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### CHAPTER

## Symbols and material signs in the debate on human origins

Antonis Iliopoulos, Lambros Malafouris

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### Abstract

This chapter delves into the issues of symbolization and material signification as they have been conceived in the literature on human origins, focusing on three interrelated questions found at the crux of the debate on behavioral and cognitive “modernity:” firstly, how did material objects signify in prehistoric times? Secondly, how were material signs created at that point in time? And thirdly, how did material signs and human minds evolve and change over time? These questions about the nature, emergence, and evolution of material signification have been addressed in very different ways by two broad schools of thought. The symbolocentric paradigm, which for long was the favored approach, treats material signs in linguistic terms, attributes their creation to predefined mental templates harbored by symbolically and linguistically capable brains, and sees their evolution as an adaptive response to selective pressures. Contrastingly, a more recent approach defines material signs primarily based on their material qualities and relations, ascribes their creation to the anchoring of cognitive projections onto these physical manifestations, and approaches their evolution as an ontogenetic process driven by the prolonged engagement between humans and things. Opting for the latter way of thinking, this chapter evaluates the theoretical assumptions of the traditional approach, and sketches the materially sensitive dictates of Peircean semiotics and the Material Engagement Theory. As we suggest, the emphasis of these chronologically distant, but philosophically proximate frameworks on the ontological primacy of process and situated engagement, allows them to shed new light on the origins of mind and material semiosis.

**Keywords:** [symbolism](#), [material signification](#), [cognition](#), [creativity](#), [evolution](#), [pragmatism](#), [enactivism](#), [Peircean semiotics](#), [Material Engagement Theory](#), [metaplasticity](#)

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## Introduction

It is generally accepted that humans are a “symbolic species” (see e.g., Deacon, 1997; Schilhab et al., 2012). Influenced by White’s (1949, 1959) proposition that symbolism is what makes human culture unique, prehistorians have long sought to identify the Rubicon of “modern” human cognition by searching for material traces of symbolic behavior (Hopkinson, 2013). According to the archaeological consensus over the past three decades, it is symbolism we ought to consider as the most defining feature of “modernity” (e.g., Chase & Dibble, 1987, p. 264; Henshilwood & Marean, 2003, p. 635; d’Errico et al., 2005, p. 4; Nowell, 2010, p. 447; Pettitt, 2011, p. 142; Shea, 2011, p. 8; see Majkić, this volume; Tattersall, this volume). As characteristically stated by d’Errico and his colleagues (2003, p. 31) in their extensive overview of the archaeological evidence: “A fundamental turning point in the evolution of human cognitive abilities and cultural transmission was when humans were first able to store concepts with the aid of material symbols and to anchor or even locate memory outside the individual brain.” Associating the origins of “modernity” with symbolic artefacts is essentially based (even if implicitly so) on White’s (1959, p. 234) idea that culture “is a class of things and events, dependent upon symboling, considered in an extrasomatic context [emphasis in original].” As we show in this chapter, this distancing from the body meant embracing a linguocentric point of view in which artefacts were arbitrarily bound to concepts already established. According to this linguistic point of view, these concepts had been predefined by a symbol-processing apparatus that purposefully imbued them in artefacts. As might be expected, the notion that the material world was a “passive” substrate for the storage of symbolic representations, in turn forces one to surmise that a symbolically capable brain had already evolved by that point.

Reacting to this predominant stance, an increasing number of scholars, whose work will also be discussed in this chapter, have attributed an “active” role to materiality when studying significant artefacts. According to Material Engagement Theory (MET) in particular, past material signs were not the epiphenomenal products of *a priori* symbolic representations; they instead emerged *during*, or better yet *through* processes of engagement between people and things (Malafouris, 2013). Originally formulated by Renfrew (2004) and Malafouris (2004), MET seeks to highlight the processes by which the physical qualities and relations of things not only incite, but actively shape the very meanings humans live to experience (Gosden & Malafouris, 2015; Malafouris, 2015). From the vantage point of its proponents, the meanings of the earliest significant artefacts would have not so much been designated in advance, as much as realized (both physically and mentally) in developmentally and historically situated interactions. And by extension, accepting that material signs must have emerged through material engagement entails re-conceptualizing our evolution as a process of diachronic change in human-artefact integration.

To clarify the theoretical postulates currently circulating in Evolutionary Cognitive Archaeology (ECA), we devote this chapter to presenting the disparate ways through which prehistorians have approached the *nature*, *emergence*, and *evolution* of material signification (see also Wynn & Coolidge, 2017). We specifically focus on addressing three issues that lie at the core of the debate on human origins:

- *Firstly, how did material objects signify in prehistoric times?*
- *Secondly, how were material signs created at that point in time?*
- *And thirdly, how did material signs and, by extension, minds evolve and change over time?*

Delving into the different ways these questions have been answered, we start with a distinction between the *linguistic* and the *pragmatic* understanding of material signs. Doing so allows us to highlight the implications of treating material signs in strictly linguistic and syntactic terms, versus seeing them as physically manifested processes that had practical effects. We then make a closely related distinction—namely the one between the *hylomorphic*<sup>1</sup> model of creation, which is rooted in a representational and computational

understanding of cognition, and the *hylonoetic*<sup>2</sup> model of creation, which is guided by a process-based, enactive understanding of cognition. As we will in turn see, the hylomorphic view of creativity is usually associated with a *Neo-Darwinian* approach to cultural evolution, whereas the process-based take on creation is closely tied to a *metaplastic* account of human becoming. In presenting the final distinction, we specifically contrast the predominant tendency to describe cultural evolution in the adaptationist terms of natural selection, with an extended synthesis picturing evolution as diachronic change in the ways humans and artefacts have been integrated in developmental contexts or sites. Opting for the latter way of thinking in all three cases, we finally arrive at what we consider a promising direction for the study of prehistoric meaning and thought.

## On the nature of material signification

Over the past four decades, material symbols have been primarily treated as external storage media for codified information, which had been displayed and transmitted to others for communicative purposes.<sup>3</sup> For the broadcasted messages to have been received, communicative artefacts would have had to be imbued with conventionally agreed upon meaning. This supposition is evident, for instance, in Henshilwood and d'Errico's (2011, p. 76) definition of a symbolically mediated culture as *"one in which individuals understand that artefacts are imbued with meaning and that these meanings are construed and depend on collectively shared beliefs [emphasis in the original]."* As they point out, *"[t]his criterion is crucial [because] [i]t explains how human norms and conventions differ from the ritualized behaviours found in nonhuman primates."*

In order to account for these symbolic conventions, prehistorians generally invoke the use of language, which they deem an essential prerequisite for the construction of the symbolic systems within which communicative artefacts were embedded. According to d'Errico and his colleagues (2003, p. 31), *"[t]he production of such systems clearly demonstrates the use of modern language, because modern language is the only communication system with a 'built-in' metalanguage that allows for the creation of symbolic codes."* Language is treated here as more than a means of sharing the predefined meanings of artefacts with other members of one's ethno-linguistic group; its semantic and syntactic structure is used as model for describing the very meaning of material culture itself. Take, for example, the way early body ornaments such as the Blombos beads have been implicated in the debate on human origins (Henshilwood et al., 2004; d'Errico et al., 2005). Ever since the time of Chase and Dibble's (1987) landmark paper, it has been widely accepted that symbolic artefacts such as ornaments are—by definition—arbitrarily connected to agreed-upon meaning, much in the same way words are semantically linked to a particular concept. As a matter of fact, the arrangement of perforated shells in beadworks has also been taken to share much with the syntactic structure of linguistic propositions. In the characteristic words of Stiner (2014, p. 62): *"Beads were the tiny elements from which syntactically organized visual arrangements could be built."* It is worth noting here that, while this approach to material signification does not appear to have been explicitly based on de Saussure's (2011, pp. 65–70) structural linguistics, its linguocentric tendencies are somewhat reminiscent of his *semiology*—a theory of signs according to which intelligible language, an archetype for all other systems of signs, is yielded through the unidimensional unfolding of sequential interdependent arbitrary signs.

Given their preoccupation with symbolic communication and language, archaeologists have mostly directed their attention towards various kinds of so-called "non-utilitarian" material culture.<sup>4</sup> For instance, rituals<sup>5</sup> and figurative representations<sup>6</sup> are generally considered to have been symbolic because their use only makes sense if they had been implicated in the communication of a predefined message. Their non-utilitarian nature is usually deemed evident enough that idiosyncratic cases can stand their own ground without losing their symbolic connotations. Contrastingly, artefacts such as beads and engraved pieces of ochre are not so clearly communicative on their own. This is why archaeologists have mostly focused on

establishing their standardization. According to what has been dubbed the “consistent behavior” argument (Henshilwood & d’Errico, 2011, p. 91), a non-utilitarian artefact that is found in multiple locales must have been communally understood. After all, a shared understanding of their meanings would have been imperative for the successful communication of the imbued messages. Based on this logic, symbolism has also been associated with highly stylized tools,<sup>7</sup> abstract engraved motifs,<sup>8</sup> and of course decorative pigments and ornamental beads.<sup>9</sup> As the literature on these kinds of material culture quickly reveals, the debate on human origins has been long preoccupied with the referential function of artefacts, at the expense however of their pragmatic implications.

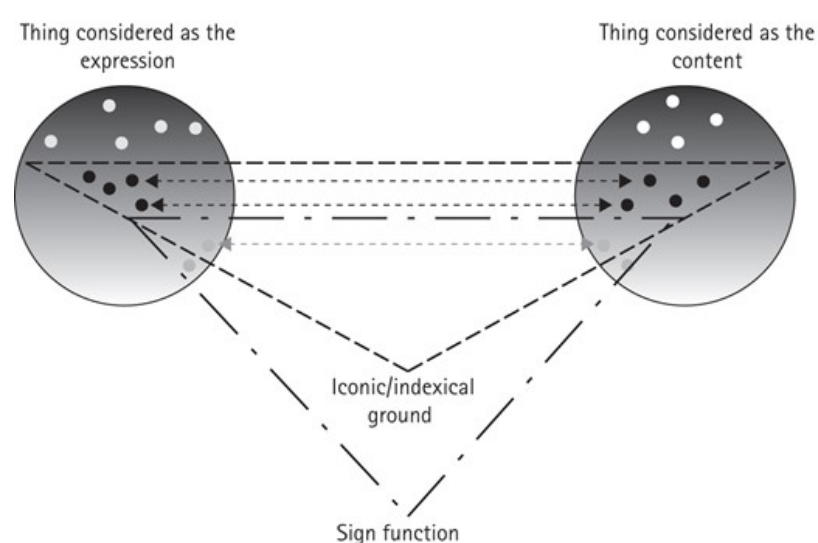
Unpersuaded by the traditional outlook on style, Byers (1992, 1994, 1999a, 1999b) introduced an *action-constitutive* approach according to which artefacts actually substantiate (rather than merely reference) their meaning. As he proposed, style is the symbolic medium that allows users to bestow upon artefacts a form of derived Intentionality,<sup>10</sup> which in turn confers them with pragmatic power. Consider, for instance, how the “style” of a passport can afford its bearers with distinct powers, allowing them to fulfill their intent to enter a country. Style imbues a passport with the expressive meaning that *constitutes* it, making it what Byers (1994, 1999b) has termed the “iconic warrant” required to cross a border. Functioning as such, meaning is not referential, but can be said to be a constitutive part of the passport. In fact, Byers (1999b, p. 275) tells us that “material styles have primarily or possibly *only* expressive moments [emphasis in original].” Yet given that they function within cultural milieux and are dictated by cultural standards, he posited that styles (and all other forms of rule-governed behavior for that matter) are nonetheless best considered as symbolic. For Byers then, material forms of symbolism are based not on the arbitrariness of reference, but on systemic beliefs, rules, and values, which associate all actions and objects with symbolic cultural meaning.<sup>11</sup> In taking this position, he was basically able to retain the symbolic connotations of the objects at the center of the debate, but in a way that acknowledged how artefacts physically embody their meaning (see also Sinha, this volume).

A few years later, Renfrew (2001b) coined the term “constitutive symbol” to denote a material sign “where the symbolic or cognitive element and the material element co-exist, are in a sense immanent, and where one does not make sense without the other” (Renfrew, 2001a, p. 98). To use one of his own examples, the concept of “weight” has no meaning when detached from the embodied experience of a physical entity (Renfrew, 2001b, p. 133). In this regard, it is the tangibility of an artefactual medium that allows it to acquire conventionalized meaning (Mahaney, 2014). Based on the idea that meaning emerges when humans engage with the material world, Malafouris (2013, Chapter 5) suggests that a significative artefact actually substantiates the meaning signified—that is, “[i]t operates on the principle of participation rather than that of symbolic equivalency” (Malafouris, 2013, p. 97). From MET’s point of view, conflating material culture and language by treating the former with tools geared towards the latter deprives the material world from having an active role within the semiotic system, effectively leaving a large part of the significative spectrum unexplored. To avoid the *fallacy of the linguistic sign*—that is, the erroneous tendency to treat material culture in linguistic or textual terms (Malafouris, 2013, p. 91)—a new wave of thinking in ECA has recently outlined the usefulness of praxis-oriented approaches that ground the material sign on the physical dimensions of our world (Garofoli, 2015; Iliopoulos, 2016a, 2016b; Kissel & Fuentes, 2017; Froese, 2019; Garofoli & Iliopoulos, 2019).

To clarify the ways in which the artefacts comprising the archaeological record would have participated in prehistoric cases of meaning-making, one could draw upon the theoretical insights of pragmatic semiotics (Iliopoulos, 2016b). Influenced by the semiotic work of Sonesson (2012), we recently suggested that it would be misguided to reduce all kinds of material signification to symbolism (Iliopoulos, 2019, pp. 49–52). In cases where a sign is not connected to what it stands for through a purely arbitrary connection held entirely in mind (as is characteristic of symbolism), the sign essentially consists of a sign function that is actually founded on a physical relation of relevance between a thing or event and something else (Figure 1). To

appreciate the kinds of relevance that can be perceptually established between a significative artefact and what it stands for, we must consult the pragmatic semiotics of Charles Sanders Peirce. As Peirce famously proposed, a *Sign* or *Representamen* stands for something else, its *Object*, not in all ways, but *in some respect or capacity*, which he called the sign's *Ground* (CP 2.228).<sup>12</sup> In adding to the symbolic grounds generally associated with language, Peirce (CP 2.243, 2.247–2.249) made a widely adopted distinction between *iconic* and *indexical* grounds. While the former pertain to relations of similarity, the latter pertain to relations of spatiotemporal contiguity and factorality (i.e., the relation between a part and the whole; Sonesson, 2006). In principle, things that are iconically related share particular qualities that inhere in them independently, whereas things that are indexically linked participate in the same existential relation. Sonesson (2006, p. 181) thus points out that “the indexical ground is ‘about’ this relation (its contiguity, its factorality, etc.), but the iconic ground is ‘about’ the object at the other end of the relation.” Surprisingly though, while these types of non-symbolic signification have proven especially insightful in the semiotic study of historic artefacts, they remain somewhat underexploited in ECA.

**Figure 1**



The sign as a mapping between different spaces, based on different principles of relevance (i.e., iconic and/or indexical ground) and sign function. The points are properties of the two things thus put into relation. The arrows are mappings between such properties.

**Source:** Adapted from Sonesson, G. (2006). The meaning of meaning in biology and cognitive science: A semiotic reconstruction. *Sign Systems Studies* 34(1), 170. Figure 1 © 2006, Göran Sonesson.

To be fair of course, some scholars have indeed recognized that the connection between prehistoric artefacts and what they stood for need not have been symbolic (e.g., Chase, 1991; Chase & Dibble, 1992; d’Errico & Nowell, 2000; Rossano, 2010; Hodgson, 2014; Garofoli, 2015; Iliopoulos, 2016a, 2016b; Kissel & Fuentes, 2017; Froese, 2019). For instance, figurative representations such as the c. 400 kya Tan-Tan proto-figurine from Morocco (Bednarik, 2003) and the c. 233 kya Berekhat Ram proto-figurine from Israel (Goren-Inbar, 1986; Marshack, 1997; d’Errico & Nowell, 2000; d’Errico et al., 2003) could have functioned as icons (Rossano, 2010, p. S91). Iconic signification has also been associated with figurative art and hand stencils such as those found on the walls of European caves (Froese, 2019, p. 14). Interestingly, these hand stencils might have well been associated with another mode of material signification, since they could have also been indexically linked to their maker (Froese, 2019, p. 14). Along similar lines, indexicality has been attributed to early body ornaments, on the basis that shell beads such as those found at Blombos Cave must have functioned as indicators of their wearer’s social affiliation (Rossano, 2010, p. S92).<sup>13</sup> However, while the differentiation between icon, index, and symbol may have helped considerably in identifying the kinds

of relevance between past material signs and what they could have stood for, other aspects of semiotic functioning remained unaccounted for until recently.

According to some recent publications, attending to the trichotomy about the Sign's relation to itself allows archaeologists to differentiate between three states of meaningful being: possible quality, actual thing or event, and general rule (Iliopoulos, 2016a, 2016b; Kissel & Fuentes, 2017). Having recognized the potential of the differentiation between what Peirce called *Qualisigns* (CP 2.244), *Sinsigns* (CP 2.245), and *Legisigns* (CP 2.246) for the study of prehistoric material signs, Kissel and Fuentes (2017) applied these terms to three popular case studies: ochre pigments, shell beads, and abstract engravings (i.e., motifs found on bone, eggshell, ochre, shell, and stone). As they were able to demonstrate, all these kinds of material culture can be further illuminated by attending to the ways in which a possible quality such as a particular color (i.e., a *Qualisign*) can be embodied in an actual object such as specific artefact (i.e., a *Sinsign*), as well as to the way in which such an object is an instantiation of the general rule guiding its interpretation (i.e., a *Legisign*).

It is worth noting here that if we expand our analysis even further so that it also includes the third of Peirce's triptychs, then our semiotic analysis can gain even more in analytical precision. Attending to the way that the Sign relates to—what Peirce has termed—the *Interpretant* (i.e., the effect of the sign on the mind) allows us to establish whether a material sign denotes, informs about, or dictates its meaning (Iliopoulos, 2016b, p. 115). Case in point, applying the distinction between—what Peirce (CP 2.250–2.252) has respectively called—*Rhemes*, *Dicisigns*, and *Arguments* to the case of early body ornamentation has helped illuminate how denotative (*Rhematic*) material signs could have been synthesized to yield informative (*Dicentric*) material signs. For instance, the capacity of a beadwork to inform a viewer about certain qualities of its wearer (e.g., wealth) results from its ability to point iconically towards the perceived qualities of the shells (e.g., rarity), as well as from its ability to point indexically towards the wearer (Iliopoulos, 2016a, pp. 265–266). Besides helping us understand how denotation can lead to information, the third of Peirce's triptychs also allows us to appreciate how a series of informative signs such as propositions about the status of the wearer (i.e., *Dicisigns*) can come together in forming syllogisms such as the ones guiding the practice of rituals (i.e., *Arguments*) (Iliopoulos, 2016a, p. 268). What pragmatic attempts ultimately seek to demonstrate is that a detailed reading of Peirce's theory, with all three kinds of his triadic relations (Table 1), can help us describe the semiotic nature of prehistoric artefacts quite accurately.

**Table 1** The three trichotomies of signification as defined by Peirce (CP 2.243–2.246, 2.250–2.252)

	Firstness	Secondness	Thirdness
<b>Triadic relations of Comparison</b>  ( <i>Sign—Sign itself</i> )	<i>Qualisign</i>  (A quality that is a Sign.)	<i>Sinsign</i>  (An actual thing or event that is a Sign.)	<i>Legisign</i>  (A law that is a Sign.)
<b>Triadic relations of Performance</b>  ( <i>Sign—Object</i> )	<i>Icon</i>  (Sign which refers to the Object that it denotes merely by virtue of characters of its own, and which it possesses, just the same, whether any such Object actually exists or not.)	<i>Index</i>  (Sign which refers to the Object that it denotes by virtue of being really affected by that Object.)	<i>Symbol</i>  (Sign which refers to the Object that it denotes by virtue of a law, usually an association of general ideas, which operates to cause the Symbol to be interpreted as referring to that Object.)
<b>Triadic relations of Thought</b>  ( <i>Sign—Interpretant</i> )	<i>Rheme</i>  (Sign which, for its Interpretant, is a Sign of qualitative Possibility, that is, is understood as representing such and such a kind of possible Object.)	<i>Dicent</i>  (Sign, which, for its Interpretant, is a Sign of actual existence.)	<i>Argument</i>  (Sign which, for its Interpretant, is a Sign of law.)

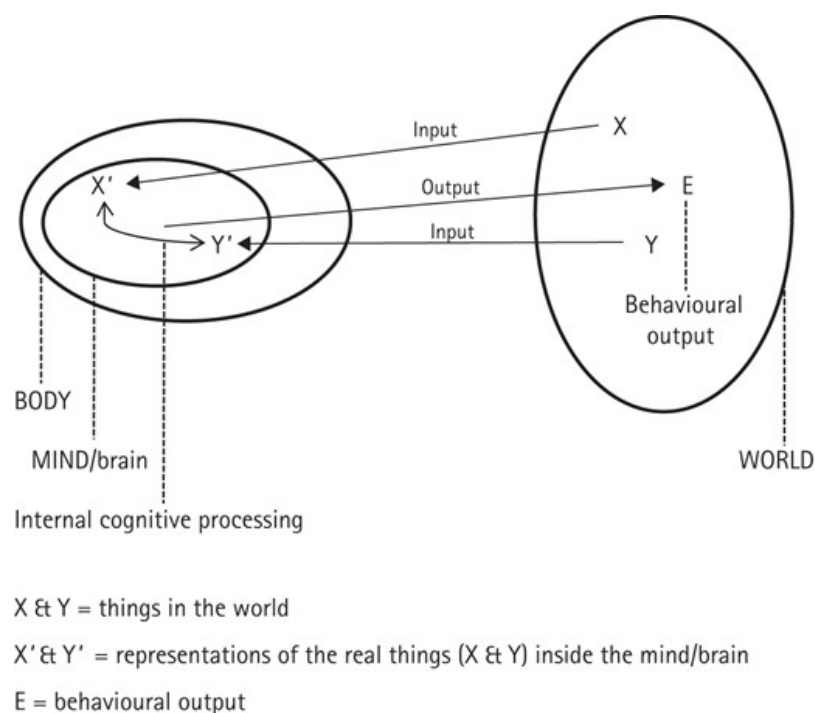
## On the emergence of material signification

As we saw in the previous section, non-utilitarian artefacts are usually seen as symbolic objects manufactured and used for the purpose of transmitting information. This then raises the question of how did that information come to be stored within the confines of various artefacts. Faced with this issue, the proponents of the traditional dictum generally subscribe to the idea that material culture is the epiphenomenal product of pre-existing ideas and dispositions, essentially assuming—what Ingold (2010) has dubbed—a *hylomorphic* model of creation. According to this stance, artefacts play a neutral role in cognition because their function is restricted to realizing the goal that justified their creation in the first place (Ihde, 1990, pp. 5, 140; Ihde, 2002, p. 93). It became apparent from our reading of the literature that this instrumentalist point of view is closely tied with the idea that meanings are pre-specified by an internal apparatus that processes symbolic representations, before being purposefully imbued into material objects for the purpose of transmitting them to people sharing the same cultural knowledge and of course the requisite cognitive capacities (Malafouris, 2013; Garofoli & Iliopoulos, 2019). To give a telling example, Lewis-Williams (2002) attributes European cave art to hallucinations, visions, and dreams underpinned by the universal capacity of humans to enter into altered states of consciousness, leaving materiality outside of the cognitive equation. As he suggests: “In short, people did *not* invent two-dimensional images of things in their material environment. On the contrary, a notion of images *and* the vocabulary of motifs *were part of their experience* before they made parietal or portable images [emphasis in original]” (Lewis-Williams, 2002, p. 185). While the internalist way of thinking is seldom as explicit as in this excerpt, it is usually implied in the commonplace tendency of prehistorians to treat material culture as an unambiguous proxy of a distinctively human mind residing uniquely in the brains of makers and creators (e.g., Wadley, 2001; Henshilwood & Marean, 2003; Soffer, 2009; Conard, 2010; Nowell, 2010).



This internalist mode of thinking pervading much of ECA seems to bear a strong resemblance with the presuppositions of nativist Evolutionary Psychology (EP), whose proponents maintain that the mind evolved as an ensemble of modules geared towards using pre-specified mental representations in order to track particular contents in the world (Pinker, 1997; Carruthers, 2006; Cosmides & Tooby, 2013). According to this paradigm, artefacts must have been created deliberately by a sufficiently capable mind, and as such are mediators between a fixed set of mental representations and problems of adaptive importance identified in the environment. One could say that adopting a representational approach to creation and cognition, and maintaining a non-agentive stance toward artefacts, are complementary positions rooted in Cartesian mind-body dualism. From a Cartesian point of view, the interaction between mental and bodily substances must be attributed to a mechanism that transforms perceptual stimuli into inner representations, which are subsequently employed as mental templates that guide action (Figure 2). With the invention of the digital computer, this representational understanding of cognition morphed into a computationalist paradigm, according to which cognitive processes are best treated in information-processing terms, as formal operations on syntactically structured representations (Fodor, 1975). In the wake of such theorizing, Mithen (1998a) observed that some cognitive-processual archaeologists had been construing the formation of past ideologies from a representational point of view (e.g., Flannery & Marcus, 1983; Renfrew, 1985; Renfrew & Zubrow, 1993), while others had been studying the effects of individual decision making in long-term cultural change by drawing upon an information-processing approach (e.g., Mithen, 1990; Perlès, 1992). A few decades later, these approaches are still commonplace in the debate on human origins, with most studies on newly discovered artefacts focusing either on the representational or the information-processing capacities of early humans.

**Figure 2**



The internalist view of the mind.

**Source:** Reproduced from Malafouris, L. (2013). Rethinking the archaeology of mind. In *How things shape the mind: A theory of material engagement* (p. 27). Figure 2.1 © 2013 MIT Press.

The representationalist approach attempts to account for the emergence of material signs such as early body ornaments by attributing their use to a pair of meta-representational abilities: first, the capacity to



understand false beliefs and other abstract mental states about things such as higher-order desires, and second the ability to inhibit one's own perspective and comprehend how an object looks from another person's point of view. According to Henshilwood and Dubreuil (2011), *higher theory of mind* and *level-2 perspective-taking* would have allowed early humans to infer that others share the same cultural norms about communicative artefacts. They argue that these cognitive capacities would have been required regardless of whether the ornaments had been imbued with symbolic meaning or had simply been the products of peoples' concern for their appearance. More recently, growing orders of intentionality have also been implicated by Cole (2015, 2017) in the transmission of meaning through communicative artefacts. As his *identity model* suggests, using artefacts to broadcast information about personal and collective identity must have been driven by the increasing orders of intentionality humans became able to entertain.

Yet as mentioned earlier, attempts have also been made to gauge, from the archaeological record, the ability to hold and manipulate information. Rossano (2010), for instance, attributes artefacts generally associated with complex symbolic systems to an *enhanced working memory capacity*, which Wynn and Coolidge (2011) have famously invoked in order to account for executive cognitive functions, such as fluid and general intelligence, linguistic comprehension, acquisition, and expression. For Hoffecker (2011), symbolic artefacts are best attributed to the externalization of *hierarchically-structured representations*. As he defines it, creativity is "the ability to recombine the elements of mental representations in hierarchical form, yielding potentially infinite variations of structure" (Hoffecker, 2011, p. 74; see Tattersall, this volume). In employing such representational and information-processing accounts of creativity, prehistorians attribute novel forms of material culture to mental templates created in communal contexts by prodigious individuals—a postulate that entails committing to some form of methodological individualism.

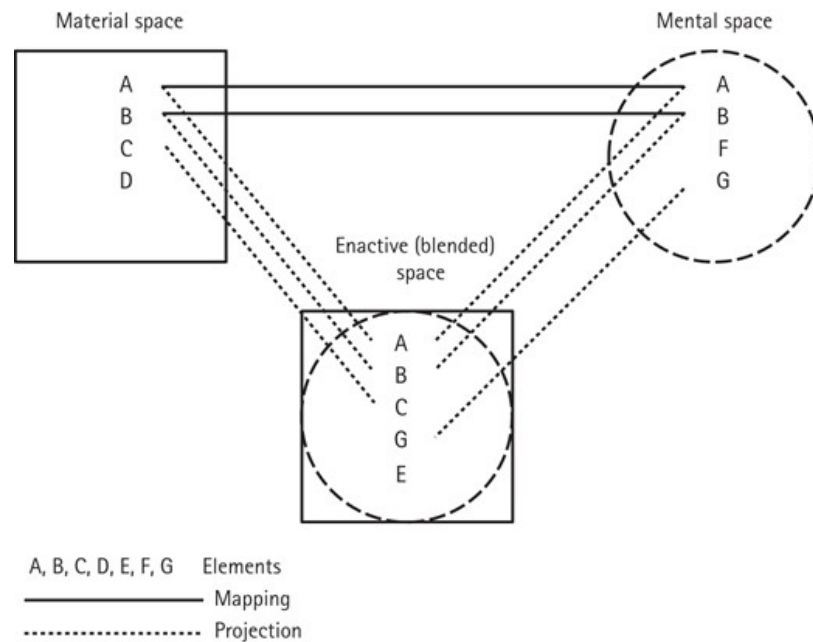
As might be expected, the tendency to attribute cultural effects to the motivations and actions of individual agents often leads to neurological explanations of "modern" human cognition. Granted that the anatomy of our bodies does not appear to have changed much over the last couple of hundred thousand years (only the latter half of which, at most, is currently associated with behavior and cognition generally accepted as distinctively human; see Majkić, this volume), prehistorians have been seeking for answers in changes that must have affected the brains of hominins. Klein (2009), for example, attributes the flourishing of art and ornamentation during the European Upper Paleolithic to a prodigious *executive brain mutation* that caused no apparent changes in skull anatomy, while Deacon (1997) accounts for the creation of symbolic material culture through a *mnemonic recoding* of indexical tokens into symbolic relations embedded within systems, permitted by the gradual evolution of the brain's executive functions. Mithen (1996), on the other hand, focuses on the arrival of an enhanced *cognitive fluidity*, which improved the connection between modules specialized in various forms of intelligence (i.e., general intelligence, social intelligence, natural history intelligence, technical intelligence, and language). As for Donald (1991), he invokes a biologically-bestowed supramodal enhancement of the *motor control system* that enabled hominins to achieve three major cognitive transitions in memory representation. According to his well-known account, hominins transitioned from an "episodic" stage, where they would have been able to represent specific events, to a "mimetic" stage, where they would have been able to manipulate stored representations in order to dictate social action, and then to a "mythic" stage, where they would have been able to invent lexical forms for the purpose of systematizing the categorical meanings found in their perceptions and conceptions. Donald (1991) finally suggests that a "theoretic" stage, where hominins would have been able to externalize their memories by storing information in novel material media, had been enabled by a cognitive reorganization of literacy-oriented modules. Also along neurocognitive lines, Henshilwood and Dubreuil (2011) attribute the externalization of symbolic meanings in forms of material culture, such as the ones characteristic of the Still Bay and Howiesons Poort industries, to the functional reorganization and/or expansion of the higher association areas of the temporal and parietal cortex, which provided the neural substrate for higher theory of mind and level-2 perspective-taking. In all these cases, the proponents of neurocentric approaches embrace varying degrees of representational, modular nativism.

Yet while representationalist, computationalist, and nativist approaches became increasingly influential in cognitive archaeology, their assumptions have not been accepted without contestation. Noble and Davidson (1996) were probably the first to opt for a social constructionist model of the mind that treats cognition as socially distributed. In the years that followed, a new wave of thinking in cognitive archaeology formed, based on the premise that associating the nexus of semiosis with the locus of an individual overlooks the fact that meaning-making involves the *active* participation of exosomatic elements in a hylonoetic process that Renfrew (2001b, p. 129) called *substantialization*. From a hypostatic point of view, meaning does not reside in the brain per se, but emerges through the process of engaging with material things and objects (Knappett, 2005; Boivin, 2008; Malafouris, 2013; Iliopoulos & Garofoli, 2016a; Overmann, 2016, 2017; Poulsen & Malafouris, 2017; Garofoli & Iliopoulos, 2019; March, 2019; Poulsen, 2019). Philosophically speaking, this proposal has much in common with enactivism, a theory that sees cognition “as an embodied engagement in which the world is brought forth by the coherent activity of a cogniser in its environment” (Di Paolo, 2009, p. 12).

Seeking to introduce the enactivist program to the study of material culture, Malafouris (2004, p. 58) moves past the representational idiom by positing that it is possible for humans “*to think through things, in action, without the need of mental representation* [emphasis in original].” The theory of material engagement specifically proposes seeing perception as a form of skillful interactive engagement—that is, as a form of action rather than a form of “internal” representation, on the basis that the outside world does not have to be represented inside the brain; it functions as its own “external” representation (Malafouris, 2007, p. 295; 2013, p. 203). If perception is a mode of probing rather than representing the outside world, then it would not be unreasonable to conceptualize objects, with all of their affordances and constraints, as continuous prosthetic parts of this probing mechanism and therefore as cultural extensions of the human brain. Adhering to the *hypothesis of the extended mind*, MET maintains that “*material culture is potentially co-extensive and consubstantial with mind* [emphasis in original]” (Malafouris, 2013, p. 77).<sup>14</sup> From this externalist point of view, treating material culture as a mere vessel or “external storage medium” of cognition, and invoking a representational mechanism in order to explain their relation, is a theoretical pitfall that has been accordingly dubbed the *representational fallacy* (Malafouris, 2013, p. 237).

As might be anticipated, recognizing the active role of material culture in inciting and shaping experiences is associated with a disentanglement from nativist and neurocentric explanations of creativity. From MET’s long-term perspective, the protracted flow of cause and effect between brain and material culture is best considered to have been bidirectional (Malafouris, 2013). Malafouris (2008, 2011) has therefore argued against prioritizing brain reorganization over behavioral or material changes, when studying the emergence of artefacts such as the Blombos beads. To account for the co-emergence of sign vehicles and meanings, the theory of material engagement draws particularly upon the cognitive anthropological work of Hutchins (2005). Influenced by his “materialist” take on the conceptual blending theory, which was advanced by cognitive scientists and linguists Fauconnier and Turner (2002), Malafouris (2013, Chapter 5) puts forth the *hypothesis of enactive signification*—a working hypothesis according to which a material sign emerges through a process of embodied conceptual integration that is based on the anchoring of cognitive projections to material culture (Figure 3). Applying this analytical tool to the case of personal decoration allows us to propose that the concepts generally associated with the use of early body ornaments would have emerged through means of enactive signification—that is, through the integrative projection of properties shared between objects and the meanings perceived/conceived during their use into hybrid spaces where matter and mind come together (Iliopoulos, 2016a). As enactive attempts ultimately seek to establish, this sort of conceptual blending in a hylonoetic space differs from the unidirectional projection of predefined internal templates into a passive external world, because MET’s integrative approach is instead guided by a logic of *participation*.

**Figure 3**



A conceptual blend with a material anchor.

**Source:** Reproduced from Malafouris, L. (2013). The enactive sign. In *How things shape the mind: A theory of material engagement* (p. 101). Figure 5.2 © 2013 MIT Press.

## On the evolution of material signification

As became clear in the last two sections, material signs have generally been considered to have functioned as *external storage devices* upon which human agents offloaded symbolic content through the behavioral externalization of internal representations. This supposition in turn leaves one with the task of explaining how early humans were able to come up with and maintain these internal representations. The first place one would seek for answers is inside the braincase. Given the obvious lack of direct access to prehistoric brains, scholars are left with the task of using the artefactual evidence in order to estimate the chronological point in our lineage at which humans had evolved a nervous system that was capable enough to support a “modern” kind of thinking. As they see it, the cognitive capacity required to produce and use seemingly “modern” artefacts would have had to rely on a neural apparatus already there. Tattersall (2009, p. 114) characteristically argues that “in evolution, form has to precede function, if only because without form there can be no function.” As he sees it, the novel capacity for symbolism can be explained as an “exaptation”, in that the neural substrate needed to sustain it must have emerged during an earlier, independent event, and was only later co-opted for communicating arbitrary information (see Tattersall, this volume). From a neurocentric point of view, “[i]t may thus be permissible to speculate that the neural substrate for our remarkable symbolic cognitive abilities initially arose as a by-product of the extensive physical reorganization that we see so clearly reflected in our unique osteology” (Tattersall, 2009, p. 115). Assuming that the formation of a symbolically capable brain was a fortunate event randomly achieved through biological processes serving other goals, its potential is argued to have gone unrecognized until it was eventually discovered through behavioral or cultural innovations. From this paleoanthropological point of view, symbolic artefacts, such as those sharing the spotlight in the debate on human origins, were basically able to untap a prodigious capacity that was simply lying dormant.

Admittedly, the disconnect between the evolution of the requisite neural substrate and the epiphenomenal artefacts is not as pronounced in archaeology. That said, the symbolic capacity of hominins is still often

attributed to an extensive physical reorganization and/or expansion forced by selection pressures. This is, for instance, the case according to the *Social Brain Hypothesis* defended by Gamble, Gowlett, and Dunbar (2014), who attribute the encephalization of the hominin brain to pressures exerted by our increasingly complicated social lives. Seeing how the brain's increasing size correlates to the increasing size of social units, the latter of these eminent scholars has long proposed that theory of mind is the main ability linking the biological and social domains (Dunbar, 1992, 2003). Dunbar specifically argues that the capacity to attribute mental states to others was an evolutionary response to problems of cognitive load stemming from the increasingly larger and more complex social groups of the Paleolithic. From the vantage point of evolutionary psychology, it was socially exerted selective pressures for greater computational capacity that drove the expansion of the neocortex, thus leading to the characteristic encephalization of hominins. This so-called "Machiavellian intelligence" hypothesis has been lately invoked to help explain the prehistoric record. According to this biological predictive model, the amplification of "technological" and "social" competencies associated with our ancestors' increasingly enlarged neo-cortex can be explained by postulating that it allowed for the purposeful employment of tools and art in strategies geared towards solving problems that arose from growing group sizes (Gamble et al., 2011; Gowlett et al., 2012).

Seeing artefacts as biologically underpinned adaptive solutions to social problems appears to follow in the Neo-Darwinian footsteps of the so-called *Modern Synthesis*. In studying the evolution of mind and culture, its proponents specifically focus on dynamics of variation, inheritance, competition and selection (for a review, see Mesoudi (2011)). Dual inheritance theory (DIT) is a characteristic example of an adaptationist approach to evolution. Geared towards gene-culture coevolution, Richerson and Boyd (2005, p. 7) characteristically argue "that the human cultural system arose as an adaptation, because it can evolve fancy adaptations to changing environments rather more swiftly than is possible by genes alone." As they see it, the aforementioned mechanisms drove the evolution of culture along a path of its own, albeit one in close interaction with the trajectory of genetic evolution. In cultural evolution though, information is manifested as memes, snippets of cultural knowledge transmitted between individual minds. Yet much like its biological counterpart, culture is subjected to selective pressures. For example, demographic phenomena (e.g., increased population size and migratory connectivity) that were underpinned by climate change are factors posited to have played a key role in the appearance of cultural innovations (Shennan, 2001; Zilhão, 2007; Powell et al., 2009; Kuhn, 2012; Lombard, 2012; d'Errico & Banks, 2013). In fact, it has long been maintained that symbolism was developed because it "solves an adaptive problem for humans that is probably related to information-processing requirements" (Lindly & Clark, 1990, p. 252). As Hoffeecker (2011, p. 84) characteristically put it: "More than any other organism that has ever trod the Earth, modern humans are the product of information, rather than genes (or, because genes are themselves a form of information, an alternative and more mutable type of information)."

Against the tendency to treat evolution as change resulting from information coursing through two interacting, yet distinct trajectories, some scholars have been defending an alternative scenario: one wherein biology and culture are treated as intimately entwined dimensions of the same ontogenetic process (e.g., Ingold, 2013). Post-genomic metatheoretical models such as *developmental systems theory* (Griffiths & Gray, 1994; Griffiths & Stotz, 2000; Oyama et al., 2001) and *probabilistic epigenesis* (Gottlieb, 2003; 2007) have been making a strong case for the ontogenesis of phenotypes through a developmental process resulting from bidirectional influences between genes, neurons, behaviors, and the physical, social, and cultural environment. Furthermore, according to an approach in evolutionary biology known as Niche Construction Theory (NCT), organisms systematically alter their developmental niches by transforming the environments they pass onto subsequent generations, effectively influencing the selection pressures acting on them (Odling-Smee et al., 2003; see Laland et al., 2016 for a recent review; see also Sinha, this volume). Humans, in particular, create social and technological environments that facilitate the learning process for the descendants that inherit them, thus shifting the focus of natural selection from the organism alone to the organism in its epistemic niche. For the proponents of NCT then, human evolution should be seen as

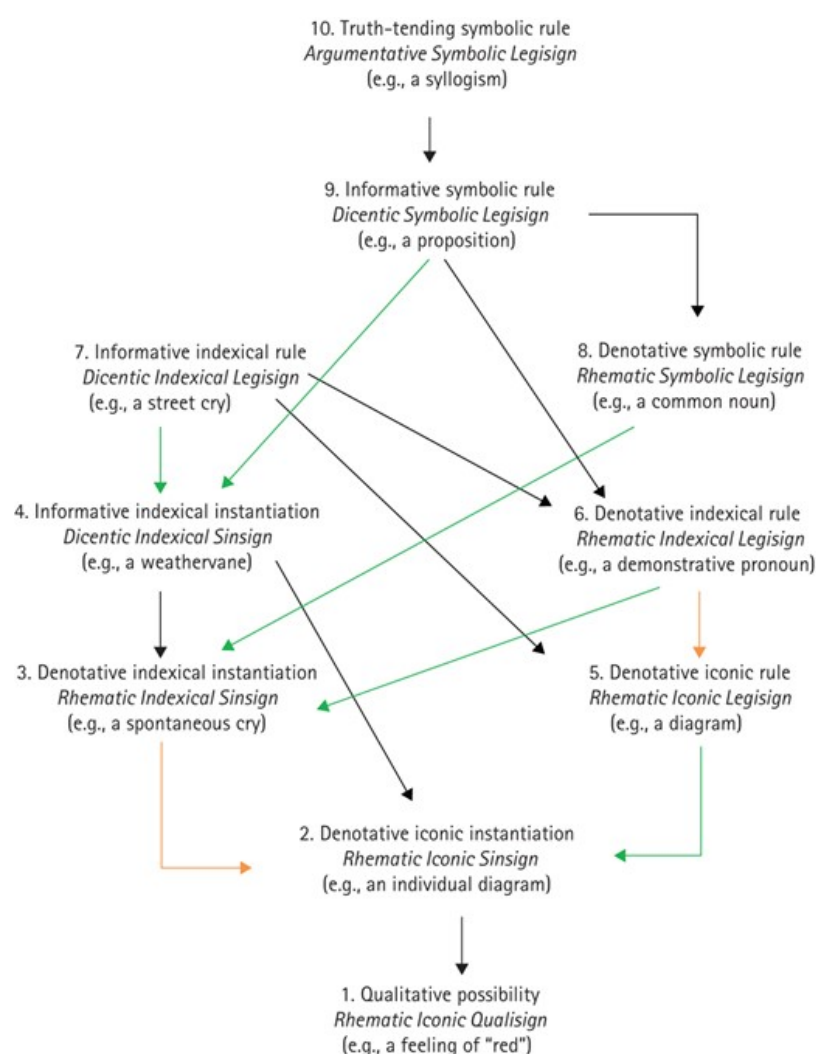
process of cumulative epistemic engineering both leading to and driven by an increasing propensity for social learning (Sterelny, 2012). From this epigenetic point of view, our symbolic ability is best attributed to an augmented developmental transition from relative organismic plasticity and informational openness to relative rigidity and informational closure, taking place within the complex niches humans construct and dwell in (Sinha, 2015). Therefore, in integrating an ecological aspect into the Darwinian notion of inheritance, the *Extended Evolutionary Synthesis* (Laland et al., 2015) appears to provide a biologically and culturally informed conceptual framework that is suitably geared for archaeological research (Laland & O'Brien 2010).

Transposing niche construction from evolutionary biology into the domain of cognitive archaeology means honing its sensitivity towards material culture, especially with regard to its cognitive implications. If we are to really account for the various practical and poietic ways through which a niche is developed and changed, we might want to consider combining NCT with an externalist, process-based take on cognition and creativity. In an attempt to grant materiality with a more active role in the story of human evolution, the theory of material engagement specifically blends niche construction with Bergson's (1998) notion of *creative evolution* (Malafouris, 2015). According to Malafouris (2016, p. 290): "Human beings evolve by creating material things and assemblages which scaffold the ecology of our minds and shape the boundaries of our thinking." While we do not of course doubt the role of natural selection as a prime mover of diachronic change, we suggest that the creative impulse of humans must also be recognized as a catalytic factor in their evolution. From where we stand, studying their evolution proper requires attending to the creative ways in which their plastic brains could have been integrated with the ductile objects that made up their worlds. This entails acknowledging that the relation between their neural and their cultural plasticity is itself malleable and dynamic—a fact that calls us to recognize *metaplasticity* as the defining characteristic of our species (Malafouris, 2010, 2013, 2015). What this concept allows us to do is explore the diverse ways through which humans and artefacts must have come together in situated actions that generated meaning. In the case of early body ornamentation for instance, ochre pigments and shell beads would have come to function as material signs that provided information about their wearers because biology and culture had been brought together in the same ontological locus through the very act of attaching artefacts onto bodies (Garofoli, 2015; Iliopoulos, 2016a; Garofoli & Iliopoulos, 2019). Of course, the initial interpretations of early humans would have veered towards haphazard guesses, especially when first-presented with unfamiliar "facts" which cast doubt on the meanings grasped. Given that what is interpreted as an informative sign (i.e., a *Dicisign*) is not always true, humans would have been faced with the task of evaluating their interpretations against the backdrop of perceptual cues and prior experience. Essentially then, they would have had to learn how to think about thinking. From MET's point of view, the awareness that came with the development of *meta-representational* thinking would have been instrumental for the conscious manipulation of the rich array of signs that make human culture and symbolic systems so unique.

As we see it, tracing how material signs provided the semiotic scaffolding that drove the evolution of cultural practices calls for a framework that can accurately describe a broad semiotic spectrum, ranging from iconic and indexical signs such as communicative artefacts, to symbolic syllogisms such as those guiding rituals. In order to follow this evolutionary transition from the more concrete to the more arbitrary, our typology should also be able to account for the interrelations between different kinds of signs. This is why we must return to Peirce's three triads of semiosis and put them together in order to get a hierarchized tenfold typology (CP 2.254–2.263; Figure 4), which allows us not only to accurately describe the nature of past material signs, but also to appreciate their role in broader contexts of semiosis and meaning. The epistemic potential of this descriptive typology has already been recognized by studies on both historic (Preucel, 2006, Chapters 8 and 9; Watts, 2008) and prehistoric artefacts (Iliopoulos, 2016b). According to a recent application to the case of early body ornamentation, cultural narratives or syllogisms such as rituals (i.e., *Argumentative Symbolic Legisigns*) would have been yielded through the arrangement of symbolic propositions about qualities such as the wearer's status (i.e., *Dicentic Symbolic Legisigns*), while

informative indexical rules about the wearer's ability to accumulate coveted objects (i.e., Dicentric Indexical Legisigns) would have resulted from the embodiment of rules about their actual relation to their wearer (i.e., Rhematic Indexical Legisigns), as well as about the value of the artefacts themselves (i.e., Rhematic Iconic Legisigns) (Iliopoulos, 2016a). Seeing how the meaning of material culture appears to have been multi-layered rather than one-dimensional, we must thus arrive at the conclusion that the evolution of symbolic narratives is best attributed to protracted processes of semiotic scaffolding, which would have been driven by cases of creative material engagement with iconically and indexically grounded signs.

**Figure 4**



In this lattice, the ten classes of signs are hierarchically structured, with higher-order signs embodying lower-order signs (adapted from Iliopoulos, 2016b, p. 120, Figure 4). The black arrows point towards the embodied lower-order signs that provide the foundations for higher-order signs. The other two types of arrows are special in that they point towards special cases of lower-order signs: the green arrows point towards “peculiar” Sinsigns that are real-world instantiations (i.e., Replicas) governed by general rules (i.e., Legisigns) (CP 2.246); and the orange arrows point to “peculiar” Icons that do not just resemble their Object, but are actually modified by it (CP 2.248).

It should then follow that the evolution symbolic material culture would not have been an all-or-nothing affair; “[i]t was rather the culmination of a prolonged evolutionary process that involved: perceiving the relevance between two ‘things’; understanding that one of these ‘things’ can stand for the other in some respect or capacity; recognising that this relation can be purely arbitrary; and appreciating that this relation can belong to a syllogistic system of other such relations” (Iliopoulos, 2016b, p. 120). Given that



typification, sign function, symbolicity, and systematicity were probably distinct points in our semiotic becoming, it would be misguided to subsume them all under the umbrella of a “symbolic” ability. As might be expected, treating them as distinct cognitive achievements in the various spatiotemporal trajectories of our semiotic evolution contradicts the key belief of the symbolocentric paradigm—that is, the one according to which “[a]n organism has the ability to symbol or it does not; there are no intermediate stages” (White, 1949, p. 24). If a symbolic capacity is any way to define a “modern” mind as such, then it seems that we must also rethink our search for traces of “modern” human behavior and cognition. Not surprisingly, the incremental achievement of semiotic milestones at various places and times across the prehistoric landscape is largely incongruent with the widely held assumption according to which the “symbolic” capacity that made humans “modern” was bestowed to parental groups of hominins through one or more culturally adaptive genetic mutations that enabled them to cross some sort of neurocognitive Rubicon. Given our critical perspective, we join with the growing minority of scholars that have called for the elimination of “modernity” as a notion from the debate on human origins (Shea, 2011; Langbroek, 2012; Hopkinson, 2013; Malafouris, 2013, pp. 239–243; Garofoli, 2016; Iliopoulos, 2016b; Roberts, 2016; see also Latour, 1993).

## Towards a materially sensitive account of human origins

Our by no means exhaustive overview of the archaeological literature on the origins of symbolism revealed that the connection between prehistoric material signs and what they would have stood for is usually seen as governed by pre-existing conventions. Most cognitive archaeologists maintain the view that “symbolic” artefacts were the epiphenomenal products of predefined forms and meanings that were imbued into them through the purposeful creation of communally agreed, linguistically communicated cultural constructs. This *hylomorphic* model of creation in turn presupposes a neurocognitive apparatus sufficiently capable of coming up with solutions to looming problems, such as greater demographic size and complexity, through the invention of an informational kind of material culture. And treating material symbols as an adaptive response evidently entails the assumption that the trajectory of cultural evolution is in close pursuit of the biological trajectory, harnessing for cultural purposes the processing power bestowed on our ancestors by the selectively-driven accumulation of random mutations.

In reaction, a new school of thought has called attention to the fact that, besides of course being able to signify arbitrarily, significative artefacts can also stand for something else by way of similarity, spatiotemporal contiguity, and/or factorality. In fact, the physical qualities and relations they embody and enact make them prime candidates for an iconic and/or indexical mode of signification, at least in the beginning. In revealing how the “real” world can scaffold the emergence of novel concepts, a pragmatic take on the nature of material signs sets the foundations for a *hylonoetic* approach to creation. Rather than seeing the mind as a computational device that processes symbolic representations about the world before externalizing them as epiphenomenal products, the proponents of this enactive view suggest that cognition is brought forth by physically engaging with the material world. The theory of material engagement thus avoids treating cognition as a brain-bound process, opting instead for a process-based philosophy according to which the mind emerges from the inextricable folding of brains, bodies, and things. Rejecting symbolocentric theories of cognition, methodological individualism, and representational nativism ultimately leads us to a post-genomic take on the evolution of material culture and material signification. Contrary to the idea that biological and cultural evolution follow parallel yet distinct trajectories, the MET-inspired notion of metaplasticity seeks to account for diachronic change in the way plastic brains and things have been integrating in developmental contexts. As we see it then, ECA might benefit from reevaluating some of the theoretical assumptions made when studying the origins of symbolism.

We should note at this point that, apart from theoretical reasons, methodological difficulties also preclude us from making any definitive statements about “when” and “where” symbolic artefacts first appeared. If we restrict the notion of symbolism to *purely* arbitrary signs (so as to distinguish these from iconic and indexical signs), then the actual connection between a symbolic artefact and what it stands for is virtually undetectable in the prehistoric archaeological record. As Sonesson (2006, p. 172) points out when discussing symbols, there is nothing in the expression and the content of the sign that explains the sign relation that produced the relevance between them. Given then that the “cognized” categories held by past minds cannot be directly accessed (Renfrew, 1982, p. 11), attempting to gauge the presence of symbolic meanings from prehistoric artefacts does not seem very promising.

As it turns out though, while the chronological version of “when symbolism first appeared” cannot be confidently addressed, exploring the deeply ontological version of “when it evolved” is in fact possible. From a pragmatic and enactive point of view, accounting for the evolution of material signification basically entails tracing the process of change in the prehistorically situated perceptions and conceptions of different kinds of artefacts, not necessarily “non-utilitarian.” Since we cannot access prehistoric societies directly, we can never be certain about whether any particular artefact had actually been taken to stand for something else in some respect or capacity. What we can however garner are opportunities for the scaffolding of sign function. All we need to do is focus on whether the unearthed objects might have afforded the perception of similarity, contiguity, and/or factorality. Recognizing that a thing or an action could have been seen as iconically or indexically relevant to something else, at least accounts for the availability of the grounds required for the development of iconic and indexical signs. And once humans discovered that a “thing” can expressively stand for something else, the development of purely arbitrary connections with abstract contents would have been less of a leap, especially if we consider that the development of symbolic concepts reduces the cognitive load stemming from the accumulation of many physically grounded meanings in the same sign vehicle. It is easy then to see how the propositions resulting on the basis of these concepts could have been in turn associated with other such propositions (themselves probably based on other kinds of material signification), effectively scaffolding the development of symbolic narratives such as those involved in rituals. Unlike language-like systems, which are characterized by many-to-one associations and one-to-many associations between their elements, these cultural practices would have taken the form of syllogisms connected through one-to-one associations between premises building towards a conclusion. In seeking then to uncover the systems guiding the use of representational and communicative practices, ECA might have something to gain from replacing its formalist and structuralist understanding of material culture with a pragmatic and enactive approach that grants merit to the physical world for its role in semiotic scaffolding.

Of course, it must be recognized here that the evolution of material signification would have also owed much to the affordances presented by the body itself. From an anatomical standpoint, developments such as full bipedalism, opposable thumbs, pointing fingers, complex facial musculature, and eye coloration would have enabled hominins to engage in face-to-face encounters with some degree of eye contact, until an awareness of joint attention was established (Barrett, 2013). According to Barrett, joint attention would have allowed for copying and teaching, thusly maintaining a shared embodied empathy between social agents in their practical understanding of the material world (see Gärdenfors & Höjberg, this volume). Drawing upon work in developmental psychology (Sinha & Rodríguez, 2008), we could then argue that it was the shared interobjective world of early humans that afforded their participation in joint semiotic action, thus bringing forth an intersubjectivity which in turn shaped social facts and ultimately themselves. As we see it, intersubjectivity—that is, “the sharing of experiential content (e.g., feelings, perceptions, thoughts, and linguistic meanings) among a plurality of subjects” (Zlatev et al., 2008, p. 1)—must have reached the rich and elaborate state characteristic of humankind through protracted processes of creative material engagement and semiotic interpretation taking place at both personal and social levels.

## Conclusion

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If, as evolutionary cognitive archaeologists, we are to concern ourselves with a *biological* explanation for the evolution of human intelligence, then we must attend to more than the mechanisms of what the Greeks referred to as *ζωή* [zōē]—that is, the simple fact of living common to all animals. To really enter the post-genomic era as a discipline at large, ECA must wholly embrace what they called *βίος* [bíos or, better yet, víos]—that is, the form or way of living proper to an individual or group. By borrowing this fundamental categorical distinction from political philosophy (Agamben, 1998), we would like to hint towards the fact that biology is much closer to culture than we often tend to think. While biology is usually associated with the carnal manifestation of adaptive brains and bodies sculpted through natural selection, its etymological root seems to be much closer to an ontogenetic understanding of the term. It might be worth it then to opt for a developmental take on cognitive evolution, which essentially means attending to the finer intricacies of lived experience in prehistorically situated contexts of material engagement.

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## Notes

- 1 The term *hylomorphic* comes from the Greek words *hyle* (matter) and *morphe* (form).
- 2 The term *hylonoetic* comes from the Greek words *hyle* (matter) and *nous* (mind).
- 3 See Wobst, 1977; Conkey, 1978; Gamble, 1982; Chase & Dibble, 1987; Mithen, 1988a, 1988b; Marshack, 1989; Lindly & Clark, 1990; Chase, 1991; Donald, 1991; Mellars, 1991; Chase & Dibble, 1992; Duff et al., 1992; Schepartz, 1993; Chase, 1994; Henshilwood & Sealy, 1997; d’Errico, 1998; Mithen, 1998b; Renfrew, 1998; McBrearty & Brooks, 2000; Wadley, 2001; d’Errico, 2003; d’Errico et al., 2003; Henshilwood & Marean, 2003; d’Errico et al., 2005; Chase, 2006; Kuhn & Stiner, 2007a, 2007b; McBrearty, 2007; Zilhão, 2007; Bednarik, 2008; Conard, 2008; Habgood & Franklin, 2008; Henshilwood & Dubreuil, 2009; Nowell, 2010; d’Errico & Henshilwood, 2011; d’Errico & Stringer, 2011; Henshilwood & Dubreuil, 2011; Cole, 2015; d’Errico et al., 2018.
- 4 The term “non-utilitarian” is used in contradistinction to the term “utilitarian,” which refers to non-significative artefacts and practices used for subsistence/settlement purposes (e.g., Marshack, 1989; Mellars, 1989; Bednarik, 1992, 1995; d’Errico & Nowell, 2000; d’Errico et al., 2003; Henshilwood & d’Errico, 2011).
- 5 See Chase & Dibble, 1987; Marshack, 1989; Mellars, 1989; Lindly & Clark, 1990; Mellars, 1991; Belfer-Cohen & Hovers, 1992; Gargett, 1999; McBrearty & Brooks, 2000; d’Errico, 2003, 2007; Kozłowski & Sacchi, 2007; Zilhão, 2007; d’Errico & Stringer, 2011; Pettitt, 2011; Barton & d’Errico, 2012.
- 6 See Marshack, 1976; Chase & Dibble, 1987; Davidson & Noble, 1989; Mellars, 1989; Chase, 1991; Noble & Davidson, 1991; Chase & Dibble, 1992; Duff et al., 1992; Noble & Davidson, 1993; Chase, 1994; Mithen, 1996; Marshack, 1997; d’Errico & Nowell, 2000; McBrearty & Brooks, 2000; Soffer et al., 2000; Conard, 2003, 2009; d’Errico, 2003; Klein, 2009; Barton & d’Errico, 2012.
- 7 Sackett, 1986; Chase, 1991; Henshilwood et al., 2001.

- 8 Davidson & Noble, 1989; Chase, 1991; Chase & Dibble, 1992; Henshilwood et al., 2009; Henshilwood & d’Errico, 2011; Barton & d’Errico, 2012.
- 9 See Marshack, 1981; 1989; Mellars, 1989; White, 1989a, 1989b; Knight et al., 1995; Ambrose, 1998; Barham, 1998; McBrearty & Brooks, 2000; Barham, 2002; Watts, 2002; d’Errico, 2003; d’Errico et al., 2003; Henshilwood & Marean, 2003; Hovers et al., 2003; d’Errico et al., 2005; Bouzouggar et al., 2007; Kuhn & Stiner, 2007a, 2007b; Marean et al., 2007; Watts, 2009; Henshilwood & Dubreuil, 2011; Pettitt, 2011; Vanhaeren et al., 2013; Abadía & Nowell, 2015.
- 10 Byers capitalized “Intentionality” in order to distinguish and denote the mental property of an artefact user.
- 11 To avoid the conflation between these two conceptualizations of symbolism, Chase (1994, p. 627) employed the term “referential symbolism” to denote the referential use of conventional signs, while calling the phenomenon described by Byers “symbolic culture.”
- 12 Adhering to scholarly tradition, we cite Peirce’s work (1931) as CP (followed by volume and paragraph number).
- 13 While the discourse on human origins has been mostly focused on the ability to early body ornaments to reference the social status of their wearers, it is important to acknowledge that they would have also conferred it to them (Iliopoulos, 2016a, pp. 267–268). In effect, past material signs would have both created and described states of affairs. To this extent, semiotic approaches towards prehistoric evidence might benefit from finer distinctions, such as the one between—what Sonesson (2006, pp. 175–176) terms—*abductive* and *performative* indices (Iliopoulos, 2016b, p. 116; see the same page for a distinction between what Sonesson (2010, p. 39) calls *primary* and *secondary* icons).
- 14 A number of edited volumes and special issues over the past decade or so have been devoted to a view of the mind not limited within the confines of the brain, or even the body (e.g., see papers in Knappett & Malafouris, 2008; Renfrew et al., 2009; Malafouris & Renfrew, 2010; Iliopoulos & Garofoli, 2016b; Malafouris, 2019).