



# Evolving Belief, Evolving Minds: Evolutionary Insights Into the Development and Functioning of Human Society

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**Keywords:** evolution, neurobiology, human mind, genus *Homo*, belief

## OPEN ACCESS

### Edited by:

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### Specialty section:

This article was submitted to  
Emotion Regulation and Processing,  
a section of the journal  
Frontiers in Behavioral Neuroscience

**Received:** 25 April 2022

**Accepted:** 30 May 2022

**Published:** 22 June 2022

### Citation:

Fuentes A (2022) Evolving Belief,  
Evolving Minds: Evolutionary Insights  
Into the Development and Functioning  
of Human Society.  
*Front. Behav. Neurosci.* 16:928297.  
doi: 10.3389/fnbeh.2022.928297

Belief involves the ability to think beyond what is here and now and develop mental representations in order to see and feel and know something not immediately present to the senses, and invest in that something so that it becomes one's reality (Fuentes, 2019). Belief involves mental activity constituted by neural circuits in the brain (Boyer, 2003), but it is more than that. Belief involves the human ability to draw on cognitive and social resources, histories and experiences, and combine them with imagination to produce neurobiological, physiological, mental and social experience. Belief is a capacity, which may include manifestations of a mental state or attitude involving the appraisal of a proposition, but is not simply this particularly complex human ability of perceptive and affective information processing (e.g. Seitz and Angel, 2020). Nor is belief solely a property arising from the human capacity for extensive shared agency and shared intentionality (e.g. Tomasello, 2019), although both of those processes form aspects of the human capacity for belief. The capacity for belief enables the human to commit wholly and fully to an idea, a sensation, a concept such that it structures perceptual and experiential processes. Beliefs and belief systems permeate contemporary human neurobiologies, bodies, and ecologies, acting as dynamic agents in evolutionary processes and playing core roles in structuring human societies and the human mind (Stotz, 2010; Downey and Lende, 2012; Han, 2017; Fuentes, 2019; Seitz and Angel, 2020).

Belief is not an 'emergent property', something ephemeral floating above the material reality of being human. It is a central component of the human experience. The ability to believe is part of the human system similar to the way that fingers are part of our arms and hands. Fingers are core aspects of human anatomy, modified over evolutionary time dramatically expanding our options for interacting with the world and each other. In humans, mammalian and then primate limbs were shaped and altered over evolutionary time so that their ends contain structures (prehensile digits and hands with precision grips) expanding the capacities for engagement with, and manipulation of, the world. The capacity for belief is similar: it expands human cognitive, sensory and perceptual dynamics and is critical in the human ability to engage with and shape the world.

In an evolutionary context, beliefs provide for both novel alterations and continued coherence in the human niche. In this brief essay I outline key elements in human evolutionary history that facilitated the emergence of the capacity for belief and suggest that beliefs act as core niche constructive processes in the development of the human mind.

## EVOLUTIONARY CONTEXT AND HISTORY

A niche is the structural, temporal, and social dynamic in which a species exists. The niche involves the interfaces between individuals and space, structure, climate, nutrients, and other physical and social factors as a dynamic set of interacting processes (Wake et al., 2009). Over the last two million

years members of the genus *Homo* (humans) underwent significant changes via the emergence of a distinctively human niche. Relative to other hominins, *Homo* underwent specific morphological changes alongside significant behavioral, ecological and cognitive shifts as they forged and were shaped by this human niche (Fuentes, 2015; Marks, 2015; Antón and Kuzawa, 2017; Kissel and Fuentes, 2021). During this time core human patterns emerged including: hyper-cooperation and complex collaboration in social interactions and material technologies; substantially extended childhood development and complex caretaking behavior; intricate and diverse foraging and hunting patterns involving complex technologies, behavior and communication; novel and dynamic material and symbolic cultures eventually resulting in complex cognitive and material meaning-making processes; emergence of exchange networks and increasingly dynamic intergroup relations; and increasingly complex communication and information sharing, eventually resulting in language (Foley, 2016; Fuentes, 2017, 2018; Galway-Witham et al., 2019) (Figure 1).

Across the last million years there were many morphologically and behaviorally diverse populations of the genus *Homo* occupying and shaping the human niche, initially across Africa and Eurasia and eventually into Australasia, the Americas and multiple islands across the planet. The taxonomic distinctions between these populations are far from clear. Some argue for multiple species and others for many subspecies, with others suggesting that it is not currently possible to determine the correct number and types of taxa within the genus *Homo* (Schwartz and Tattersall, 2015; Wood and Boyle, 2016). Given the morphological and ecological diversity, and the multiple tool technologies and lifeways evident across this period it is clear that there were many successful ways to navigate the human niche and that they all were intricately connected to, and stemming from, an evolving cognitive capacity setting the stage for the contemporary human mind. Contemporary *Homo sapiens* are inheritors of a diversity of biological and cultural histories facilitated by the dynamics of the human niche (Kissel and Fuentes, 2021).

Current integrative approaches to human evolution emphasize mutual mutability between agents, bodies, collective action, social perceptions, and the roles of experiences, cultures and institutions in structuring human behavior (Fuentes, 2009, 2017; Marks, 2012; Fry, 2013; Kim and Kissel, 2018; Seitz et al., 2018; Sykes, 2020; Kissel and Fuentes, 2021; e.g. DeSilva, 2021). Such complex and multifarious dynamics model interfaces of ecological, behavioral, cultural and cognitive processes as core in the human niche enabling conjectures about the processes at play in the emergence of distinctively human cognition and thought, a “human mind.”

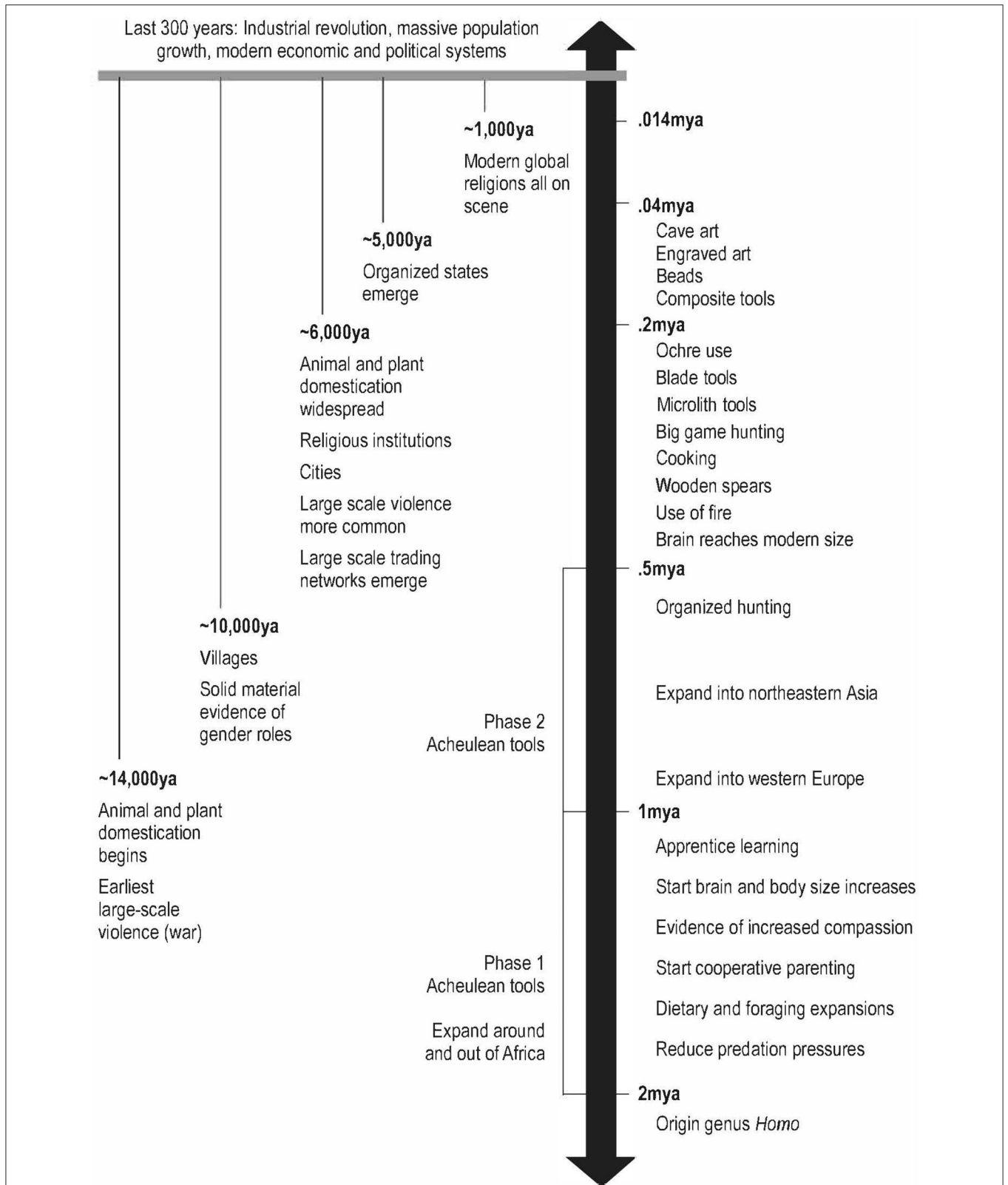
In previous work (Fuentes, 2015, 2016, 2017) I’ve argued for envisioning the human niche as encompassing individual bodies and their evolutionary histories and the patterns and dynamics of interactions within social groups, interactions among/between social groups, and at the community/population levels all within an interactive dynamic with local ecologies (see also Whiten and Erdal, 2012; Foley, 2016). In such a model, evolutionary processes exert pressures at various nodes in the system and responses to those pressures emerge at individual, group, and community

levels. The human niche is a dynamic produced by proactive and reactive responses to social and ecological pressures and contexts at various levels creating local and regional ecologies of interactive material, social, cognitive, and historical aspects that flow from one generation to the next; it creates a shared ecology across time and space, the cultural context in which humans evolve (Henrich, 2016; Fuentes, 2017; Laland, 2017; Boyd, 2018). In the development of that human niche the capacity for belief emerged as a significant component creating a dynamic suite of affordances and constraints on human lives facilitated through human cognition, perception, and thought. The evolution of the human niche then, included the emergence of a shared imagination and a suite of distinctive socio-cognitive processes (Whiten and Erdal, 2012; Tomasello, 2014; Fuentes, 2017; Laland, 2017) and a ubiquitous semiotic ecosystem (Deacon, 2016) as central to the context in which humans evolve.

## MEANING MAKING, CULTURE, AND CONTEMPORARY HUMAN COGNITION

The environment humans make for themselves is created through their symbol using ability, their capacity for abstraction. The symbols, the ideas, are created in the mind... but the human animal learns not only to create them, but to project them onto the external world, and there transform them into reality. –Montagu (1965), *The Human Revolution* [1965:2–3]

The patterns and processes of contemporary human cognition and culture, the human perceptual landscape and core facets of human minds, emerged alongside the processes of toolmaking, foraging, caretaking, the control of fire, the creation of symbolic materials, and the ecological expansion of humans across the planet. This ongoing dynamic, the feedback between neural and behavioral plasticity, laid the neurobiological, social, and ecological foundations in human populations for a particularly complex cognition, and for belief (Deacon, 1997; Fuentes, 2019; Tomasello, 2019; Corbey, 2020). The ratcheting up of social and ecological complexity, combined with increased interactions among populations of the genus *Homo*, particularly over the last 200,000 to 500,000 years, created opportunities for the connections and exchanges between groups and populations that enabled shared beliefs, and eventually belief systems, to emerge (Galway-Witham et al., 2019; Kissel and Fuentes, 2021). The last few hundred thousand years offer material evidence for an increase in, and eventual ubiquity of, meaning-making, art and symbol in human populations (Malafouris, 2013; Deacon, 2016; Roberts, 2016; Fuentes, 2017; Sykes, 2020). Across this process humans developed a capacity for imagination and conceptual innovation. These cognitive processes entailed the emergence of two significant patterns. First, the imagining of novel items and/or representations and either making them or altering other things to become them. Such a capacity appears in a limited form in other animals but becomes permanently and ubiquitously part of the human niche by the middle to late Pleistocene. Second and drawing on the first, over the last few hundred thousand years of our history, as part of our intensive communicative and semiotic capacities, humans began creating explanations of



**FIGURE 1** | A summary overview of the many key capacities, events and processes in the human niche dated to their first appearances in the fossil and archeological record. Reproduced from Fuentes, 2018, 2019, with permission from University of Chicago Press and Yale University Press.

widely observable phenomena such as death, the behavior of other animals, weather, or the sun and moon. They did not, for example, simply connect clouds, thunder, rain, and floods, they also developed explanations for why these things happen (Deacon, 1997, 2016; Tomasello, 2014; Henrich, 2016; Fuentes, 2017, 2018, 2019; Kissel and Fuentes, 2017). This capacity is what Bloch (2008) refers to in arguing that over evolutionary time humans went from socially complex transactional beings (like most social mammals and other primates) to groups of organisms who exist simultaneously in both transactional and transcendent realities, and who use imagination and belief to reshape themselves and the world around them (Fuentes, 2019).

## HUMAN CULTURE/HUMAN MIND

While many organisms have cultures (Whiten, 2021), human culture is demonstrably distinctive. Human culture affects the way that humans do almost everything: fighting, eating, reproducing, innovating, interacting, cooperating, perceiving, making and using technology, expressing ourselves, experiencing emotions, and a host of other cognitive and behavioral processes and events. Culture makes human reason, human being, possible; it forms the central facet of the human niche (Tomasello, 2014; Laland, 2017). Yet individual cultures constrain as much as they enable. Cultures shape social processes and outcomes as well as individuals' development. Cultural contexts, the "webs of significance" that are symbolic meaning, are both materially and perceptually real for the people within them and thus structurally relevant to, and affected by, evolutionary processes and societal processes. When something happens – an action, observation, or experience – our cultural context helps give it meaning, and our participation in that culture enables us to interact with that meaning, making the engagement dynamic and malleable. So, if culture has meaning, then the symbols, ideals, and traditions human participate in come ready-made with relevance and connection to our personal schemata; they make sense to us and shape how we interact with the world. When culture becomes a species' capacity and necessity, as it is for *Homo sapiens*, understanding the mechanisms by which cultural processes evolved, how they function and how such function impacts members and populations of that species itself is of primary interest in any evolutionary narrative of the mind.

For example, a stone tool is not relevant to human evolution simply as the combination of a person altering and using a shaped stone, but rather requires the fact that a person has a set of beliefs, or concepts, of a tool to begin with. The stone object is given shape but also a functional capacity in affecting the world by being transformed from stone to tool, not just through mechanical modification, but also by an understanding about "tool" as a concept. Such assemblages of practical and conceptual processes are a cognitive outcome of evolved capacities in the human niche. A human with the tool concept, and beliefs about the tools themselves, is not constrained by existing tools or materials when novel challenges arise. Rather they can try

to innovate and find and modify a stone, or other material, into a novel or altered tool for the job. Likewise, beliefs can shape how social interactions and behavior impact bodies. The contemporary belief of an infant as a fragile (or not) body affects adult handling of infants in ways that influence the maturation processes in a child's motor system, leading to differences in the attainment of landmark events in motor development by working through parental behavior on developmental pathways (Hopkins and Westra, 1990). On a broader populational scale, a shared cultural belief in monotheism can affect social organization and has significant impacts on human reproduction, phenotype, or functioning. It can be linked, for example, to entrenched social inequality such that it makes hierarchy and differential resource distribution more likely to occur, and it increases the likelihood of large state formation or endurance (see Norenzayan, 2013; Henrich, 2020).

Cultural beliefs are important because they fundamentally and reliably change humans' relationships to our environments, the resources at our disposal (e.g., tools, senses, communication), and the conditions of our maturation (the developmental niche), which can have both intra- and intergenerational impact (Seitz et al., 2018; Fuentes, 2019). They are a fundamental part of the niche into which humans born and through which they will interact with the world and other people. Rather than rehashing either side of well-worn debates about the relative importance or contribution of biological and cultural processes, it is evident that the human experience is composed of interacting, co-determining elements of both. And that this process evolved as a central component of the human niche. Human neuroanatomy makes experience material—neural systems adapt through long-term refinement and remodeling, which leads to learning, memory, maturation, which structure perception and affect the creation of beliefs. Through systematic change in the nervous system, and immersion in cultural contexts, humans learn to orchestrate themselves. Cultural concepts and meanings become anatomy (Downey and Lende, 2012). Beliefs infuse human minds, bodies, and ecologies, creating dynamic perceptual and interpretative assemblages that can act either as robust 'enculturalizing' forces in human social systems/socioecologies (our cultures) or disrupt them, facilitating new and/or modified dynamics in perceptual and cultural processes. Therefore belief, and its related cognitive processes and their evolutionary history, matters in assessing human behavior and experience; belief shapes the human mind, past, present, and future.

## AUTHOR CONTRIBUTIONS

AF conceived, wrote, and revised all aspects of this article.

## ACKNOWLEDGMENTS

My thanks to Rudiger Seitz, Hans-Ferdinand Angel, Raymond Paloutzian, and Ann Taves for organizing the symposium and shepherding this special volume.

## REFERENCES

- Antón, S. C., and Kuzawa, C. W. (2017). Early homo, plasticity and the extended evolutionary synthesis. *Inter. Focus* 7, 20170004. doi: 10.1098/rsfs.2017.0004
- Bloch, M. (2008). Why religion is nothing special but is central phil. *Trans. R. Soc. B* 12, 2055–61. doi: 10.1098/rstb.2008.0007
- Boyd, R. (2018). *A Different Kind of Animal*. Princeton: Princeton University Press.
- Boyer, P. (2003). Religious thought and behaviour as by-products of brain function. *Trends Cogn. Sci.* 7, 119–124. doi: 10.1016/S1364-6613(03)00031-7
- Corbey, R. (2020). Baldwin effects in early stone tools. *Evol. Anthropol. Issues News Rev.* 29, 237–244. doi: 10.1002/evan.21864
- Deacon, T. (2016). “On human (symbolic) nature: How the word became flesh”, in T. Fuchs and C. Tewes (Eds.), *Embodiment in Evolution and Culture*. Tbingen: Mohr Siebeck. p. 129–149.
- Deacon, T. W. (1997). *The Symbolic Species: The Co-Evolution of Language and the Brain*. New York, NY: W. W. Norton.
- DeSilva (2021). *A Most Interesting Problem. Human evolution 150 years after Darwin's Descent of Man*. Princeton: Princeton University Press. doi: 10.1515/9780691210810
- Downey, G., and Lende, D. H. (2012). Evolution and the brain. In D. H. Lende and G. Downey (Eds.), *The Encultured Brain: An Introduction to Neuroanthropology*. Cambridge: MIT Press. p. 103–138.
- Foley, R. A. (2016). Mosaic evolution and the pattern of transitions in the hominin lineage. *Philos. Trans. R Soc. B Biol. Sci.* 371, 1–14. doi: 10.1098/rstb.2015.0244
- Fry, D. (2013). *War, Peace, and Human Nature*. Oxford: Oxford University Press. doi: 10.1093/acprof:oso/9780199858996.001.0001
- Fuentes, A. (2009). *Evolution of Human Behavior*. Oxford: Oxford University Press.
- Fuentes, A. (2015). Integrative anthropology and the human niche: toward a contemporary approach to human evolution. *Am. Anthropol.* 117, 302–315. doi: 10.1111/aman.12248
- Fuentes, A. (2016). The extended evolutionary synthesis, ethnography, and the human niche: toward an integrated anthropology. *Curr. Anthropol.* 57, 13–26. doi: 10.1086/685684
- Fuentes, A. (2017). Human niche, human behaviour, human nature. *Interface Focus* 7, 20160136. doi: 10.1098/rsfs.2016.0136
- Fuentes, A. (2018). How humans and apes are different, and why it matters. *J. Anthropol. Res.* 74, 151–167. doi: 10.1086/697150
- Fuentes, A. (2019). *Why We Believe: Evolution and the Human Way of Being*. Yale University Press/Templeton Press. doi: 10.12987/9780300249255
- Galway-Witham, J., Cole, J., and Stringer, C. B. (2019). Aspects of human physical and behavioural evolution during the last 1 million years. *J. Quarter. Sci.* 34, 355–378. doi: 10.1002/jqs.3137
- Han, S. (2017). *The Sociocultural Brain*. Oxford UK: Oxford University Press. doi: 10.1093/acprof:oso/9780198743194.001.0001
- Henrich, J. (2016). *The Secret of Our Success: How Culture is Driving Human Evolution, Domesticating Our Species, and Making us Smarter*. Princeton: Princeton University Press. doi: 10.1515/9781400873296
- Henrich, J. (2020). *The WEIRDest People in the World: How the West Became Psychologically Peculiar and Particularly Prosperous*. New York, NY: Farrar, Straus and Giroux.
- Hopkins, B., and Westra, T. (1990). Motor development, maternal expectations, and the role of handling. *Infant Behav. Develop.* 13, 117–122. doi: 10.1016/0163-6383(90)90011-V
- Kim, N. C., and Kissel, M. (2018). *Emergent Warfare in Our Evolutionary Past*. New York: Routledge. doi: 10.4324/9781315151021
- Kissel, M., and Fuentes, A. (2017). Semiosis in the pleistocene cambridge archaeological. *Journal* 27, 1–16. doi: 10.1017/S0959774317000014
- Kissel, M., and Fuentes, A. (2021). The ripples of modernity: how we can extend paleoanthropology with the extended evolutionary synthesis. *Evolut. Anthropol.* 30, 84–98. doi: 10.1002/evan.21883
- Laland, K. N. (2017). *Darwin's Unfinished Symphony: How Culture Made the Human Mind*. Princeton: Princeton University Press. doi: 10.1515/9781400884872
- Malafouris, L. (2013). *How Things Shape the Mind: A Theory of Material Engagement*. Cambridge, MA: MIT Press. doi: 10.7551/mitpress/9476.001.0001
- Marks, J. (2012). The biological myth of human evolution. *Contemp. Soc. Sci.* 7, 139–157. doi: 10.1080/21582041.2012.691989
- Marks, J. (2015). *Tales of the Ex-Apes: How We Think About Human Evolution*. Berkeley: UC Press. doi: 10.1525/california/9780520285811.001.0001
- Montagu, A. (1965). *The Human Revolution*. New York: World Publishing Company.
- Norenzayan, A. (2013). *Big Gods: How Religion Transformed Cooperation and Conflict*. Princeton, NJ: Princeton University Press. doi: 10.1515/9781400848324
- Roberts, P. (2016). We have never been ‘behaviourally modern’: the implications of Material Engagement Theory and Metaplasticity for understanding the late Pleistocene record of human behaviour. *Quat. Int.* 405, 8–20. doi: 10.1016/j.quaint.2015.03.011
- Schwartz, J. H., and Tattersall, I. (2015). Defining the genus *Homo*. *Science*. 349, 931–932. doi: 10.1126/science.aac6182
- Seitz, R. J., and Angel, H.-F. (2020). Belief formation—A driving force for brain evolution. *Brain Cogn.* 140, 105548. doi: 10.1016/j.bandc.2020.105548
- Seitz, R. J., Paloutzian, R. F., and Angel, H. F. (2018). From believing to belief: a general theoretical model. *J. Cogn. Neurosci.* 9, 1254–1264. doi: 10.1162/jocn\_a\_01292
- Stotz, K. (2010). Human nature and cognitive–developmental niche construction. *Phenom Cogn. Sci.* 9, 483–501. doi: 10.1007/s11097-010-9178-7
- Sykes, R. W. (2020). *Kindred: Neanderthal Life, Love, Death and Art*. London: Bloomsbury Sigma. doi: 10.5040/9781472988201
- Tomasello, M. (2014). *A Natural History of Human Thinking*. Cambridge: Harvard University Press. doi: 10.4159/9780674726369
- Tomasello, M. (2019). *Becoming Human: a Theory of Ontogeny*. Cambridge: Harvard University Press. doi: 10.4159/9780674988651
- Wake, D. B., Hadly, E. A., and Ackerly, D. D. (2009). Biogeography, changing climates, and niche evolution. *Proc. Nat. Acad. Sci.* 106, 19631–19636. doi: 10.1073/pnas.0911097106
- Whiten, A. (2021). The burgeoning reach of animal culture. *Science*. 372, eabe6514. doi: 10.1126/science.abe6514
- Whiten, A., and Erdal, D. (2012). The human socio-cognitive niche and its evolutionary origins. *Philos. Trans. R. Soc. B* 367, 2119–2129. doi: 10.1098/rstb.2012.0114
- Wood, B., and Boyle, E. (2016). Hominin taxic diversity: fact or fantasy? *Yearbook Phys. Anthropol.* 159, S37–S78. doi: 10.1002/ajpa.22902

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