

# SEMIOTIC ARCHAEOLOGY: CORRELATED EVOLUTIONARY STAGES OF LANGUAGE, ART AND TOOLS

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Bringing together the archaeological record from art history and tool production, this paper delineates four different stages of semiotic and hence communicative abilities for hominin evolution from the primate stage to modern *homo sapiens*: (1) reactive-mimetic; (2) proactive-mimetic; (3) hyperindexical; and (4) externalized iconic and symbolic. These evolutionary stages presuppose a gradual emancipation of a virtual sphere detached from nature and a corresponding giving over of hominin evolution to culturally rather than genetically determined conditions. This transition comprises a spiraling turn in the Lower Paleolithic, in which the phylogenetic lifeworld emerges as an enlargement of the intimate space of postnatal ontogenesis, what we term a macro-cocoon. Although we hold that any hominin line would possibly follow this route of development, either independently or in interaction with other contemporary lines, only *Homo Sapiens* reached the fourth stage.

## 1. Introduction: an interdisciplinary approach

This paper presents a transdisciplinary model of human evolution, linking linguistics with art history and prehistoric archeology. Its approach is systems-oriented, suggesting that humanoid mental capacities have evolved in increasing interaction with diverse forms of cultural practices. Because of the close interaction between “outer” cultural practices and their imprints in “inner” brain disposition, we must suppose certain stages of human evolution, in which archaeological traces of semiotic activities and utilitarian artifacts could be seen as evidence of stages of certain brain dispositions, spanning cognition, emotions and religious beliefs. We suggest a preliminary model with four basic steps, whose ground tendencies are supposed to be applicable to any hominin line, living

or extinct. Although any hominin line would possibly follow this route of development, either independently or in interaction with other contemporary lines, only *Homo sapiens* reached the fourth stage. In our concluding synoptic table, we exemplify the different stages by samples from the currently available archaeological record, but without claiming them to be exhaustive.

Our guiding presupposition is that the advancement of hominin culture creates a virtual niche, or sphere, that is increasingly autonomous from the living and surviving conditions offered by the natural habitat (Harari [2011] 2014), and that this involves a corresponding autonomization of semiotic signs in relation to their referents. It is indeed the crystallization of such a relatively autonomized virtual sphere that pauses the genetically based anatomical evolution of the human species. Human evolution is now predominantly transferred – sublimated – to the domain of social learning, i.e. accumulative culture. Here, anatomical changes only happen after birth in the form of micro-changes in cortical morphology and diverse bodily techniques (Deacon, 2010; Krubitzer & Prescott, 2019).

However, the mature stage of this sphere, presenting the first externalized icons and symbols, was only reached after a long evolutionary process that could be compared to a spiraling turn. In total, we distinguish the following four major evolutionary stages: (1) *reactive-mimetic*: a stage, shared with other primates, as well as dolphins and certain corvids, in which the early hominin can recognize its mirror image as referring to itself; (2) *proactive-mimetic* (beginning 2,5 mio BP): the earliest specifically humanoid stage marked by stone tools, the ability to project iconic shapes onto pre-existing natural forms, and mimetic body language; (3) *hyperindexical* (beginning ca. 700-500,000 BP): a stage in which the phylogenetic life world at large becomes modeled on the intimate space of early postnatal ontogenesis, resulting in an animated ecology with the first thoroughly externalized semiosis: a stylized reactualization of indexical communication, including proto-symbolic speech (musical proto-language) and nonfigurative pictorial patterns; and (4) *externalized iconic and symbolic* (beginning ca. 100,000-40,000 BP), marked by representational pictures and symbolic language.

## **2. The four evolutionary stages: semiosis of art, toolmaking and language**

The initial stage (1) of hominin semiosis, *reactive-mimetic*, has to be the one present in contemporary great apes (Anderson & Gallup, 2011), which we assume was prevalent in both ancestral non-hominin primates and early hominins – the

ability to recognize oneself in a mirror (e.g. of still water). This ability relies on the immediate indexical association between the self and its reflection. Although the hominin mind hereby identifies itself with something outside the body, this identification does not yet presuppose a consciousness of the distinction between body and mirror reflection but merely their close association. As is also the case with contemporary apes, this ability to self-reflect is allied with an ability to use stone tools (Kortland, 2013) and to communicate by vocalizations and gestures, with a predominance of the latter in close-range communication, characterized by intentionality (deictic) reference, iconicity (pantomime), and turn-taking, i.e. communication structured between dialogue partners (Fröhlich et al. 2019).

The second stage, the *proactive-mimetic* one (2), covers the two tool industry periods of the Oldowan and the Acheulean. Its initiation is exemplified by the South African Makapansgat Pebble, a hominid face-like, but nature-created, stone that 3-2,5 mio BP apparently was retrieved and transported from its finding site to their habitation 50 miles away by supposedly *Australopithecines*. This effort could be seen as a manifestation of the general idea of ‘human face’, in Peirce’s categories of a so-called legisign, “a law that is a sign.” However, at this stage, the representation is established only through reaction to something already given, rather than production (Watson, 2015 as quoted in Hampton, s.a.). What is specifically hominin and not found in apes is the ability to understand the double nature of the image as a sign that is both similar and dissimilar to the thing it represents. Probably the oldest documented hominid stone tool production, consisting of stone tools coarsely chipped at the edges to yield a cutting edge (de la Torre, 2011), the East African Oldowan culture by *Homo habilis*, from ca. 2,6-1,7 mio BP, represents the first level of tool production linked to this mental level of image recognition (Sernaw et al. 2003). The next level of stone tools within this stage is the Acheulian type (hand axes and cleavers): bifacially knapped, symmetrical artifacts, produced by the homo lineages *Erectus* and *Heidelbergensis* (Shipton & Nielsen, 2018). The earliest record so far dates back to 1.76 mio BP (Lepre et al., 2011), and the industry remained productive until about 130,000 BP. Peterson et al. (2018) specify the existence of the Acheulean hand axe as a type (category/model) to be realized in form of a token (the concrete handaxe) in the terms of the Peircian sign types of respectively “legisign” (type/an idea) and “sinsign” (token/an actual singular thing) (Bergmann et al., 2003f.). We hold that, while interior legisign and exterior sinsign are in fact highly detached at this evolutionary stage, the sign user does not experience them as separate. At

stage (2), intra- and intergenerational technology was therefore still transferable through mimetic-imitative embodied learning alone.

To approach the complex *hyperindexical* stage (3), we should understand it as a phase that moves the expanding world of inner representations closer to the outer world of objects through dense indexical connections. It could be specified as what Tomlinson (2017: 13) calls “hyperindexicality,” that is, the “systematic and hierarchical arrangement of indexes in relation to one another, which brings them close to one of the characteristic features of the symbol.” How this bridge-building between inner and outer worlds is realized could be illuminated by considering the further evolution of hominins as an exposure of a now more vulnerable organism towards its accordingly more protective environment. For a crucial price for the evolutionary rise of complex brains and sensoria seems to be an intensification of the initial protection of individual organisms, which is underway throughout the evolution of eukariotic organisms: the ontogenetic protective worlds of eggs, wombs, nests, and warm spaces for suckling. Hominins are located at a particularly intricate crossing point between rising autonomization of the brain and this accompanying protection of embryos and infants, since now this protective cocoon not only restricts itself to the ontogenetic evolution of womb and suckling environment. Rather, in a transferal from onto- to phylogenesis, it seems to be projected onto the physical environment at large in a process, which the German philosopher of culture, Peter Sloterdijk (1999), terms *Blasen* (blowing). Corresponding with this giving-over of protection to the macro-cocoon of the surrounding world, the hominin body seems to become increasingly fragile and open in its naked state. Prematurely born and continuing its neoteny, the furless vulnerable state of young mammals into adulthood, the naked human ape (Morris, 1976) only becomes completed through wrapping itself in new artificial furring: the macro-cocoon of semiotics and technology (Gehlen [1940] 2016). It is this process of self-domestication (Deacon, 2010) that generates the hyperindexical stage, in which inner signs are connected to the outer world of objects and events through intense indexical communication.

Although evolutionary linguistics seems to lack a systematized model of this process of self-domestication, Darwin’s original idea about a “musical proto-language” has lately gained renewed scholarly interest and might be a well-suited explanatory candidate for accounting for the communicative underpinnings of this process: an indexical form of proto-symbolic communication, in which sounds are stylized according to intensity, rhythm and pitch (Ravignani & de Boer, 2021). As suggested by Michael Tomasello (2008), this sort of proto-symbolic language

is very similar to the nonlinguistic communication between early infants and caretakers. To further elaborate this connection between onto- and phylogenetic development we should consult the paleo-art historian Ellen Dissanayake (2000) who traces the origins of visual art to exactly a phylogenetic upscaling of the intimate indexical communication between parent and infant.

In terms of visual art, the pre-symbolic indexical patterns of parent-infant communication are confirmed by the surviving remnants of Lower Paleolithic art, from *Homo heidelbergensis* to *Homo neanderthalensis*. Their exclusively non-figurative patterns, such as parallel lines or criss-crossings, could thus be conceived of as ritualistic traces, imprints of performative actions, whose significance is retained in indexical form. The main surviving evidence includes the *Pseudodon Shell DUB 1006-fL* (540,000-430,000 BP) from Trinil, Java (Joordens et al., 2015), the elephant bone from Bilzingsleben, Germany (400,000-350,000 BP) (Mania & Mania, 1988), the ochre and ostrich eggshell fragments from the South African Blombos Cave and Diepkloof Rock Shelter (100,000 BP) (Tylén et al., 2020), and the criss-cross patterns engraved by Neanderthals in the rocky walls of the Gorham Cave, Gibraltar (ca. 39,000 BCW) (Callaway, 2014). The same semiotic mechanisms must have applied in the case of the Schöningen wooden hunting spears (nine spears, one lance, a double pointed stick, and a burnt stick) from 300,000 BP, made by *Homo heidelbergensis* or early *Neanderthalensis* (Schoch et al., 2015). The cultural niche, where abstract models (types) and concrete tokens must coexist in the minds of the artisans, allows for the passage from indexical to symbolic thinking. On the practical level of communication, the indexical event of namegiving of concrete tokens (living or non-living entities) precedes the symbolic event of namegiving of categories/types (legisigns), and is supposedly found at this cultural state (Deacon 1997).

Stage (4) is finally characterized by externalized icons (representational pictures) and externalized symbols (spoken words), with the latter possibly preceding the former, at least if we keep to what the currently available archaeological record allows us to infer. The externalization of mammalian and avian fauna in the cave paintings of Spain and France, and on the Indonesian island of Sulawesi, created during a period from ca. 45,500 to 12,000 BP (García-Diez et al., 2013; Ducasse & Langlais, 2019), were probably dependent on a beginning division of the Lower Paleolithic macro-cocoon. Because humans now felt separated from an emergent maternal underworld, a bridge was constructed in the form of pictorial animals that seemed autochthonously born through the cave walls, the membrane between

the other world and ours (Clottes & Lewis-Williams, [1996] 1998). Such externalized pictorial signs thereby made remote realities of all kinds accessible, including those of imagined abstractions. If we now look at the archaeological evidence for bow-and-arrow technology, the complexity of its complementary design (hafting of different components with several-component glues, etc.) demands communication of highly abstract information, which can only be performed via a similarly externalized symbolic language system (Wadley, 2010; Lombard & Haidle, 2012). The emergence of such a system is hence a prerequisite for this cultural stage, whose archeological record can be traced back to 70,000 BCW.

In the following synoptic *Table 1*, we will, in conclusion, recapitulate the steps of this chronology, while emphasizing that the datings must be taken as approximative and veiling the plausible assumption that there has been considerable overlap in time as well as depending on space.

Table 1. Conservative evolutionary chronology of semiotic stages, art production, tool making and communication in hominins (approximative and simplified).

<i>Dating</i>	<i>Semiotic stages</i>	<i>Art</i>	<i>Tools</i>	<i>Communication</i>
primate	reactive-mimetic	recognition of own mirror image (pre-stage)	stones and sticks	gestural, vocal
3-2,5 mio	proactive-mimetic; legisigns and sinsigns	Makapansgat pebble		
2,6 mio			Oldowan	vocal, gestural (mimetic)
1,76 mio – 130.000			Acheulean	
540-430.000		Trinil Shell		
400-350.000	hyperindexical	Bilzingsleben Bone		namegiving of tokens
300.000			Schöningen spears	
100.000		Blombos, Diepkloof engravings		
70.000	externalized symbolic and iconic		bow & arrow	
				symbolic language
45.000		Sulawesi paintings		(namegiving of categories/types)
20.000		Lascaux paintings		

## References

- Anderson, J.R.. & Gallup, G.G. Jr. (2011). Which Primates Recognize Themselves in Mirrors? *PLoS Biol*, 9(3), e1001024.
- Barham, L. & Everett, D. (2021). Semiotics and the origin of language in the Lower Paleolithic. *Journal of Archaeological Method and Theory*, 28 (2), 535-579.
- Bergman, M., Paavola, S. & Queiroz, J. (2003f.). *Commens. Digital Companion to C. S. Peirce*. <http://www.commens.org/home>
- Callaway, E. (2014). Neanderthals made some of Europe's oldest art. *Nature*. <https://doi.org/10.1038/nature.2014.15805>
- Clottes, J. & Lewis-Williams, D. ([1996] 1998). *The Shamans of Prehistory: Trance and Magic in the Painted Caves*, trans. Sophie Hawkes (New York: Harry N. Abrams).
- Deacon, T. W. (1997). *The symbolic species. The co-evolution of Language and the brain*. New York and London: The W. W. Norton Company.
- Deacon, T. W. (2010). *Language and complexity: Evolution inside out*. Lecture held at the 37th International Systemic Functional Congress, <https://www.youtube.com/watch?v=OT-zZ0PMqgI>
- Dissanayake, E. (2002). *Art and Intimacy: How the Arts Began*. Seattle and London: University of Washington Press.
- Ducasse, S. & Langlais, M. (2019). Twenty years on, a new date with Lascaux. Reassessing the chronology of the cave's Paleolithic occupations through new 14C AMS dating. *Revue d'Archéologie Préhistorique*, 30 (1), 130-147.
- Fröhlich, M., Sievers, C., Townsend, S. W., Gruber, T. & van Schaik, C. P. (2019). Multimodal communication and language origins: integrating gestures and vocalizations. In *Biological Reviews*, 94, 1809-1829.
- García-Diez, M., Hoffmann, D. L., Zilhão, J., de las Heras, C., Lasheras, J.A., Montes, R. & Pike, A.W.G. (2013). Uranium series dating reveals a long sequence of rock art at Altamira Cave (Santillana del Mar, Cantabria). *Journal of Archaeological Science*, 40 (11), 4098-4106.
- Gehlen, Arnold. *Der Mensch: Seine Natur und seine Stellung in der Welt* (Frankfurt a.M.: Vittorio Klostermann, [1940] 2016).
- Hampton, J. G. (s.a.). Contemporary Rock Art. In Hampton, J. G. (s.s.). *Rocks, Stones Dust, Contemporary Art Devoted to Rocks and Their Relations*. Online Exhibition Catalog. The Justina M. Barnicke Gallery and the University of Toronto Art Centre, 28, 1-22.
- Harari, Y. N. ([2011] 2014). *Sapiens: A Brief History of Humankind*, trans. P.P.P.S.F. Ahmed. New York: Harper.
- Joordens, J. C. A., d'Errico, F., Wesselingh, F. P., Munro, S., de Vos, J., Wallinga, J., Ankjærgaard, C., Reimann, T., Wijbrans, J. R., Kuiper, K. F. & Mûcher, H. J. (2015). Homo erectus at Trinil on Java used shells for tool production and engraving. *Nature*, 518 (7538), 228-21.

- Lombard, M., & Haidle, M. N. (2012). Thinking a Bow-and-Arrow Set: Cognitive Implications of Middle Stone Age Bow and Stone-tipped Arrow Technology. *Cambridge Archaeological Journal*, 22 (2), 237-264.
- Mania, D. & Mania, U. (1988). Deliberate engravings on bone artifacts of Homo Erectus. *Rock Art Research*, 5, 91-97.
- Morris, D. (1967). *The Naked Ape*. London: Corgi Books.
- Peterson, J.V., Thornburg, A.M., Kissel, M., Ball, K. & Fuentes, A. (2018). Semiotic Mechanisms Underlying Niche Construction. *Biosemiotics*, 11, 181-198.
- Pike, A. W. G., Hoffmann, D. L., García-Diez, M., Pettitt, P. B., Alcolea, J., De Balbín, R., González-Sainz, C., de las Heras, C., Lasheras, J. A., Montes, R. & Zilhão, J. (2012). U-Series Dating of Paleolithic Art in 11 Caves in Spain. *Science*, 336 (6087), 1409-1413.
- Ravignani, A., & de Boer, B. (2021). Joint origins of speech and music: testing evolutionary hypotheses on modern humans. *Semiotica*, 239, 169-176.
- Schoch, W. H., Bigga, G., Böhner, U., Richter, P. & Terberger, T. (2015). New insights on the wooden weapons from the Paleolithic site of Schöningen. *Journal of Human Evolution*, 89, 214-225.
- Semaw, S., Rogers, M. J., Quade, J., Renne, P. R., Butler, R. F., Domínguez-Rodrigo, M., Stout, D., Hart, W. S., Pickering, T. & Simpson, S. W. (2003). 2.6-Million- year-old stone tools and associated bones from OGS-6 and OGS-7, Gona, Afar, Ethiopia. *J. of Human Evolution*, 45 (2), 169–177.
- Shipton C., Nielsen M. (2018) The Acquisition of Biface Knapping Skill in the Acheulean. In: L. D. Di Paolo, F. Di Vincenzo & F. De Petrillo (Eds.). *Evolution of Primate Social Cognition. Interdisciplinary Evolution Research* (pp. 283-297). Vol 5. New York: Springer.
- Sloterdijk, P. (1998). *Sphären I: Blasen*. Frankfurt a.M.: Suhrkamp.
- Tomasello, M., & Farrar, M. J. (1986). Joint Attention and Early Language. *Child Development*, 57(6), 1454-1463. <https://doi.org/10.2307/1130423>
- Tomasello, M. (2008) *Origins of Human Communication*. Cambridge, MA: MIT Press.
- Tomlinson, G. (2017). Semiotic Epicycles and Emergent Thresholds in Human Evolution. *Glass-Bead I*, 1-14.
- Wadley, Lynn. (2010). Compound-adhesive manufacture as a behavioral proxy for complex cognition in the Middle Stone Age. *Current Anthropology*, 51 (1), 111–19.