case with evolutionary processes, we cannot divine the junctures of the plot through top-down reasoning alone. Instead, we must reason in a bottom-up fashion. We must fix the starting point of the trajectory, which we can do by observing the communicative behaviors of non-human primates. We must combine this with archaeological and fossil evidence to build models of the lifeways of ancient hominins, and infer the signaling capacities needed to sustain them. Finally, we must identify the selective pressures operating on those lifeways, and posit successive changes in technologies of communication that at each step are likely to have conferred our ancestors some adaptive advantage (Laland 2017).

Planer and Sterelny (2021) provide a helpful illustration of this approach. For instance, at a certain point in the evolution of our line, we domesticated fire. The domestication of fire required the transmission of knowledge about combustion and led to an increased budget of opportunities for social interaction at night, both of which are likely to have stimulated non-ostensive communication about objects and situations removed in time and space. Fire allowed our ancestors to cook, which aided the development of a vocal morphology adaptable to the production of complex vocalizations. While chimpanzees and orangutans spend several hours per day chewing, and must maintain a morphology suited to this, the decrease in feeding times brought about by the consumption of processed foods freed the vocal tract for the articulation of increasingly diversified speech sounds. The emergence of technical skills for tool manufacture presupposes trial-and-error learning, a capacity to perform complex motor sequences, and social learning, all of which may have selected for the improved hierarchical memory and executive control capacities that kickstarted syntax. The same goes for the intensified demands of social cooperation (and the ever more elaborate sender-receiver interactions this required) brought about by the development of big-game hunting and delayed-return cooperation

(giving *x* at *t* in return for *x* or some *y* some time after *t*), which introduced the need to track the reputation of transaction parties. In sum, we can use great ape behavior and the archaeological record to recreate the lifeways of past hominins, establish the communication requirements of those lifeways, and on that basis form hypotheses about the way our ancestors advanced from pre-language to language, and "from calls to words" (Sterelny 2016).

Of course, there is disagreement about how exactly the transition between the pre-word and the word unfolded, just as there is disagreement about language evolution in general. Think of the split between gradualist (Jackendoff 1999) and saltationist (Bickerton 1998) accounts of the emergence of syntax; the clash between models on which the primary force behind language evolution was selection, and those on which it was domestication (Cloud 2014); the rivalry between views on which language was kickstarted by enhanced combinatorial skills, those on which a sudden major leap in metarepresentational abilities did most of the weightlifting, and those appealing to a smaller initial advancement in theory of mind capacities enhanced over successive generations via cultural evolution (Scott-Phillips 2015; Moore 2021). However, there is broad consensus on one idea which is crucial for present purposes: the idea that the transition from calls to words occurred *early* in language evolution, and that systems of communication with units paralleling in key respects the words of modern languages were available to our ancestors before other aspects of the grammar reached the maturity they demonstrate today.[8] The historical path from primate signals to mature languages passed through the emergence of a system with a learned lexicon of meaningful units with impoverished grammatical

[8] I speak of broad consensus because the idea is shared by a diverse group of scholars with opposing views about other aspects of language evolution. See, among others, Lieberman (1984), Givón (1995), Jackendoff (2002), Tallerman (2005), MacNeilage (2008), Tomasello (2008), Fitch (2010), Hurford (2008; 2011), Gibson and Tallerman (2012), Bickerton (2014), and Planer and Sterelny (2021). The exceptions belong mostly, and unsurprisingly, to the camp of the hard-line Chomskyians. See, e.g., Berwick and Chomsky's (2016: 72) claim that Strong Minimalism leaves "no room [...] for any precursors to language – say a language-like system with only short sentences".

features. These meaningful units grew into the vocabulary items of modern languages through subsequent processes of optimization and enrichment. Using the methods above, we can reconstruct the properties of these early units, reflect on how they differentiated themselves from previous signals, and dig for clues to what it takes for something to be a word.

At this point, a skeptic may interject that the reasoning is legitimate in principle but guilty of an excess of optimism, since the reliability of the operation hinges on how confident we can be about the properties of those long gone stages in the evolution of our communication capacities. Accounts of the transition from primate communication to language are in their infancy and, as I acknowledged, disagree on several points. Some have gone so far as to express doubts that substantial progress in our understanding of the origins of language will ever be possible (e.g., Hauser et al. 2014), not least because of the common adage that languages, unlike organisms, do not fossilize, and hence that claims about their deep history can only be made via inferences on indirect evidence. Compared to disciplines like psycholinguistics, models of language evolution may be doomed to remain speculative. And even if they were not, they have not reached the state that would warrant leaning on them in the pursuit of neighboring inquiries. So do we really stand to gain anything reliable by interfacing ontological work with this line of research?

Without underestimating the complexity of the exercise, I believe we do. Prominent voices in the debate like Fitch (2017) have argued that theories of language evolution are actually in a privileged position by comparison to disciplines which would warrant similar concerns of evidential obliqueness, and yet which we consider sound lines of inquiry (say, the physics of the early universe). Linguistics is giving us an ever clearer picture of the end point of the evolutionary path at issue (contemporary languages), we can fix its starting point though the comparative study of primate behavior, and we can formulate testable hypotheses about what happened in between. Along the way, progress has been made, and more will come. Besides, while there is still a lot we do not know about language evolution,

and while there are competing accounts of the origins of words on the market, the parties to the debate do share, in spite of their divergences, a few key assumptions about the differentiation between calls and words. So although caution is advised, searching those junctures of agreement for fresh inputs for an ontology of words is an exercise that can be carried out within reasonable desiderata of epistemic safety. To see what all this means in practice, let us turn to an application.

5. Words in search of a grammar

Now for a practical illustration of how language evolution may inform a theory of wordhood. There is no scarcity of possible angles. For instance, most animal signals are about the here and now: they alert to the presence of a predator, they threat a competitor, they advertise the signaler's fitness as a prospective mating partner. One turning point in language evolution was the "release from proximity" (Gamble 1998) generated by the emergence of displaced reference. Is the capacity to signify entities removed in time or space a necessary condition for a signal type to qualify as a word?[9] Likewise, primate call repertoires are largely fixed and resist cultural modification. By contrast, human speakers can invent new words, alter the form of existing words, or change the meanings associated with the forms available in their lexicon. Is it necessary for a signal type to exhibit similar forms of alternative arbitrariness or optionality (Planer and Kalkman 2021; Gasparri et al. 2022; Watson et al. 2022) to

[9] Bickerton (2009) offers statements of sympathy for the requirement, but its prospects are unclear. First, the requirement cannot be general. Functors like articles and adpositions are not referential, but they are words nonetheless. Second, the requirement may mischaracterize displaced reference as a property of words while it is, in fact, a user-level capacity. Suppose John is an English speaker with normal linguistic abilities. Further, suppose an evil deity strips John of the capacity to talk about displaced objects. Despite the incident, John would still be able, at least *prima facie*, to produce word-infused declarative utterances about his immediate surroundings. Say, utter "The leaves of the tree are red" while standing in front of a tree with red leaves. For a similar point, see Nevins, Pesetsky and Rodrigues (2009) in response to Everett (2005) over the inexistence of displaced reference in Pirahã.

constitute a word? Each of these questions could lead to valuable developments, but here I will experiment with a different application. I will introduce, following Tallerman (2012), the competition between lexical and holistic models of protolanguage, observe that these models tap into some shared assumptions about the differentiation between calls and words, and extract from their overlap three evolutionary inspired suggestions about the hallmarks of wordhood.

So, most models accept that the trajectory between primate communication and mature languages passed through the emergence of an intermediate system often referred to as a "protolanguage". According to one account, which we can call the Lexical Protolanguage Hypothesis (LPH for brevity), the earliest hominin protolanguage was *lexical*: it featured a vocabulary of semiotic units carrying out noun-like and verb-like semantic functions (e.g., Heine and Kuteva 2007; Bickerton 2009; Progovac 2015). These units did not fit into a structured inferential network with relations of sense subordination and hyperonymy. They lacked the selectional features of present-day vocabulary items, such as a clear argument structure. They were uttered either in isolation (like *hello*, *ouch*, or *wow*) or in two-place sequences without a recursive hierarchical structure.[10] They also lacked the segmental features of modern words. They did not concatenate minimal sound units, were not divided into syllables, and did not have a regular prosody. Dual patterning and the digitization into phonemes and syllables were later adaptations driven by the expansion of the system. Put simply, as more and more of these protolanguage units came into existence, they crowded speech space, and our ancestors had to introduce segment-specific contrasts to tell them apart while maintaining reasonable production costs.[11] These differences notwithstanding, the units of LPH paralleled the words of modern languages in other

[10] For example, Progovac (2015) proposes an incremental account with an initial system of lexical units that advances towards the grammatical complexity of modern languages in four main steps: i) single-word utterances; ii) two-word combinations stringed together by a non-recursive antecedent of Merge; iii) proto-coordination with linkers marking predicate-argument relations; iv) full-fledged recursion.

fundamental respects: they were discrete symbols for verb-like or noun-like meanings, which could be stringed together in larger utterances, and which grew into more complex grammatical creatures with the development of other aspects of the language faculty.[12]

According to a competing account, which we can call the Holistic Protolanguage Hypothesis (HPH for brevity), the earliest protolanguage appeared after primate calls was *holistic* (e.g., Wray 2002; Arbib 2005; Mithen 2005). The main claims of HPH are as follows. First, protolanguage began as a "pushmi-pullyu" system, in Millikan's (2005) sense. Its utterances conveyed multiple pieces of content, entire propositions, or multiple propositions at once, and were not structured in parts that mapped onto specific components of the conveyed message. For instance, they transmitted at once information about a salient property of the environment fused with information about a desired response from the receiver, and the signal was not functionally, nor temporally, segregated into parts or stages each specifically tasked with the transmission of either of these pieces of content. Second, the system was such that whole utterances marked the minimal unit of production and comprehension. Instead of combining discrete units that could possibly be uttered in isolation, protolanguage utterances were unstructured signals without internal break-points which could only be traded as wholes in communicative transactions. For HPH, the earliest protolanguage consisted therefore of an inventory of all-or-none holistic utterances which did not feature anything one can reasonably call "words". If anything like the signal types of a LPH-like protolanguage emerged at all before the system structured itself into units that could later grow into grammatically complex words, for HPH this event had to be preceded by the emergence of a holistic repertoire.

[11] See Schaden and Patin (2018) for some discussion. For an example of a live language following this developmental trajectory, see the Al-Sayyid Bedouin Sign Language described by Sandler et al. (2011).

[12] In so doing, they presumably also gained in semantic definiteness. Although vagueness, indeterminacy and ambiguity are ubiquitous in modern vocabularies, we have every reason to think they were even more pervasive in the early stages of lexical communication. Thanks to a reviewer for pressing me to make this explicit.

The jury is out on the competition between LPH and HPH. For some of its proponents, HPH is attractive because it regards protolinguistic communication as an incremental adaptation that preserves the holistic attributes of primate vocalizations.[13] But this supposed advantage entails collateral costs, which supporters of LPH are quick to point out (e.g., Tallerman 2007). For instance, the supporter of HPH owes us an explanation as to how the discrete lexical repertoires of mature languages may have emerged, or may emerge at all from a principled standpoint, from the utterances posited by HPH. For the fractionation of a continuous utterance to take place, the utterance at stake must be such that it can be cognitively and perceptually broken down into parts fit to be elevated to the rank of lexical constituents. But if protolanguage utterances were production simples like, say, shrieks of fear, they could not possibly take part to any such fractionation process.

For present purposes, we do not have to settle the dispute. We can instead note that irrespective of whether protolanguage started in an LPH-like fashion right off the bat, or began in an HPH-like fashion first to give rise to a lexical technology later, the two sides appear to agree on three underlying ideas. First, it is only at the stage where holism is lifted that it makes sense to speak of a lexical protolanguage and consider filing a signal type under the notion of word or protoword. Second, evidence of morphosyntactic complexity is not necessary to commit to the existence of lexical units in a repertoire of signals. Third, the segmental properties characteristic of modern words items were created through a process of digitization whose inception postdated, both historically and logically, the emergence of the units it modified.

[13] Though I am merely reporting the argument, I should mention that the emphasis on continuity is harder to convert into a supporting factor within accounts on which gestural communication was the first major locus of innovation in language evolution. If vocal communication was refined due to the prior development of more complex forms of gestural signaling which then restructured call production, it would make perfect sense for protolinguistic communication in the vocal modality to mark from the outset a stark discontinuity with primate calls. The complication is orthogonal to the point I am trying to make, but thanks to a reviewer for pointing out it deserved mentioning.

This gives us three potential takeaways for an ontology of words. First, words are necessarily non-holistic. A unit of communication cannot be regarded as a genuine word unless it contributes something more demanding than pushmi-pullyu contents, and it can be assembled with similar units to form discrete strings of signal types, each mapped onto an insulable component of the conveyed message. This is not to say that words cannot be used in a holistic or quasi-holistic fashion, as, for instance, children do in the holophrastic stage of language acquisition.[14] It is also not to say that words cannot be uttered in isolation (e.g., "Rise!"). Nor is it to say that utterance elements that are normally holistic cannot be occasionally recruited by a developed grammar to play word-like roles (e.g., "Paul thought he had a good argument but his pitch was [*ironic shriek of fear*]"). The suggestion is rather that for a signal type S to qualify as a word, S must be standingly associated with a semantic meaning that can feed into larger compositional strings (rather than with a whole proposition blending several sub-propositional meanings, or with blends of propositions), and can, though it may not, operate as a discrete unit of production and comprehension within strings of similar signal types.

Second, wordhood does not entail the instantiation of the rich array of combinatorial properties found in the vocabularies of mature languages. Most ontologies of words assume, with reason, that they should vindicate the premise that words bear advanced morphosyntactic features. But the matter at this point is more complex. Words in mature languages do bear advanced morphosyntactic features. However, if the above points us in the right direction, advanced morphosyntactic tagging does not fix a requirement for wordhood. It may demarcate a feature that words acquired after instances of the kind had already emerged in language evolution. Note that this is consistent with what was said earlier about the ban on holism, where the suggestion was that in order for a unit of communication to be viably characterized as a word, it must be fit for compositional combination in strings of units mapping onto

[14] The stage where children produce one-word utterances to convey, e.g., blends of declarative and imperative content. Think of a child presented with a toy truck, and uttering "Truck!" to mean "That is a truck; give it to me".

specific parts of the conveyed message. The requirement is agnostic about manner of combination, and can be met by items whose rudimentary morphosyntactic features prevent them from fulfilling the intrasentential roles of modern words. Picture a system of protowords with no morphology and a flat syntax that can only combine its vocabulary items in two-place strings whose overall meaning is fixed by bare co-occurrence. For instance, a fictional protolanguage where a noun-like word *x* means *my neighbour*, where *y* is a verb-like word without inflection meaning *jump*, and where the proposition *my neighbour jumps* can be arbitrarily expressed by *x-y* and *y-x*. A system of this sort would be non-holistic despite its morphosyntactic primitiveness.

Finally, words are not necessarily composed of the concatenation of reusable sound segments. If the dominant hypothesis about the digitization of lexical communication is correct, an idiom can have a vocabulary of meaningful words even if it does not have a completely formed phonology, and therefore does not differentiate the units of its lexicon by appealing to the mechanisms of phonological contrast familiar to contemporary languages. Modern words divide up into smaller, reusable sound segments, but the digitization of ancient lexical items did not create words. It changed them. And it did so to provide a way of managing lexical contrast at a stage where protolanguage words had crowded speech space enough to make whole-unit differentiation inefficient. It is again helpful to situate this claim within the opposition to holism and the related emphasis on the capacity to take part in larger utterances incorporating distinct lexical parts. Combining the two, we can propose the generalization that a signal type S can qualify as a word on condition that S has external segmental boundaries allowing it to operate as a lexical chunk within an utterance, regardless of whether S is also internally digitized. On the internal front, we could further set the requirement that in order to be considered a word, S must feature perceptible transitions that can be promoted to the rank of segmental boundaries and be exploited by a phonological grammar to create contrastive patterns among minimal sound units, or serve as loci for the distribution of stress and tone patterns.

6. Conclusion

The paper has proceeded as follows. Section 1 introduced the debate over the ontology of words and announced the goal of the discussion: making a case that ontologies of words should engage with the emergence of lexical communication in the deep history of our line. Section 2 previewed the relevance of the origins of words to work on their ontology. Section 3 defended the interest of interfacing these two lines of work against complaints of change of topic and circularity. In particular, I argued that evolutionary considerations are consistent with the preservation of the subject matter of ontologies of words, and can inform ontological inquiry irrespective of one's antecedent beliefs about the transition between the pre-word and the word. Section 4 said more about the methods and the evidence guiding work on the origins of language, and defended the cross-disciplinary usability of the outputs of the field in the face of complaints of epistemic obliqueness and instability. Section 5 introduced the competition between lexical and holistic models of protolanguage, identified their overlap, and suggested three takeaways: the idea that words are necessarily non-holistic; the idea that wordhood is consistent with minimal morphosyntactic complexity; and the idea that a signal type may qualify as a word even in the absence of internal digitization.

If the transition between the pre-word and the word was such a critical milestone in the rise of language, and such a pivotal event in the becoming of our species, it would be strange if reflection on how this transition unfolded had nothing to teach us about about the nature of words, and possibly about language ontology more generally. I hope to have made a sufficient case that conceptual work on wordhood can benefit from paying closer attention to language evolution. Besides continuing to mine evolutionary research for new constraints on wordhood (or absence thereof), another development could be to reflect on the contributions of the exercise to related lines of debate outside ontology, such as theories of primate communication. For instance, there is evidence that some chimpanzee gestures

have stable, non-pushmi-pullyu semantic features which make them suitable to combination into larger compositional strings, even though these gestures are rarely compositionally combined in practice (Rivas 2005; Hobaiter and Byrne 2011; 2014).[15] So there is an argument that some chimpanzee gesture satisfy the constraint on wordhood marked by the lift of holism. We are still far from a claim of sufficiency, but it is conceivable that as we pursue this reflection further, our commitments may force us to grant the existence of "gestural words" in chimpanzee repertoires, and perhaps in the repertoires of other primates. If wordhood can obtain in the absence of the grammatical phenotype of modern vocabulary items, it only makes sense that we should be prepared to allow for instances of the kind in surprising domains. Once again, this paper has been a first step. But I hope it will nudge some readers into the thought that reflection on the origins of words can yield valuable developments in and outside philosophy, and that as we try to uncover what makes words the unique technology of communication they are, we should not feel comfortable ignoring where they came from.

[15] Thanks to Richard Moore for suggesting this.

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