THE SYMBOLIC CAPACITY AS A BASIS OF HUMAN COGNITION IN EVOLUTION AND DEVELOPMENT

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The symbolic capacity, defined as the ability to use one thing or situation to stand for another through socially constituted meaning (Rakoczy et al. 2005), is generally considered a human trait that underlies many aspects of the characteristic complex mental abilities of our species. Although researchers disagree as to precisely which faculties and conducts are to be considered typical of *H. sapiens*, most agree that modern human behaviour has symbol-making 'at its core' (Nowell 2010). In this paper I discuss data from archaeology, developmental and comparative psychology which indicates that, contrary to what predominant models of human cognitive evolution claim, symbolic ability emerges early in both evolution and development and should therefore be considered as a foundation of human cognition, and not as its result.

Leading models of cognitive evolution assert that the human symbolic capacity originated relatively late in evolution, over the last 50,000 years, as the result of a long process of neural development that led to the modern human brain (Coolidge and Wynn 2009; Deacon 1997; Donald 1991; Mithen 1996). However, the archaeological research of the past three decades has shown that several of the suite of traits typically associated with modern symbolic behaviour (technological innovation, art, ritual, exchange networks, etc.) appear prior to 50,000 and sometimes even earlier than 100,000 years ago, suggesting that symbolic cognition did not come about suddenly but developed gradually alongside anatomical evolution, in a stepwise cumulative process that took hundreds of thousands of years (McBrearty & Brooks 2000; Straffon 2019).

Recent data further support the presence of early symbolic cognition in extinct hominins. For example, a geometrically incised shell attributed to *H. erectus* dated c. 500,000 BP (Joordens et al. 2015), engraved bones from China made potentially by Denisovans over 100,000 years ago (Li et al. 2019), and a series of Neanderthal finds, such as a rock engraving from Gibraltar older than 39,000 years (Rodríguez-Vidal et al. 2014), and rock paintings from Spain c. 60,000 BP

(Hoffmann et al. 2018). For early *H. sapiens*, discoveries from Blombos Cave in South Africa include a cross-hatched pattern drawn with a red ochre crayon on stone c. 73,000 BP (Henshilwood et al. 2018), and a piece of reddish-brown siltstone displaying a double chevron c. 75,000 BP (Henshilwood et al. 2009). These seemingly intentional marks, recorded among four different hominin groups, indicate that the production of external symbols, likely for communication, may be a deeply-rooted behaviour in *Homo*.

The idea that symbolism arrives late is prevalent also in developmental psychology. In classic semiotics, arbitrary symbols which bear no resemblance to their referent, are considered as a higher order of signs, more complex and difficult to acquire and interpret than so-called iconic or indexical signs which have a likeness to their referent (Deacon 2006). Therefore, traditional developmental trajectories have placed the acquisition of 'proper' symbols last (Namy 2008). Yet several studies have shown that, in fact, young children do not acquire iconic signs more easily (Bohn et al. 2018), and that iconicity, not symbolicity, might be ontologically late, requiring a long period of learning and practice (Tolar et al. 2007; Saito et al. 2014). In contrast, by the first year of life, infants develop an incipient symbolicity as they learn language, and by the third year they understand symbolic content across different domains such as pretend play and drawing (Callaghan 2008; Rakoczy et al. 2005; Tomasello 2009; Vygotsky 1978). This indicates that symbolic capacity appears earlier rather than later in ontogeny and seems more cognitively available than iconic interpretation in early life.

Finally, studies in comparative psychology suggest that symbolic cognition might have even deeper phylogenetic origins. The well-known cases of Koko the gorilla, and Kanzi the bonobo, show that great apes are at least capable of successfully learning and using (though not creating) gestural, graphic, and language-based symbols (de Waal 2001; Gillespie-Lynch et al. 2011; Heimbauer et al. 2011; Matsuzawa 2009), and research into animal signalling (e.g. Vervet monkey alarm calls) alludes to symbol-based communication being widespread in nature (Ribeiro et al. 2007). So, symbolic capacity may be a trait shared with other hominins (Shea 2011) and perhaps other primates and lineages (e.g. birds, cetaceans). But whereas the perceptual aspects of symbolism might not be 'uniquely human', some of the traits required for material symbol *production* may well be (Westphal-Fitch & Fitch 2015).

The reviewed evidence shows that the emergence of symbolic capacity in both human phylogeny and ontogeny seems earlier than predicted by dominant models of cognitive evolution and development. Research into early human behaviour should then focus not on whether symbolic ability was present but on how the use and production of symbols shaped modern cognition and culture.

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