

WHAT DO MODERN BEHAVIORS IN HOMO SAPIENS IMPLY FOR THE EVOLUTION OF LANGUAGE?

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The emergence of modern cultural behaviors in *Homo sapiens* 150,000-50,000 years ago is often explained by a change in the faculty of language, such as the development of recursive syntax or autonomous speech. In this paper, I argue that the link between modern sapiens behaviors and language evolution has never been made convincingly and that a change in the faculty of language can hardly account for the whole range of new behaviors that appear with *Homo sapiens*. I propose that the domain-general cognitive ability that psychologists call level-2 perspective-taking — an ability closely related to higher theory of mind and metalinguistic awareness — is more parsimonious in explaining modern sapiens behaviors.

1. Introduction

In the archeological record, the emergence of “symbolic artifacts” – such as the abstract engravings and marine shell beads found in the Blombos Cave in South Africa – are universally taken as evidence of modern cognition and language in the human lineage (McBrearty & Brooks 2000; Klein & Edgar 2002; Henshilwood & Marean 2003; d’Errico et al. 2003). In the literature on the evolution of language, influential accounts have connected the emergence of symbolic artifacts with a change in the faculty of language (Bickerton 2003; Corballis 2004).

The most important argument in favor of this thesis was the discovery that a mutation of the FOXP2 gene occurred during the last 200,000 years, which is consistent with the emergence of anatomically and behaviorally modern humans (Enard et al. 2002). Dysfunction of the FOXP2 gene in modern humans is associated with the underactivation of the Broca area, where the mirror neurons are located, and with a deficit in motor control during speech. From this point of view, modern sapiens behavior was caused by a mutation of the FOXP2 gene that allowed the development of autonomous speech (Corballis 2004) or that facilitated the iterative productivity of language (Lieberman 2005).

However interesting, the hypothesis has been recently invalidated by genetic

studies that revealed that the alleged FOXP2 mutation was also present in Neanderthals and, most probably, shared with their common ancestor with modern humans 400,000 or 300,000 years ago (Krause et al. 2007). The idea that a deficit in speech production explains the behavioral gap between Neanderthals and modern *Homo sapiens* has now lost its main support.

The debate on the foundation of modern behaviors in *Homo sapiens* is thus reopened. On the one hand, the change was so sudden and fundamental that it leaves little room for hypotheses that do not include any biological or cognitive factor (Klein & Edgar 2002). On the other hand, no anatomic or genetic changes support the link between the faculty of language and modern sapiens behaviors.

In this paper, I challenge the idea that a change in the faculty of language caused the emergence of modern sapiens behaviors. I make three points. First, at the conceptual level, I argue that the link between the use of symbols in the archeological record and the evolution of the faculty of language has never been made convincingly. Second, I point out that modern sapiens behaviors include many traits that are not clearly related to language or communication. Third, I propose a domain general cognitive framework that is realistic at the neuropsychological level and that connects specific behavioral traits more precisely with cognitive abilities.

2. Modern behaviors and language evolution: the link is still missing

The conceptual link between the presence of symbols in material culture and the faculty of language is intuitive in many respects. Is not language firstly about manipulating symbols? Under closer examination, however, the link is not so obvious. First, symbolic reference itself – the very capacity to use arbitrary signs to refer to things in the world – is not so difficult. Trained apes are able to manipulate symbols, while young children begin to refer symbolically to things at around 12 months and understand that every object has a name (the “naming insight”) at about 18 months of age. There is no question, however, that neither is able to produce symbolic artifacts. It is precisely the ease with which apes and toddlers master symbolic reference that brought many scholars to posit an early emergence of protolanguage in the human lineage — in *Homo erectus sensu lato* — and to adopt a view of language evolution centered either on syntax (Bickerton 2003) or autonomous speech production (Corballis 2004). Nevertheless, the link between recursive syntax, autonomous speech and the manipulation of symbolic artifacts has always been taken for granted and there is no obvious reason as to why the use of such symbols in material culture would depend on recursive syntax or autonomous speech (Bouchard p. c.).

The link between symbolic artifacts and the faculty of language is weak for

a second reason, related to the nature of the archeological evidence. The most uncontroversial evidence of symbolic behaviors today are the abstract engravings and marine shell beads found in the Blombos Cave in South Africa (ca. 77 - 73 ka). The difficulty is that there is no way to prove that beads and engravings were actually used “symbolically”, as they did not necessarily stand for something else (Wynn & Coolidge 2007). There is no *a priori* reason to exclude the possibility that beads and engravings were firstly decorative rather than symbolic.

3. Modern sapiens behaviors are not all symbolic

Another argument that weakens the connection between modern sapiens behavior and the evolution of the faculty of language is that symbolic artifacts coincide in the archaeological record with many other original behavioral traits that bear no direct symbolic or communicational component. The archaeology of the Middle Stone Age in Africa is still poorly known (especially compared with Middle Paleolithic in Europe), but it is clearly during this period that we find the first evidence of long-distance exchange, structured living spaces, formal and standardized bone and stone tools, as well as regional styles in material culture (McBrearty & Brooks 2000). The increasing pace of cultural innovation has been ascribed to the “cumulative aspect” of modern culture in humans (Tomasello 1999; Richerson & Boyd 2005).

The originality of modern behaviors is particularly salient by 85,000BP in South Africa, where the Still Bay and the Howiesoons Poort industries can be described as an “African Upper Paleolithic” (Henshilwood in press). Most of modern behaviors, however, are not noticeably symbolic or communicative (Henshilwood & Marean 2003; Chase 2006). In Blombos, for instance, engraved ochres and marine shell beads coincide with formal bone tools, finely made bifacial points, and evidence of structured living spaces. How autonomous speech or recursive syntax can account for such innovations remains elusive.

4. The level-2 perspective-taking hypothesis

Another possibility is that the emergence of modern sapiens behavior did not result from a change in language, but from a domain general cognitive change that could explain both symbolic and non-symbolic innovations. From this point of view, autonomous speech or recursive syntax could have been in place much before behaviorally modern humans. For the argument to be convincing, one has to identify precisely what cognitive mechanism underlies the use of symbolic and other modern behaviors (Wynn & Coolidge 2007).

One influential hypothesis is that our general social intelligence lies behind

modern sapiens behavior. The social brain hypothesis links the evolution of culture with the development of Theory of Mind (ToM) and brain growth (Dunbar 2004). The social brain hypothesis faces two problems. First, the emergence of modern sapiens behavior is rather rapid and is not clearly correlated with any significant brain growth. Second, there are different levels of ToM and each one is based on many cognitive abilities, some of which are not properly social. For instance, the higher form of ToM – the understanding of false beliefs – relies on many domain general cognitive abilities like working memory and inhibitory control (Carlson et al. 2002). These abilities are used to regulate all aspects of our life and do not belong specifically to social intelligence.

I propose that the cognitive mechanism behind modern sapiens behavior is one of the general mechanisms underlying the higher form of ToM: the ability to hold in mind a stable representation of conflicting perspectives on objects (Henshilwood & Dubreuil in press). This general ability underlies many related cognitive tasks: the explicit ascription of false beliefs to others (higher level ToM), the distinction between appearance and reality, as well as what psychologists call “level-2 perspective-taking”, that is, the capacity to understand not only *what* others see (level-1 perspective-taking, present in apes), but also to reconstruct in one’s mind *how* they see it (Flavell 1992; Perner et al. 2002; Moll & Tomasello 2006). As these tasks are all about complex perspective-taking, I will label my argument the “level-2 perspective-taking hypothesis”.

Level-2 perspective-taking is absent in apes and develops between 4 and 5 years of age in human children, depending on the cognitive load of the task. It appears pretty much at the same time as the capacity to understand abstract symbols such as written numbers and the capacity to understand that written words have a stable meaning. At the neuropsychological level, such complex tasks as understanding false beliefs or level-2 perspective-taking activate numerous regions of the brain, although one region, the temporoparietal junction, has been specifically associated with representing conflicting perspectives (Aichhorn et al. 2006). This is consistent with the neuroanatomical data according to which the emergence of behaviorally modern humans did not coincide with any major reorganization of the brain. The modern pattern of activation of the temporoparietal junction could have resulted from a slight increase in the interconnectivity of this region of the brain and not from the general encephalization process (contrary to Dunbar’s (2004) social intelligence hypothesis).

There is no question that the analogy between ontogeny and phylogeny

should be handled carefully, as the later certainly does not recapitulate the former. But developmental psychology is here supported by cognitive psychology and neuropsychology in showing that one general mechanism allows us to get a stable representation of conflicting perspectives.

The main interest of the level-2 perspective hypothesis is to explain what scenarios invoking a change in the faculty of language do not explain: the diversity of modern sapiens behavior. First, it accounts for the emergence of symbolic artefacts. Once one is able to distinguish appearance from reality, or to represent conflicting perspectives, one can take objects to symbolize something else. Beads can be transformed into personal ornaments to symbolize social status, because people become able to see the personal ornament simultaneously as beads and as indicator of status (Dubreuil in press). This ability can be opposed to the ability that apes have to categorize dominance relations, mother-child relations or affiliation to kin groups, which is not accompanied by an ability to use arbitrary symbols to indicate these statuses. The level-2 perspective-taking suffices to explain this, because using a symbol to organize social relationships depend on the capacity to understand *how* an object *looks* from someone's else point of view, and not only to understand that she *sees* the object (which apes can do).

The level-2 perspective-taking hypothesis, however, does not imply that archaeological artefacts like engraved ochres or marine shell beads actually worked as symbols and stood for something else. They could have had a purely decorative or aesthetic function. From an archaeological perspective, there is no real way to tell aesthetic and symbolic functions apart. In the framework presented here, it does not really matter. At the cognitive level, using an object for a symbolic or aesthetic reason implies the same capacity to represent it from different viewpoints (Henshilwood & Dubreuil in press). In the symbolic case, one has to understand that the object refers to something (e.g. a social status) from someone else viewpoint. In the aesthetic case, one has to understand that wearing on object (e.g. marine shell beads) makes one looks good from someone else's viewpoint.

The level-2 perspective-taking hypothesis also explains other features of modern sapiens behaviors that have no obvious symbolic function. Formal bone and stone tools, for instance, are properly modern, but cannot be unambiguously taken to symbolize anything (Chase 2006). Moreover, attempts to link regional styles and the formalization of tools with the evolution of language remain unconvincing since the transmission of knapping techniques relies more on observation than on complex communication (Wynn 1991). On the other hand, the impact of level-2 perspective-taking on the transmission of knapping

techniques would be straightforward: hominins would gain the capacity to represent how others see the objects while knapping, facilitating the transmission of complex techniques and the emergence of what has been called “cumulative culture” (Tomasello 1999; Boyd & Richerson 2005).

The same argument can be made concerning the emergence among modern *Homo sapiens* of structured living spaces including windbreaks, fixed hearths, storage pits, etc. The construction of such structures does not involve the use of complex communication, but can be explained parsimoniously by an enhanced understanding of spatial perspective, that would make possible the collective ascription of functions to specific parts of the living space.

5. Implications for the evolution of language

The level-2 perspective-taking hypothesis implies that modern sapiens behaviors have not been caused by a change in the faculty of language, but by a change in domain general cognition. Nevertheless, I should make clear that this hypothesis does imply that anatomically modern humans were not using modern language 150,000 or 50,000 years ago. In fact, many independent arguments support the idea that the faculty of language was fully (or almost fully) in place at that time.

On the one hand, the linguistic data indicate that all living humans can learn any language and thus share the same faculty of language. On the other hand, genetic data show that all living humans share a common ancestor in Africa between 150,000 and 50,000 years ago, and so there is a good reason to believe that a modern faculty of language was already in place.

I should also mention that the level-2 perspective-taking does not rule out the possibility that many features of modern language, including recursive syntax, could have appeared much before behaviorally modern humans. In fact, many adaptations essential to the production of rapid spoken language were already in place in the common ancestor of *Homo sapiens* and Neanderthals. This includes a modern version of the FOXP2 gene, but also enhanced breathing control and increased brain size and plasticity (Hublin 2005).

To conclude, the argument presented here does not imply that level-2 perspective-taking has no impact on the way humans understand language. We know from child development that higher ToM and perspective-taking are closely related to metalinguistic awareness (Doherty & Perner 1998). This should not be surprising, since the capacity to reflect and manipulate consciously linguistic expressions depends on the ability to understand that things can look different under diverse – and even conflicting – viewpoints. Finally, it does not imply that earlier development in the faculty of language in the human lineage was not instrumental in the emergence of level-2 perspective-taking. Once again,

children's development shows how the ability to understand complex syntax and, more precisely, embedded sentences can predict pretty well the development of higher theory of mind.

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