

Reply to Benítez-Burraco & Longa: when is enough, enough?

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We appreciate the authors' comment on our work and agree that much "ink has been spilt" in paleoanthropology in discussing the linguistic abilities of Neandertals and their ancestors. We would not confine the "spilt ink" to just paleoanthropologists. After all, these authors are not paleoanthropologists and only 11 of their 52 citations (~21%) are written by paleoanthropologists. There is a lot of "spilt ink" and felled trees, ---the collective responsibility of decades of speculation on language origins by paleoanthropologists, paleoneurologists, anatomists, linguists, psychologists, animal ethologists, natural philosophers and popularists. We recognize determining language capacity in fossils is risky business, but contend our argument that Neandertals (and, at least, their European ancestors) likely had linguistic skills similar to modern humans is not far-fetched. Our position is not solely based on the ~90% frequency of right-handedness in Neandertals, but a confluence of internally consistent evidence from different disciplines.

First off, we retract the one time we used "complex language skills," – this slipped by our editing. In fact, we do not know what "complex language" or "complex language skills" mean since any language is complex. We only argue that Neandertals and their European forebears had linguistic competence similar to ours. There is not space to cover all our objections to their view, so we focus on mainly those related to their unfamiliarity with the paleoanthropological literature. They cite Bax & Ungar (1999) as evidence that

the labial striations in the Vindija teeth may not be related to handedness. In the four samples Bax and Ungar analyzed, scratches did not correspond to the Neandertal pattern. But, Lozano *et al.* (2009, pp. 373-4) argued the scratches described by Bax and Ungar are not morphologically comparable to the fossil examples and are likely the result of dietary habits, unrelated to scratches left by lithic tools. Spanish researchers have done experimental archaeology with living right- and left-handers and different lithics (Bermúdez de Castro, Bromage & Fernández-Jalvo, 1988; Lozano *et al.*, 2004; Lozano *et al.*, 2009) and conclude that the scratches left by modern experiments exactly match the fossil marks. Finally, Bax and Ungar (1999, p. 197) conclude:

"It may be that these fossil taxa engaged in some anterior tooth-use behaviour not seen in any of the anatomically modern human groups considered here. We expect that more quantitative, comparative studies of the incisors of both fossil hominids and living humans will help researchers further address this issue."

Fossil populations heavily used their anterior teeth, resulting in strong differential tooth wear (Molnar, 1972; Wolpoff, 1999), unlike the samples Bax & Ungar analyzed. Most recently Kreuger (2011), comparing fossil and modern microwear textural analysis on anterior teeth, concludes that the "overall signal suggests little non-dietary anterior tooth use was employed

[in moderns] and that the differences [between fossil and modern samples] are related to dissimilar tool technologies". So we consider citing Bax & Ungar a red herring to the question about the etiology and meaning of labial scratches on Neandertal anterior teeth.

Many features once thought to be unique or distinctly differentiating in *Homo sapiens* are now known to occur in Neandertals or earlier. We cited some of these in our paper, like seafaring and pigment use, --- the specific list is much longer and seemingly grows with every new journal issue (e.g. Verna & d'Errico, 2010; Peresani *et al.*, 2011a). This new and old evidence unambiguously indicates some involvement of Neandertals in intentional burials (e.g. Maureille & Vandermeersch, 2007; Pettitt, 2010, 2012; Walker *et al.*, 2011); feather (Peresani *et al.*, 2011b), ornament (Zilhão *et al.*, 2010) and pigment procurement (Cârciumaru & Țuțuianu-Cârciumaru 2009; Soressi & d'Errico, 2007); ritual behavior (Frayer *et al.*, 2008); modern-like food preparation (Blasco 2008; Sørensen 2009); curation and interregional raw material distribution (Conard & Adler, 1997; Slimak & Giraud, 2007); complex site structures (Bourguignon, 2006; Vallverdú *et al.*, 2010); and dietary diversity including resource scheduling (Blasco & Peris, 2009; Cortés-Sánchez *et al.*, 2011, Daujeard & Moncel, 2010; Fiorenza *et al.*, 2011; Hardy & Moncel, 2011; Henry *et al.*, 2010). Even a long-time Neandertal "denyer" who once argued Neandertals disappeared with 'a whimper and not a bang" and maintained they were subject to "gradual displacement to more marginal environments, where their dwindling numbers would have suffered greater attrition from the vagaries of fluctuating climates and food supplies, as well as disease" (Stringer & Grün, 1991, p.702) now accepts their complex behavior, including subsistence scheduling, artifact manufacture, use of ornaments and pigments (d'Errico & Stringer, 2011). The old idea of Neandertals as incompetents is based on a long history of paleo-discrimination, related more to an attitude and to the absence of information than fact. Speth (2004) addressed this nearly a decade ago and

showed that applying the same logic (like lack of ornaments) to other recent *H. sapiens* groups would similarly deny them of membership in our species. While controversy continues to surround the late Mousterian ornaments from Arcy, the Higham *et al.* (2010) article is not the final word, since Caron *et al.* (2011) maintain the dating is corrupted and conflicts with evidence that other artifact classes in the Mousterian/Upper Paleolithic levels are not mixed stratigraphically. Accumulating data confirms that Neandertals were not bereft of ornaments or other aspects of symbolic behavior.

We wonder how Benítez-Burraco & Longa would approach this problem if Neandertals were shown to be primarily ambidextrous or 90% left-handed, had a flat cranial base like chimpanzees and gorillas, had a nonhuman hyoid, had left hemisphere dominance, had left frontal/right occipital petalial patterns, lacked evidence for any type of artwork, had no hint of planning or complex technology, had only "natural" burials or had the ape sequence for FOXP2. We suspect that even one of these would be reason for them to question language capacity in Neandertals. In fact, almost every one of these features has been used for this purpose, and almost always involved lack of evidence (Speth, 2004). Or the argument moved on to yet another, new reason to deny them speech capacity. For example, Laitman *et al.* (1979, p. 15) stated the hyoid "give clues to the position and shape of upper respiratory structure," but after the modern Kebara Neandertal hyoid was found the authors argued it could not be distinguished from a pig! (Laitman *et al.*, 1990, p.254), which was demonstrably false (Frayer, 1993; Culotta, 1993). Or, more recently when Lieberman (2007, p.52) wrote that "The FOXP2 gene provides a means to date the evolution of the human brain and the emergence of fully modern speech capabilities." But after the modern form of the protein was found at El Sidrón, *Homo sapiens neanderthalensis* was still excluded because they now had insufficient tongues (Lieberman, 2009; see Barceló-Coblijn, 2011). Benítez-Burraco *et al.* (2008, p. 226) similarly reject the significance

of El Sidrón “because although FOXP2 is arguably a necessary condition for language, it almost certainly is not a sufficient one, by any stretch of the imagination.” We do not argue FOXP2 is the only evidence that Neandertals spoke, but without the modern sequence, Neandertals would have lacked modern linguistic ability just like the members of the KE family (Hurst *et al.*, 1990) where it was first identified. The relationship between genotype and phenotype is not always simple or direct, but can obviously be. Just ask people who have some hereditary disease caused by a point mutation, like cystic fibrosis or the FOXP2 deficiency. Following Benítez-Burraco and Longa’s logic thread never leads to sufficient evidence to address the question of prehistoric language ability. So, for them enough evidence is never enough.

A more effective approach combines multiple lines of evidence and fossils from different time periods (Bresson, 1992; d’Errico *et al.*, 2003; Frayer *et al.*, 2012). Recently Stout, Chaminade and colleagues have focused on brain areas involved in tool manufacture and language using with fMRIs while participants make Olduwan and Acheulean tools (Stout, 2011; Stout & Chaminade, 2009, 2012). Their work suggests a close interaction between Acheulean handaxe shaping and cortical areas associated with language areas in both hemispheres, but especially involving *praxis* and language areas on the left side. Stout & Chaminade argue for the initiation of language in the Acheulean, based on the interaction among brain areas associated with manufacture, pedagogy, cognition and vocal language. If language begins in the Acheulean, it makes questions about Neandertal speaking ability a moot issue and nullifies Benítez-Burraco *et al.* (2008) speculations about Neandertal “knotting” ability, since the brain areas associated with making complicated Mousterian tools would have developed long before Neandertals appear in the fossil record.

We submit that the preponderance of evidence (not simply handedness, hemispheric laterality or FOXP2), leads to the conclusion that Neandertals spoke.

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