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Marks and Meanings: new perspectives on the evolution of human symbolic behavior

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Introduction

Understanding the unique evolutionary trajectory taken by humanity is impossible without an appreciation of our singular capacities for symbolic cognition and behaviour, which have evolved into the diverse practices of communication, art, reasoning, and ritual we encounter today (Deacon, 1998; Donald, 1991). But how did these capacities evolve during the Late Pleistocene?

Within only the last couple of decades, early milestones in human symbolic behavior have been continuously revised as new archaeological investigations across the globe challenge previously long-held assumptions (Aubert et al., 2019; Brumm et al., 2021; Henshilwood et al., 2018; Hoffmann et al., 2018). However, at the same time, we have made little progress in our understanding of past symbolic behaviour and the mechanisms by which it evolved.

As ‘tools of the mind’, symbols are constituted by the intangible social and cognitive processes they evoke in pragmatic contexts of production and use. These processes do not fossilize and we often have to base our inferences on the sparse and incomplete material remains consisting, for instance, of marks on portable artefacts and cave walls. This limited evidence has often led to speculative and competing interpretations without well-established theoretical or empirical grounds to weigh accounts or arguments.

This symposium brings together four speakers from very different backgrounds and institutions, who have recently presented novel theoretical, empirical, and/or methodological perspectives in attempts to address the grand challenges of the evolution of human symbolic behavior.

Coming from the field of archaeology, Michelle Langley has made important contributions to the study of human

cognitive and cultural evolution, among other things, based on novel findings from Australia and Indonesia. To inform discussions of early geometrical art, Mathias Sablé-Meyer has done computational modelling and comparative experimental work with humans and primates. Judith Fan has used a combination of neural-network and probabilistic models to investigate how people produce and understand drawings. And last, Kristian Tylén has used archaeological artefacts as stimuli in experimental investigations to inform discussions of their functions.

Michelle Langley: Australian perspectives on interpreting the evolution of symbolic behaviour in humanity

Traditionally, the archaeological record of early symbolic and other complex behaviours have been interpreted in reference to European and African datasets and ideologies. Increasingly, however, newly uncovered evidence from Australia and Island Southeast Asia is overthrowing long-held understandings and challenging archaeologists to rethink their narratives surrounding human behavioural evolution. Here I outline the latest archaeological finds and reframe the human story from a uniquely Australian perspective.

Mathias Sablé-Meyer: Mental representation of geometric shapes as programs in humans

What cognitive and neural mechanisms underlie the human ability to represent abstract geometric concepts, such as a line of infinite length and null width? How much of these mechanisms do we share with non-human primates? In this talk, I will show that even in the mere detection of an intruder among quadrilaterals, all humans share a sense of geometric complexity that baboons lack (Sablé-Meyer et al., 2021). The nature of the parameters required to model each

population gives us an insight about the nature of their internal representations. I will propose that humans mentally represent geometric shapes as programs in a mental language, and that understanding a shape requires finding its program. I will make a concrete proposition of a possible language, inspired by archeological findings (Henshilwood et al., 2018; Joordens et al., 2015), I will provide empirical support for this theory, and I will offer a possible implementation of shape perception as program induction (Sablé-Meyer, 2022)

Judith Fan: Visual content and social context jointly determine pictorial meaning

Drawing is one of the most basic and versatile forms of symbolic behaviour. Even in the simple case of drawing an object in the world, there are countless ways of depicting that object. How does a medium spanning such a broad range of appearances reliably convey meaning? On the one hand, recent work in computational vision has found that the identity of an object depicted in a drawing can be derived from its visual properties alone (Fan, Yamins, & Turk-Browne, 2018). On the other hand, classic work in aesthetics has emphasized the role of cultural and social context in determining how drawings denote objects (Goodman, 1976). In this talk, I will describe recent computational modelling and behavioral work exploring how visual information and social context jointly determine the correspondence between a drawing and the object it depicts (Fan, Hawkins, Wu, & Goodman, 2019; Hawkins, Sano, Goodman, & Fan, 2021). Together, this work lends support to the notion that pictorial meaning in context is strongly determined by the amount and type of shared knowledge between communicators.

Kristian Tylén: What can experiments reveal about the evolution of symbolic behavior?

In this talk, I will outline a conceptual framework for the investigation of early symbolic artefacts, and demonstrate how it can be used to generate predictions for experimental work. The framework starts by establishing an analytic distinction between three layers of description of artefacts: i) their structural properties, which are directly accessible from their form, ii) their cognitive affordances – that is, their effect on relevant aspects of cognition which we can “measure” using visual experiments, and iii) their function in contextualized contextualised symbolic practices, for instance related to communication, aesthetics, reasoning, or ritual (which is often subject of controversy in the literature). An important aspect of the model is the relation between layers: in particular, I suggest that the cognitive implications to changes in artefacts’ form over time can assist us in drawing inferences about their function (Tylén et al 2020). I will provide a number of empirical cases illustrating the potentials of the framework and experimental approach.

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