Language Sciences xxx (2014) 1–8

Contents lists available at ScienceDirect

Language Sciences

journal homepage: www.elsevier.com/locate/langsci

An evolutionary context for the emergence of language

Ian Tattersall*

Division of Anthropology, American Museum of Natural History, New York, NY 10024, USA

ARTICLE INFO

Article history:
Available online xxx

Keywords:
Human evolution
Language
Symbolic cognition
Evolutionary process

ABSTRACT

Modern human beings process information symbolically, rearranging mental symbols according to rules to envision multiple potential realities. They also express the ideas they form using structured articulate language. No other living creature does either of these things, reflecting a qualitative cognitive gulf between modern *Homo sapiens* and all the other species – including their own closest living relatives – that compose the Great Tree of Life. Yet it is evident that we are descended from a non-symbolic and non-linguistic ancestor. How did this astonishing transformation occur? Scrutiny of the fossil and archaeological records suggests that the transition to symbolic reasoning happened very late in hominid history – indeed, within the tenure of anatomically recognizable *Homo sapiens*. It was evidently not simply a passive result of the increase in brain size that typified multiple lineages of the genus *Homo* over the Pleistocene. I thus propose that a brain exaptively capable of complex symbolic manipulation and Universal Grammar was acquired as a byproduct of the major developmental reorganization that gave rise to the anatomically distinctive species *H. sapiens*, and that this new capacity was later recruited through the action of a cultural stimulus. In evolutionary terms this would have been a rather routine happening: after all, structures must necessarily be in place before they can be used for new purposes. Given the intimate interdependence of modern cognition and language – both are intrinsically symbolic activities – the most plausible cultural trigger for symbolic thought processes was the invention of language in an African isolate of *H. sapiens* at (very approximately) 100,000 years ago. I enumerate several advantages that language has in this role relative to other putative stimuli such as theory of mind.

There can be no doubt that we living *Homo sapiens* are fully integrated into the great Tree of Life that unites all living organisms on this planet. But it is nonetheless intuitively obvious that we are not simply another run-of-the mill primate. There *is* something qualitatively unique about us, or at least about the way in which we process information in our minds. Human beings think symbolically, categorizing the exterior and interior worlds into a vocabulary of discrete mental symbols that can be rearranged to produce alternate perspectives, and to envision new possibilities. We also use structured articulate language to express, to communicate, and at least in part to generate such ideas. As far as can be told, no other organism does any of this. Of course, among primates and other vertebrates vocal communication can be very complex indeed, especially when supplemented by gestures and "body language." But all the other denizens of the Tree of Life – including even very close human relatives, such as chimpanzees and bonobos – at best deal with symbols in a simple additive manner. They do not engender multiple alternatives by rearranging those symbols according to the rules, encoded at the murky interface between the brain and behavior, that we refer to as Universal Grammar.

* Tel.: +1 212 769 5877; fax: +1 212 769 5334.
E-mail address: iant@amnh.org.

http://dx.doi.org/10.1016/j.langsci.2014.06.011
0388-0001/

Please cite this article in press as: Tattersall, I., An evolutionary context for the emergence of language, *Language Sciences* (2014), http://dx.doi.org/10.1016/j.langsci.2014.06.011

As a result there is a narrow but hugely significant gulf between the cognitive styles of human beings and all other organisms. Yet there can be no rational doubt that our symbolic, linguistic species was descended from an ancestor that was neither. At some point in our evolution, that symbolic and linguistic gulf must have been bridged. Or was it only a single gulf? Could language actually have existed without symbolic thought, or vice versa? Here we have the familiar problem of understanding the unique. All normally-functioning modern humans have both symbolic thought and language, while even their closest living relatives, along with all twenty million other organisms on the planet, have neither. So in the modern world, symbolic reasoning and language are clearly associated, if only in our single peculiar species. But need the two have been associated among earlier hominids, species now extinct but much more closely related to us than anything alive today? In other words, if the drama of human evolutionary history turned at least in part on the transition from an ancestral non-symbolic and non-linguistic condition to a symbolic and linguistic one, then might historical clues exist as to whether or not these two singular features are indeed indissolubly linked? Might it be possible to trace their connection or disconnection in the historical record?

It turns out that this is not easy. The hominid family to which *Homo sapiens* belongs has a long biological history that is recounted through a fossil record that is more abundant and diverse than often appreciated. Still, even where they consist of complete crania preserving brain size and external morphology, mineralized bones have proven to be hugely limited in what they can tell us about past cognition. Symbolic information processing turns out not to be correlated in any useful way with brain mass, while the paleoneurologists who study fossil endocranial casts can find little to agree on in preserved external brain morphology (Holloway et al., 2004; Falk, 2004). Similarly, while the fossil record does contain tangible if spotty evidence of the presence or absence of bony conformations that are (arguably or otherwise) associated with modern speech (e.g. Laitman et al., 1979; Lieberman and McCarthy, 1999), it remains true that the anatomical potential to produce speech is far from synonymous with the possession of structured language. This is also the case with the physical ability to hear sounds that lie within the frequency range of modern speech (Martinez et al., 2012).

It is thus fortunate that over the past 2.5 million years (myr) or so the hominid fossil record is supplemented by an archaeological record that stores information about past hominid behaviors. For the Pleistocene epoch over which our genus *Homo* evolved (roughly, the past two million years), that behavioral register consists for the most part of stone tools and butchered animal bones, and of the ways in which these are spatially disposed at occupation sites. Disappointingly, though, none of these elements serves as an adequate proxy for any specific cognitive condition, although in the aggregate they may be indicative of general complexities of lifestyle. What is more, scientists in different disciplines, and even within the same one, have differed wildly in their willingness to accept various archaeological proxies for the more specific features of language and symbolic thought.

Thus, adopting a hugely selectionist outlook, evolutionary psychologists suppose that hominids gradually accumulated their linguistic abilities in a feedback process between brain and behavior that spanned the entire two million years of the Pleistocene epoch (Tooby and Cosmides, 2000) over which hominid brains on average enlarged with time. Paleoanthropologists have differed in their views on this matter, but several influential voices have similarly favored an early origin of language in some form (Tobias, 1991; Holloway et al., 2004), and neurobiologists such as Terrence Deacon (1997) have concurred. Based on their reading of the archaeological evidence, McBrearty and Brooks (2000) envisaged the gradual emergence of "modern" behaviors, but over a shorter stretch of time, namely the last half-million or so years of the Pleistocene.

In contrast to such gradualist scenarios, some linguists have advocated a recent "big bang" appearance of language. Derek Bickerton, for one, believes that "true language, via the emergence of syntax, was a catastrophic event, occurring within the first few generations of *Homo sapiens sapiens*" (Bickerton, 1995: 69). Many archaeologists, among them Henshilwood et al. (2002), Marean et al. (2007), and Richard Klein (Klein and Edgar, 2002) perceive in varying ways a rather abrupt appearance of "modern" behavior patterns in the Late Middle and Late Pleistocene, roughly the last 200 thousand years (kyr). So does the geneticist Tim Crow (2002), who has strongly argued that the anatomically and cognitively distinctive species *H. sapiens*, and all of its peculiarities including language, arose in a single recent genomic event.

This vast range of opinion exists, of course, because language is an intangible quality that does not directly preserve in any known record. Neither is it closely correlated with anything that does. For the greater part of the Pleistocene archaeological record symbolic thought is hardly any easier, because the nature of the evidence obliges us to make very indirect inferences about all behaviors except explicitly technological ones. And I would argue that, while many Paleolithic stone-working techniques are certainly witness to very sophisticated cognitive states, few if any can be used alone to infer a specifically modern human symbolic cognitive style (Tattersall, 2008a, 2012). Indeed, apart from multi-stage technological sequences that requiring extensive planning and recursive reasoning inputs, it seems justifiable to conclude that only explicitly symbolic artifacts can reliably be used as proxies for symbolic thought processes on the part of their makers.

Of course, opinions differ as to what can or cannot be considered a symbolic artifact. Can a roughly-altered lump of stone that looks to a modern person like a vague representation of something be considered symbolic? Was a gastropod shell presumptively pierced for stringing necessarily part of a symbolic ornamentation system? Does the presence of ground ochre in archaeological deposits imply the intention to use it for purposes of symbolic bodily decoration? There will always be difficult cases like these. But other early expressions were more overtly symbolic. Thus, virtually all observers can agree that the engraving of geometrical designs implies a modern thinking style on the part of the engraver, and the production of realistic representations or the repetitive elements of a notational system are clear evidence of such thought processes.

Please cite this article in press as: Tattersall, I., An evolutionary context for the emergence of language, *Language Sciences* (2014), http://dx.doi.org/10.1016/j.langsci.2014.06.011