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# The Dual Role of Culture for Reconstructing Early Sapiens Cognition

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Questions on early sapiens cognition, the cognitive abilities of our ancestors, are intriguing but notoriously hard to tackle. Leaving no hard traces in the archeological record, these abilities need to be inferred from indirect evidence, informed by our understanding of present-day cognition. Most of such attempts acknowledge the role that culture, as a faculty, has played for human evolution, but they underrate or even disregard the role of distinct cultural traditions and the ensuing diversity, both in present-day humans and as a dimension of past cognition. We argue that culture has exerted a profound impact on human cognition from the start in a dual manner: It scaffolds cognition through both development and evolution, and it thereby continually diversifies the form and content of human thinking. To unveil early sapiens cognition and retrace its evolutionary trajectories, this cognitive diversity must be considered. We present two strategies to achieve this: large-scale extrapolation and phylogenetic comparison. The former aims at filtering out diversity to determine what is basic and universal versus culturally shaped (illustrated for theory of mind abilities). The latter capitalizes on the diversity to reconstruct evolutionary trajectories (illustrated for religious beliefs). The two methods, in combination, advance our understanding of the cognitive abilities of our early sapiens ancestors and of how these abilities emerged and evolved. To conclude, we discuss the implications of this approach for our insights into early cognition itself and its scientific investigation.


*Keywords:* cognition, culture, early hominins, cognitive diversity, cognitive evolution

Over the past two decades, archeological discoveries of early symbolism and complex technologies in several caves along the southern coast of Africa—such as Blombos, Klasies River, or Sibudu (e.g., Henshilwood et al., 2002, 2018; Wadley, 2015; Wurz, 2013)—have forced us to rethink how we perceive the origins of the human mind. Until recently, the dominant view was that modern human cognition emerged about 40,000 years ago in the European Upper Paleolithic, likely driven by a genetic mutation that caused a dramatic change in cognitive abilities (e.g., Klein, 1995, 2019; Klein & Edgar, 2002). Now, we have to relocate the oldest evidence of art, symbolic thought, and complex technological innovation to the African continent and push it back at least some additional 40,000 years, into the period known as the Middle Stone Age (Henshilwood et al., 2002). In light of these recent findings, old questions need to be asked anew: When did modern human cognition emerge? Did it materialize as a new package or as a series of gradual modifications? Which factors triggered these

changes? And what counts as evidence of modern human cognition in the first place?

That human cognitive achievements today are clearly different from those of any other species may be undeniable, but exactly when and how our ancestors began to “think” differently remains unresolved. Investigations of early sapiens cognition are hindered by the fact that cognition leaves no hard traces in the archeological record and can only be inferred from indirect evidence. Approaches in cognitive archeology (for overviews, see A. Currie & Killin, 2019; Overmann & Coolidge, 2019) and evolutionary psychology (Confer et al., 2010; Cosmides & Tooby, 2013) extrapolate from present-day cognition to the abilities of our ancestors, based on often thoughtful strategies and protocols such as reverse engineering of cognitive skills (Haidle, 2010; C. Liu & Stout, 2023; Sellet, 1993), more recently combined with neuroscientific studies (Mellet et al., 2019; Stout & Chaminade, 2007). In extrapolating, these approaches do acknowledge the role that culture, as a faculty, would have played

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in human evolution. However, they tend to underrate or even disregard the role of distinct cultural traditions and the ensuing degree of diversity in human cognition among present-day humans, and even more as a dimension of past cognition (Bender, 2020a).

Here, we argue that culture has exerted a profound impact on human cognition from the start in a dual manner, not only in scaffolding cognitive development and evolution but also as a means of continuous cognitive diversification. When attempting to reconstruct early sapiens cognition and to retrace its evolutionary trajectories, we therefore need to factor in the cultural variability of human cognition. To achieve this, the above-mentioned strategies need to be complemented by approaches that take greater account of the impacts of culture.

To begin, we flesh out our argument by highlighting the dual role that culture plays for human cognition. We then elaborate on two culturally informed approaches, which provide alternative and partly complementary avenues to the unveiling of early sapiens cognition, illustrated with exemplary studies and their findings. One of these approaches aims at reconstructing the basic and universal—as well as culturally shaped—components of human cognition, the other at reconstructing ancestral states and evolutionary trajectories of cognitive systems from present-day diversity. We will illustrate these approaches with two instances perceived as uniquely human—the ability to understand one another as intentional beings and the inclination to believe in supernatural entities—which will eventually advance our understanding of what kind of mind was at work when our early sapiens ancestors roamed the earth. To conclude, we discuss implications both for our insights into early cognition itself and for its scientific investigation.

### The Dual Roles of Culture for Cognition

Culture impacts cognition in at least two distinct yet related ways: as a *scaffold* in cognitive development and evolution (Bender, 2020a; Colagè & d’Errico, 2020; Heyes, 2018) and as a *means of diversification* (Bender & Beller, 2019; Henrich, 2016; Levinson, 2003; Medin & Atran, 2004). The former arises from the fact that humans are a social species with evolved predispositions to seek and share information, establish joint intentions, and reinforce them through mutual coercion, which in turn results in specific patterning within the local group (Csibra & Gergely, 2009; de Munck & Bennardo, 2019; Tomasello et al., 2005). The latter is a natural consequence of the former: Unless heavily constrained by other factors, cultural scaffolding will inevitably lead to cognitive diversification (Boyd & Richerson, 1988; Mace & Holden, 2005).

### Scaffolding Human Cognition

The last common ancestor with our closest contemporary relatives, chimpanzees and bonobos, lived about 6–7 million years ago. The earliest specimens of our own species, *Homo sapiens*, are now estimated to have roamed the earth around 300,000 years ago (Hublin et al., 2017), and only since the Neanderthals disappeared some 40,000 years ago have we been the sole species of the hominin line left on earth. In the past few decades, it has become clear that many sophisticated technologies and cultural practices that were once considered exclusive to the human populations of the European Upper Palaeolithic were actually present among both early *Homo sapiens* (McBrearty & Brooks, 2000; Scerri & Will, 2023) and

*Homo neanderthalensis* (Hoffecker, 2018; Nielsen et al., 2020; Wynn & Coolidge, 2004). The record for the Neanderthals includes, for example, fire-making (Henry, 2017), woodworking (Vaquero et al., 2001), the production of glue for composite tools (Niekus et al., 2019), fiber processing (Hardy et al., 2020), the use of spaces in potentially ritual contexts (Baquedano et al., 2023; Jaubert et al., 2016), ochre processing (Pitarch Martí et al., 2021), and, possibly, mark-making for symbolic purposes (Hoffmann et al., 2018; Rodríguez-Vidal et al., 2014). In early *Homo sapiens* contexts, these technologies appear and reappear in a mosaic-like pattern throughout the African continent prior to 100,000 years ago (Colagè & d’Errico, 2020; Scerri & Will, 2023) but are occasionally found as a “package” in a few early key sites such as Blombos Cave in South Africa by 70,000 years ago (Henshilwood & Marean, 2003). All this suggests that our species shared a cognitive baseline with our closest extinct relatives, the Neanderthals. Nevertheless, over the past 50,000 years, *Homo sapiens* developed a level of cumulative culture unparalleled by any other members of our genus.

A key question is whether the mental capacities that underlie such development were acquired through changes in kind or only in degree from general hominin cognition, and by when. Although this issue is still hotly debated (Sterelny, 2020), comparative research in psychology has uncovered a range of predispositions that appear to enhance the cognitive skill set of present-day humans and thereby extend the perceived distance to other species.

One of these predispositions, linked to the human brand of sociality, is the ability and willingness to *align one’s mental worlds*. Humans not only seek to understand the mental and motivational states that drive others’ behavior but are also inclined to convey their own mental and motivational states in the service of cooperation (Enfield & Levinson, 2006; Tomasello et al., 2005). This willingness to share attention, interest, and information is a key building block in human culture, reinforced by an emerging sense of obligation and by nudges toward conformity (de Munck & Bennardo, 2019; Tomasello, 1999, 2020). This is why cognitive anthropologists have defined culture as “whatever it is one has to know or believe in order to operate in a manner acceptable to its members” (Goodenough, 1957, p. 167). A cultural world shared in this way provides the context in which individual cognition develops, distinct to the group and similar for its members, even though consensus regarding the details among these members is always a matter of degree (Gatewood, 2012; Romney et al., 1986).

Related to this ability of perspective taking is a second predisposition for cumulative culture, namely for *teaching and imitative learning* (Csibra & Gergely, 2009; d’Errico & Banks, 2015; Kline, 2015; Tomasello, 2016): the willingness on the part of those in possession of knowledge and skills to provide instruction and the preparedness on the part of the unskilled to recognize a teaching intention, pay attention, and copy the observed behavior. This imitative learning and copying is often done with high fidelity in human children (Horner & Whiten, 2005; Lyons et al., 2007; Nielsen, 2018; review in Hoehl et al., 2019) and with even higher fidelity in human adults (McGuigan et al., 2011). While teaching involves the transmission of beliefs, values, and practices, high-fidelity copying contributes to their establishment as normative and thereby to the strengthening of group cohesion (Legare & Nielsen, 2015). The inclination for teaching builds, in part, on the predisposition for joint intentionality and especially the ability to

take another's perspective, which helps to diagnose a lack of understanding and thereby renders teaching more effective.

Both the creation of a shared mental world and explicit teaching benefit from *language*, which is the most powerful tool for elaborating, storing, and sharing insights, interpretations, and ideas—so powerful indeed that language may be indispensable for achieving some of these goals. For instance, the ability to provide and receive information about mental states appears to be an essential precondition for comprehending both the existence and the content of mental states in other people (as will be discussed further down; and see C. A. Miller, 2006; Pyers & Senghas, 2009).

All of these factors—the willingness to align one's mental worlds, aided by a predisposition for teaching and learning, and facilitated by language—are key enablers of human culture. At the same time, they serve to enhance human cognition in multiple ways.

For a start, they foster the acquisition and accumulation of expertise. Explicit, language-based teaching and high-fidelity copying speed up the learning process tremendously, as the knowledge and skills already available in one's group need not be discovered and invented anew but can be rapidly adopted, thus saving time and cognitive resources for further elaboration and improvement. Paving the way to expand the amount of knowledge and skills that group members may acquire (Lyons et al., 2007), the key enablers also drive cultural evolution: Important achievements, once attained, can stabilize and serve as springboards for new achievements (Dean et al., 2014; Heyes, 1993; Richerson & Boyd, 2008; Tomasello, 1999), thereby “ratcheting up” human culture, including its cognitive tools and techniques (Tennie et al., 2009).

Importantly, knowledge is not merely accumulated; it is also organized and integrated into larger explanatory frameworks developed by previous generations, which afford and invite novel insights and inferences. This is how Micronesian seafarers attained their outstanding navigational skills, which enabled them to travel thousands of kilometers across the open ocean (Gladwin, 1970; Hutchins, 1983), or how Amerindian groups attained their expertise in ecological systems (Bang et al., 2007; Medin et al., 2013; Pierotti, 2011). It is how symbols gained meaning, from reading tracks in the sand to modern-day text messaging (Lupyan & Dale, 2016; Morin et al., 2018; Shaw-Williams, 2014), and how tool-making capitalized on increasingly more complex causal understanding, such as when taking the step from spears to bows and arrows (Haidle, 2014; Stuart-Fox, 2015). And it is how it was possible to achieve an ever deeper understanding of intricate matters, such as in mathematics or medicine (Erickson, 2007; Martzloff, 1997; K. F. Miller & Paredes, 1996).

By elevating us “onto the shoulders of giants,” cultural evolution brings longed-for possibilities within reach and opens up prospects of which we were not even aware. When involving the recruitment of existing cultural traits for new purposes, this evolutionary driving force has been called *cultural exaptation* (Colagè & d'Errico, 2020; d'Errico & Colagè, 2018). A paradigmatic example is the presumed invention of numerical notation: from incidental cut marks on bones, through a series of transformative steps, to full number symbols, which gradually opened up a whole new world of mathematics (d'Errico et al., 2018).

Some cultural practices, finally, are even essential for unlocking the full potential of abilities with which all humans appear to be endowed. Mental state reasoning (or *theory of mind [ToM]*), for instance, is an ability that humans typically acquire long before

adulthood. Still, its unfolding is likely contingent on growing up among other humans in any social context, and its developmental trajectories are shaped by the specifics of the cultural environment (as expounded below, on page XX).

The scaffolding role of culture for cognition spans several levels, from the dynamics of individual social learning within populations (*microevolution*) to the historical dynamics of adaptations on the population level (*macroevolution*). On the microevolutionary level, cultural input entails cognitive changes in the course of an individual's lifetime by providing cognitive tools, supporting cognitive skills, and even boosting cognitive capacities. Some of these changes are so pervasive that they culminate in substantial neural rewiring, as when people learn to read and write (Dehaene & Cohen, 2007; Maguire et al., 2000). Yet, the relation between cultural environment and individual cognition is bidirectional, with innovations created by one individual also having the potential to change the cultural environment for all (Henrich, 2016; Morin, 2016; Sperber, 1996). On this macroevolutionary level, the most profound manifestations of cultural scaffolding are those that lead to gene–culture coevolution (Boyd & Richerson, 1988; Durham, 1991).

A factor operating on all of these levels of scaffolding is language. While the origins of the faculty of language are elusive, there is general consensus that it emerged as a product of gene–culture coevolution, presumably closely tied to human sociality (Buckley & Steele, 2002; Dor & Jablonka, 2010; Dunbar, 1998; Fitch, 2010; Tomasello, 2008). According to these scenarios, some hominin groups would have begun to use gestural communication, such as declarative pointing, to coordinate behavior and establish cooperation, which eventually selected for conventionalized vocal expressions that could transmit information beyond the “here and now” (Tomasello, 2008). Genetic mutations linked to the Forkhead box protein P2 gene may have further facilitated speech production, spreading rapidly due to their adaptive value (Fisher & Marcus, 2006; Fisher & Ridley, 2013). Through these complex feedback processes, spoken language became the ubiquitous communication mode of our lineage, perhaps as far back as half a million years ago (de Boer, 2017; Dediu & Levinson, 2013).

The uncertainties surrounding its origins aside, once in place, language served to boost not only human communication but also cognition (e.g., Lupyan et al., 2020): for instance, by providing classification systems for perceptions, metaphors for analogical reasoning, or recursive levels for cognitive representations, including those on (others') mental states (as explained in more detail further below). Sustained language use entails cortical remapping, targeting specific brain structures for different language modalities, such as when learning to read and write or when using a whistled language (Dehaene et al., 2015; Güntürkün et al., 2015). Finally, fixing language in script enabled the transmission of knowledge across space and time, raising cumulative culture to an entirely new level (Huettig & Mishra, 2014; Morin et al., 2018).

In short, human cognition is fundamentally shaped by the cultural environment in which it unfolds. For this very reason, however, we should expect distinct cultural environments to shape human cognition in distinct ways.

### Sources of Diversification

Human cognition bears the stamp not only of culture in the abstract but also of concrete cultural traditions: How we perceive

and think about the world is shaped both by the fact that we are cultural beings and by the specifics of our distinct cultural background. Although systematic surveys are still largely lacking, evidence for cognitive diversity is accumulating, from low-level cognitive processes such as perception to higher order cognition involved in navigating or decision making (examples will be given below; for overviews, see Beller & Bender, 2015; Bender & Beller, 2016; Blasi et al., 2022; Henrich, Heine, & Norenzayan, 2010). Two major types of mechanisms are involved in creating this diversity. The first comprises the enablers of human culture, which themselves are shaped by cultural traditions and in turn serve to fine-tune cognitive processing on several levels. The second emerges from the interplay of these cognitive processes and the (culture-specific) content on which they are operating.

### *Enablers of Human Culture*

As detailed above, the key enablers of human culture include the predispositions for aligning one's mental worlds, for teaching and learning, and for language use. These enhance the cognitive skill set in humans, but they are also subject to cultural molding (Bender & Beller, 2019).

First, while presumably a human universal, shared intentionality varies with respect to its implementation, with the focus being placed on mental states or the types of sociality valued (Duranti, 1993; Fiske, 1992; Markus & Kitayama, 1991; Robbins & Rumsey, 2008). Cultural traditions differ, for instance, in the relative degree to which they value relations, duties, and mutual obligations in a social group as compared to the properties, rights, and accomplishments of individuals (Markus & Kitayama, 1991; Nisbett et al., 2001; ojaehto et al., 2015, 2017a, 2017b). Implications of these cultural differences for cognition are manifold. They range from basic processes such as what to focus on during perception (Nisbett & Miyamoto, 2005), through preferences for holistic versus analytic reasoning styles (Nisbett et al., 2001), to various dimensions of social cognition, including causal attribution (J. G. Miller, 1984; Morris et al., 2001), assessments of guilt (Danziger, 2006; Throop, 2008), and concepts of fairness (Henrich, Ensminger, et al., 2010; Henrich et al., 2005). For instance, members of groups that emphasize a relational or holistic perspective tend to pay equal or more attention to the context than to focal objects (Masuda & Nisbett, 2006); they tend to spot relationships between objects or agents and changes in a situation more easily (Nisbett & Masuda, 2003), to consider a larger number of potential causes and consequences of observed events (Choi et al., 2003; Maddux & Yuki, 2006), and to ascribe responsibility also to social groups rather than exclusively to individuals (J. G. Miller, 1984; Morris et al., 2001). These differences in cognitive inclination have ramifications for everyday interactions; they affect how we respond emotionally to events (e.g., with anger when we blame somebody); and they ground our principles of justice, such as taking mitigating circumstances into consideration (Beller et al., 2009; Lillard, 1998).

Likewise, the willingness to teach and to learn from teaching is presumably widespread but varies across cultural groups with respect to teaching styles, including the degree of fidelity in copying (Berl & Hewlett, 2015; Hewlett & Roulette, 2016; Köster et al., 2022; Lancy & Grove, 2010; Rogoff, 2003). Repercussions of this variability involve how and what children learn, and also how eager

they are to engage in explanation-seeking, exploration, and innovation (Gauvain et al., 2013; Legare & Nielsen, 2015).

Finally, while all human groups use language, as a whole, we have generated close to 8,000 distinct languages documented as of today (Hammarström et al., 2022). And these individual languages vary on several dimensions from the modality in which they are implemented (e.g., as spoken or whistled languages, as simple signed or tactile signed, or in writing) to details of phonology, syntax, semantics, and pragmatics—again with substantial implications for cognition (overviews in Bender, 2019; Lucy, 2016; Wolff & Holmes, 2011; and see Cibelli et al., 2016; Lupyian & Clark, 2015) right down to the neural level (Dediu & Ladd, 2007; Güntürkün et al., 2015). One level at which different languages affect cognitive representation and processing in distinct ways is by providing different classification systems for domains such as color, odors, or biological taxa (Atran & Medin, 2008; Kay & Regier, 2006; Majid et al., 2018). For instance, English recruits one basic color term each for blue and green, whereas Tarahumara or Welsh use just one term for both (Kay & Kempton, 1984; Lazar-Meyn, 2004). By contrast, languages such as Russian (Davies & Corbett, 1994) and Italian (Paggetti et al., 2016) not only distinguish between green and blue but also separate the latter into two distinct categories: a lighter blue and a darker blue. To which extent these linguistic distinctions affect pure color perception as such remains contested (overviews in Cibelli et al., 2016; Regier & Kay, 2009). However, in all tasks not precluding language use, a range of cognitive processes—including recognition, rapid distinction, similarity judgments, and learning—are affected by where the language of use draws the categorical boundaries (e.g., Kay & Kempton, 1984; Mitterer et al., 2009; Roberson et al., 2005; Winawer et al., 2007).

Languages also differ in the metaphors they use for conceptualizing more abstract domains such as time, most frequently along one spatial dimension or another (Bender & Beller, 2014b; Boroditsky, 2001, 2018), or pitch, typically in terms of either height or thickness (Dolscheid et al., 2013). And different languages provide different tools for more complex activities such as spatial referencing or computing (Bender & Beller, 2014a; Majid et al., 2004).

Finally, language diversity also affects cognition in a more indirect manner. For instance, the mere fact of being bilingual affects executive function insofar as it increases an individual's ability to ignore distracting information and monitor task switching (Bialystok et al., 2012; Kroll et al., 2014); and the usage of a foreign language instead of one's native language has the potential to alter decision making and moral judgments because the emotional detachment in the foreign language facilitates utilitarian choices (Geipel et al., 2015; Hayakawa et al., 2016).

Against this background, the challenges involved in reconstructing early sapiens cognition are obvious and daunting. How the key enablers would have shaped pre- and early sapiens cognition essentially depends on their implementation. For example, evidence on whether sociality was characterized by a stronger focus on either independence of individuals or on their interdependence would be indicative of a prevalence of either analytic or holistic systems of thought. A considerable body of research on present-day hunter-gatherers suggests that these groups rely more strongly on independent decision making and less on conformity than do agriculturalists (Boyette & Hewlett, 2018) and correspondingly seem to pay more attention to focal objects as detached from the

surrounding field (Berry, 1966, 1967). At the same time, such groups are also known to exhibit relational epistemological orientations and a propensity for systems-level thinking (Bang et al., 2007; Medin et al., 2013; Ross et al., 2007), which precludes straightforward inferences on the sociality patterns among Pleistocene groups.

Teaching in present-day hunter-gatherer communities is not uniform either. While differing notably from traditions in WEIRD societies (Henrich, Heine, & Norenzayan, 2010), the spectrum of teaching strategies is wide, variable, and multifunctional (Hewlett & Roulette, 2016). Overall, hunter-gatherer communities place a greater emphasis on the child's self-reliance and independence than on compliance (Barry et al., 1959; Boyette & Hewlett, 2018), but evidence on the degree of high fidelity is mixed (Berl & Hewlett, 2015; Nielsen et al., 2014). Children are expected to learn predominantly from observation, and subtle teaching occurs more frequently than explicit, verbal instruction (Boyette & Hewlett, 2017; Burdett et al., 2018). With increasing age, most teaching is taken over by other children (Boyette & Hewlett, 2017; Gallois & Reyes-García, 2018; Lew-Levy et al., 2020). This social learning of general skill sets in childhood seems to lay the foundation on which individual training of more complex skills in adolescence then builds (Lew-Levy et al., 2017). If we assume that hunter-gatherer groups 100,000 years ago maintained similar practices, we may conjecture that knowledge and skills were actively shared, albeit often in implicit ways (MacDonald, 2019). If implicit teaching and learning from observation, imitation, and practice, rather than from instruction, were as prevalent then as they are today, this would have implications not only for cognition (Frensch & Rüniger, 2003; Wilson & Golonka, 2013) but also for behavior, including elementary strategies such as explanation seeking (Gauvain et al., 2013; Legare et al., 2017). Specifically, such teaching practices, in combination with an emphasis on the child's autonomy, would likely have served to encourage active exploration rather than copying.

The specific forms that sociality and teaching would have taken depend crucially on the availability of language. Individualistic orientations are more likely in the absence of language, as the consideration of and emphasis on group values presupposes a powerful tool for communication. Likewise, while guided practicing is possible in the absence of language, both the diagnosis of misconceptions and explicit forms of teaching do largely depend on language. With respect to the latter, however, we lack strong evidence on how early languages were composed and even on when they came into existence in the first place.

### ***Content and Organization of Knowledge***

As described above, a major source of cognitive diversity is that the specifically human propensities and abilities linked to sociality, teaching, and language are themselves shaped by cultural traditions and, as such, shape cognitive processing in distinct ways. A second source of cognitive diversity is the (culture-specific) organization of people's knowledge, beliefs, and opinions—in short, the informational content on which the various cognitive processes are operating.

Unlike most nonhuman species, humans can gather information in two distinct ways: directly as individuals through their own experiences or indirectly from members of their group such as

parents, teachers, or peers. In fact, most of what people come to accept as true in the course of their lives is socially learned, often incompletely and imperfectly, rather than arrived at through experience or empirical testing (Bender & Gatewood, 2021; Bender & Oterhals, in press; D'Andrade, 1995; Gatewood, 2011, 2012). Furthermore, we tend to take for granted what we learn from others (Legare & Nielsen, 2015; Sloman & Fernbach, 2017); even the mere belief that someone else understands a phenomenon increases our own sense of understanding (Sloman & Rabb, 2016), and oftentimes we could not be more wrong (e.g., Lawson, 2006; McCloskey et al., 1983; Rozenblit & Keil, 2002). The net effect of humans' proclivity to learn from others—along with learning who knows more about a topic than others—is societies with increasingly complex divisions of labor based on socially distributed knowledge. No individual knows everything that is held within and transmitted by the group. Rather, the accumulated knowledge is distributed among individuals bound together by ties of reciprocal ignorance and mutual dependence. In this way, the extrasomatic information storage capacity of human groups far exceeds the neurological information storage capacity of individuals per se (Gatewood, 1983, 2011; Sloman, 2022).

Many observations made by humans around the world are indeed valid and accurately reflect the unfolding of events. Such observations, however, do not remain in isolation; they give rise to more abstract concepts, are integrated into mental models on the topic, and tend to be organized by overarching theories of how things are related. To a substantial degree, this body of culturally accumulating knowledge is predicated on believing and on subjective interpretations rather than on personally verified understandings (Bender & Gatewood, 2021), such as which mushrooms are edible (Bender & Oterhals, in press), and is organized by explanatory frameworks that themselves represent culture-specific perspectives on the world (ojalehto et al., 2015, 2017a, 2017b). While this cognitive content is tested against and adjusted to reality over generations, and hence constrained in the extent of diversity, it continues to be permeated by culture-specific values, attitudes, and beliefs.

Let us illustrate this for the domain of folk biology (overview in Solomon & Zaitchik, 2012). Living in close interaction with one's natural environment provides ample opportunity to gather information on the properties of living beings and their relationships. Some of these observations are clearly guided by the biological world itself, as indicated by a large body of research on folk taxonomies according to which we tend to carve nature at its joints (e.g., Atran, 1998; Berlin, 1992; Berlin et al., 1973; Boster, 1988; Medin & Atran, 1999). Still, cultural framework theories shape how information is organized, stored, and interpreted in culture-specific ways; they invite some inferences to be drawn more easily than others; and they suggest distinct strategies for problem-solving and behavioral responses (Bang et al., 2007; Bang & Medin, 2010; ojalehto et al., 2013). Framework theories on the natural world differ, for instance, in the dimensions on which they focus and in how they position humans. While the Euro-American tradition highlights entities and their properties, such as species and their characteristics, many Amerindian traditions emphasize interconnectedness between entities or species. Consequently, the former suggests that one ascribes agency only to species with specific properties such as consciousness, whereas the latter also opens up the possibility to ascribe agency to species such as plants based on

their interactions (ojalehto et al., 2017a, 2017b). The two types also differ in that the former considers humans as *apart from* nature, the latter as *a part of* nature (Bang et al., 2007; Medin et al., 2006).

These premises of framework theories have multiple implications for cognition. For instance, framework theories highlighting interconnectedness between entities are more likely than Euro-American theories to foster an understanding of ecological relations such as deliberate cooperation across species (ojalehto et al., 2015) or social agency and kin-related cooperation even in plants (ojalehto et al., 2017a, 2017b). Having internalized the Euro-American view disposes people to base their generalizations on inductive principles and heuristics such as the typicality and diversity of the *categories* from which to generalize, whereas none of these strategies have been observed in Amerindian groups, who recruit *causal* reasoning strategies instead (Bailenson et al., 2002; López et al., 1997; Proffitt et al., 2000). In an example reported by Doug Medin (in Bender et al., 2017, p.722) these reasoning strategies warrant the inference that a substance contained by bees would also be found in bears (despite them belonging to wildly different categories), as this substance may be transferred when the bears prey on the bees' honey or are stung by the bees.

Even cornerstones of cognitive development are affected. Children raised in line with Euro-American theories are much more likely to draw both asymmetric and anthropocentric inferences when generalizing across biological species. That is, when asked whether an unknown property found in one species would also be found in another species, these children are more willing to generalize from humans to nonhuman animals than vice versa, and they are more willing to generalize from humans to nonhuman animals than from one animal to another, even if the two animal species are closely related (Ross et al., 2003). Finally, different notions of humans' role in nature also lead to different attitudes toward other species and to diverging strategies of resource management, including more or less sustainable agroforestry, hunting, and fishing practices (Medin et al., 2006; Ross et al., 2007).

In a nutshell, the culture-specific organization of knowledge and beliefs gives rise to diversity both in cognitive content and in cognitive processing. Research on present-day hunter-gatherers suggests that even with a set of cultural values emphasizing individual autonomy and independence, expert knowledge is frequently shared, even across group boundaries (Salali et al., 2016). Yet, the scope of this body of knowledge, the degree to which it is shared within a group, and its potential impact on cognitive processes are all clearly dependent on the availability of language. Explanatory frameworks can only emerge and proliferate with sophisticated tools for communication, and the same is true for expertise. In the absence of language, the social transmission of knowledge distributed among individuals in a group would have been pretty much limited to matters that are directly observable, such as how to make a particular stone tool or which mushrooms to eat and which to avoid. If, however, language was in place, then the group's distributed store of knowledge could become shared and shaped by collective winnowing—as cognition more generally would have been.

### Bringing Culture to the Table

If we take the dual role that culture plays for human cognition seriously—not only as a scaffold in cognitive development and evolution but, importantly, also as a means of diversification—we

cannot simply extrapolate from present-day cognition to past cognition, even if our ancestors *a priori* may have had the very same capabilities as we have today. For a start, there is no such thing as (one) present-day cognition (Beller & Bender, 2015; Henrich, Heine, & Norenzayan, 2010; Medin & Atran, 2004), despite its uniform depictions in most psychological textbooks. In fact, its diversity across cultures may be one of the hallmarks of human cognition compared to other species, just as the diversity of languages is one of the hallmarks of the principal human communication tool (Evans & Levinson, 2009). Furthermore, the paleoanthropological and genomic records indicate that our species originated from several small, isolated populations that dispersed and intermixed in and out of Africa on several occasions (Gunz et al., 2009; Hublin et al., 2017; Ragsdale et al., 2023). As a consequence, early *H. sapiens* would have been as culturally and cognitively diverse as they were genetically and anatomically heterogeneous (McBrearty & Brooks, 2000).

This need not prevent us from efforts to reconstruct past cognition, though. Here, we present two main approaches to this task: one aimed at filtering out diversity in an attempt to “distill” the universal aspects of human cognition, and the other aimed at capitalizing on this very diversity in an attempt to reconstruct the actual ancestral states. We illustrate these approaches for two textbook examples of human cognition, ToM abilities and religious beliefs, respectively, and we explore the prospects of combining these approaches.

### Filtering Out Cultural Diversity

It may seem plausible that by conducting cross-cultural studies, one would be able to identify the universal core of human cognition, with the core being conceived as those aspects that do not vary across cultures. This popular assumption, however, is delusive, largely because cross-cultural differences are neither sufficient nor necessary to diagnose the impact of culture (Bender, 2020b). Moreover, an absence of cultural differences is impossible to prove, as this would presuppose a complete survey of all cultural traditions ever, both present and past. These issues render the current task even more challenging and any attempt to tackle it conjectural. Here, we outline what we consider the most promising strategy to deal with these challenges: a comparative approach that combines perspectives across a range of disciplines from the cognitive and social sciences (see also Liebal & Haun, 2018). Illustrated for ToM abilities, we show how a survey of research across species and on cognitive development allows us to identify those aspects that are distinct to and shared by humans. In order to fathom the extent of cultural scaffolding and diversification, we then sift through the research across cultures and languages. Together, the diverse sets of findings provide the basis for an informed guess on how these cognitive capacities may have looked in the Pleistocene, as presented in the final subsection on “ToM in Early Sapiens Cognition” (on pages XX).

### ToM Abilities

What a person believes he or she knows about a particular situation at a particular moment in time is just one possible view of the world. Things can be different from how they look; a person's knowledge of things can change; and other people may generate

different beliefs based on their own point of view. Children usually come to grasp such insights when they learn to take perspective and to ascribe mental states such as perceptions, beliefs, desires, and intentions to other people (Apperly, 2012; Astington, 1993; Rakoczy, 2017). This set of abilities—often referred to as ToM but also called “folk psychology” and “belief–desire psychology” (Rakoczy, 2017), or “mind reading,” “mentalizing,” “mental-state attribution,” and “perspective taking” (Krupenye & Call, 2019)—is a cornerstone of human sociality, enabling us to create the shared mental worlds so fundamental to both human culture and cognition (Call, 2009; Tomasello, 1999). ToM helps us to assess what our interlocutors may or may not know, thus rendering communication and teaching more efficient. Being able to read others’ intentions also enables us to build on those intentions in order to either form common goals and facilitate cooperative problem solving or to undermine competitors’ efforts.

Initially, several lines of research seemed to suggest that the underlying cognitive structure of ToM is an innate, encapsulated module that becomes activated in humans within the first years of life, is dedicated to a specific cognitive task, and operates largely automatically (Baron-Cohen, 1995; Fodor, 1992; Leslie, 1994). The *false belief* task, developed by Wimmer and Perner (1983) for use with children and later converted into a nonverbal task for nonhuman animals by Call and Tomasello (1999), was soon considered the litmus test for this ability. To pass it, the subject needs to be able to predict another individual’s behavior as resulting from a belief that conflicts with the subject’s own belief. Simultaneously entertaining two conflicting beliefs and correctly inferring the behavior of the other individual from this discrepancy is a formidable feat. Nonhuman species typically fail this test, while human children begin to pass it between 4 and 5 years of age. According to the modular view, ToM would therefore be a cognitive ability unique to and universal in humans.

Meanwhile, however, it has become increasingly clear that matters are more complex. Findings from various lines of research converge on an understanding of ToM as composed of a range of social–cognitive skills, from inhibitory control to perspective taking, rather than a single self-contained module (Apperly, 2012; Conway & Bird, 2018; Schaafsma et al., 2015; Slaughter & Perez-Zapata, 2014). As these skills turn out to be available separately and to develop asynchronously, they could also have emerged and evolved independently from one another. On this account, it seems more plausible to assume that they are distributed across species in distinct patterns, are more or less dependent on cultural scaffolding, and hence may vary across cultures in terms of both development and form.

### *ToM in Nonhuman Species*

Research on ToM abilities in nonhuman species goes back almost half a century. In fact, the very investigation of ToM began with a study of whether chimpanzees possess the ability to impute mental states (Premack & Woodruff, 1978). Findings and conclusions in this field of research continue to be hotly debated (e.g., Burge, 2018; de Waal & Ferrari, 2010; Penn & Povinelli, 2007; van der Vaart & Hemelrijk, 2014), but a growing body of evidence indicates that several species, such as various primates, corvids, and perhaps dogs and dolphins, possess variable sets of some of those social–cognitive skills that are essential for ToM (Bugnyar, 2007; Dally

et al., 2010; Hare & Tomasello, 2005; Krupenye & Call, 2019; Tschudin, 2006).

Chimpanzees, for instance, may not be able to understand what another individual *believes*, especially if this other’s belief conflicts with what they themselves believe, but they understand what the other *sees* and hence *knows*. And while they appear to be unable to make behavioral predictions based on another’s false belief, they succeed in making distinctive predictions depending on whether or not the other had access to relevant information (Bräuer et al., 2007; Hare et al., 2000, 2001; Kaminski et al., 2008; Tomasello et al., 2003). Based on these findings, Call and Tomasello (2008) therefore concluded that nonhuman primates are able to engage in a perception–goal psychology but not a full-fledged belief–desire psychology, as is characteristic of human mental-state reasoning. Recent studies now point to the possibility that chimpanzees may even share more foundational social–cognitive abilities with humans, including an *implicit* understanding of false belief (Buttelmann et al., 2017; Kano et al., 2019; Krupenye et al., 2016; reviewed in Krupenye & Call, 2019). If these findings prove to be robust and reliable, the claimed uniqueness of ToM abilities in humans would indeed have to be considered as a difference in degree rather than in kind (unless we allow for different evolutionary pathways leading to similar ToM abilities).

### *ToM in Human Development*

One of the reasons for the widespread assumption that ToM abilities are a human universal is that they typically emerge in children in a given time window relatively early on, pretty much uniformly, and largely irrespective of potentially influencing factors (overview in Rakoczy, 2017; Träuble et al., 2013).

Developmental precursors of ToM abilities set in even earlier. As infants, humans begin to follow the eyes of their caregiver and create shared attention through so-called triadic interactions between this person, an object, and themselves. At this age, infants represent facts directly. At about 18 months of age, they begin to differentiate between real and fictional worlds and between their own and other people’s feelings and desires, which enables them to build representations of what others might represent. They learn to understand that actions are driven by desires and become capable of *Level 1 perspective taking*: that another person may *not* see (and hence know) something that they themselves are able to see and know. *Level 2 perspective taking* requires the insight that the other person may see (and hence believe to be true) something that is *different* from what they themselves see and believe to be true. Whereas other primates are capable of perspective taking of Level 1, but arguably not of Level 2, human children begin to master Level 2 at around 4 years of age, when they realize that representations can be wrong, can be different for different people, and can change.

The task most frequently used to assess *Level 2 perspective taking* abilities is the false belief task. A meta-analysis of studies using this task revealed a largely robust pattern of findings across experimental conditions: Whereas almost all tested 3-year-olds failed, almost all 4.5-year-olds passed; the conceptual change typically took place between 41 and 48 months of age; and none of the investigated factors seemed to influence the development in any substantial manner (Wellman et al., 2001). Meanwhile, each of these three conclusions requires qualification. First, studies probing



spontaneous responses (e.g., through looking time) report *implicit* ToM abilities in much younger children, with even infants appearing to be sensitive to the beliefs of others (Scott & Baillargeon, 2017). However, both the replicability and interpretation of these findings remain controversial (Kulke et al., 2018; Schuwerk et al., 2018). Second, even when sticking to the traditional paradigms used to assess false belief representations in children, the age at which this ability begins to emerge has proven to be more variable than was previously assumed, differing by several years (Callaghan et al., 2005; De Gracia et al., 2016; D. Liu et al., 2008; Mayer & Träuble, 2013, 2015; Vinden, 1996). Finally, it emerged that its development is indeed sensitive to cognitive and social factors (Garfield et al., 2001).

The cognitive skill most strongly implicated in ToM performance is a cluster called executive function, which regulates the processes involving attention, working memory, task switching, or higher order activities such as planning. Executive function varies across individuals (Benson et al., 2013; Wang et al., 2016). Crucially for false belief representations, it also encompasses the inhibition of cognitive content or processes, which in turn helps coordinate the potentially conflicting representations that arise from taking different subjective perspectives (Apperly, 2012; Carlson et al., 2015; Rakoczy, 2010).

A second factor implicated in ToM performance is language, and this factor operates across several levels (Garfield et al., 2001; C. A. Miller, 2006). Timely and sufficient access to language is crucial in promoting ToM abilities, as attested to by studies with deaf children (Peterson & Siegal, 1999; Pyers & Senghas, 2009). Such studies have revealed, for instance, that late-signing children raised by nonsigning parents struggle more with ToM tasks compared both to hearing children and to native-signing children raised by signing parents (Woolfe et al., 2002). Moreover, if only a nascent form of sign language is available during childhood, this impairment can continue into adulthood (Pyers & Senghas, 2009). Obviously, being able to communicate through a full-fledged (sign or verbal) language opens up a unique window into the mental states of one's interlocutors, highlighting both the subjectivity of others' mental states and the need to consider them (Peterson & Slaughter, 2003). This is also reflected in findings of a correlation between individual language abilities and false-belief understanding in hearing children (Milligan et al., 2007). In addition, many languages contain explicit vocabulary for mental states, such as "want" or "believe," the usage of which raises awareness and helps direct attention to these states (Peterson & Slaughter, 2003; Ruffman et al., 2002). Finally, most languages also contain complement structures for recursive and nested expressions such as "Mum believes that dad knows that Timmy wants a puppy . . .," thereby providing the means for flexible embedding of mental-state content into mental-state activities (de Villiers & de Villiers, 2000; de Villiers & Pyers, 2002).

Languages differ, however, in the extent to which they emphasize mentalistic content. These differences are presumably the smallest with respect to the role of language for communication; they are greater in terms of syntactical structure, allowing for recursive and nested expressions; and they are greatest in terms of semantics, such as mental-state vocabulary. The scaffolding role of language for ToM abilities in humans is therefore also one door through which culture takes hold.

## ToM Across Cultures

The ToM abilities emerging in childhood serve as the nucleus of a much more comprehensive, folk-psychological "ToM." The latter provides culturally accumulated, transmitted, and shared assumptions about what it is that drives people or why people respond to events in the way they do. These folk theories, including the foundational concept of mind itself, differ substantially across cultures (D'Andrade, 1987; Lillard, 1998; White & Kirkpatrick, 1985; Willard & McNamara, 2019). From the Western ethnopsychological point of view, mental states are triggered by other mental states and processes (e.g., knowledge arising from the perception of facts) and are decisive for people's behavior. Other ethnopsychologies accommodate the idea that mental states can also be triggered by, say, supernatural powers or rituals (e.g., Heelas & Lock, 1981; Luhrmann, 2012; Mageo & Howard, 1996) and provide additional or alternative accounts of behavior. Some of these accounts focus on social relationships and context rather than on mental states as the main driving forces of behavior and as an indicator of agency (e.g., Lutz, 1988; J. G. Miller, 1984; Norenzayan et al., 1999; ojaehto et al., 2017a, 2017b). The available research points to at least six distinct types of culture-specific theories of mind, including the one that informs conceptualization in cognitive science and psychology (Luhrmann, 2011). A crucial aspect in which these ethnotheories differ is the extent to which they presume a capacity for truly accessing other minds. For instance, whereas Western traditions emphasize the guest's privilege to choose, East Asian traditions expect the observant host to infer the guest's desires (Markus & Kitayama, 1991).

Importantly, these ethnotheories not only inform what people assume to be common ground and what to convey when communicating but also guide the way in which they raise their children. The culture-specific content of these theories therefore tends to reinforce the concepts that children acquire and the degree of attention they pay to them. Two types of ethnotheories in particular do not appear to be conducive to the early development of ToM abilities, one revolving around the opacity of other minds and the other emphasizing the transparency of language.

Ethnotheories grounded in the *opacity of other minds* prevail in Pacific societies (overview in Träuble et al., 2013). They consider mental states as ultimately private, deemphasize them as a topic of conversation, and discourage attempts to gain a first-person-like perspective on others (Robbins & Rumsey, 2008; Throop, 2008). In Samoa, for instance, adults are reluctant to draw and/or communicate inferences about the feelings, intentions, or thoughts of others. At the same time, children are expected to learn from observation rather than receiving explicit teaching (Gerber, 1985; Mageo, 1989, 1998; Ochs, 1988; Shore, 1982). While Samoan children learn to participate in rich and complex social interactions through social awareness and social responsiveness (Ochs & Izquierdo, 2009), this does not involve routine reflections on others' mental states (Mayer & Träuble, 2013, 2015).

Ethnotheories emphasizing the *transparency of language* are found in Central and South America. As they prioritize communication about objective observations over subjective views, mental-state vocabulary is limited and rarely resorted to (Danziger, 2006; Gaskins, 2013; Vinden, 1996). Junín Quechua, for instance, talk readily about the appearance of things—and even use grammatical markers to indicate the source of information as being direct

evidence, conjectural, or hearsay (Aikhenvald, 2004)—while mentalistic vocabulary is basically absent.

If mental states are not a regular topic of discourse, children have to discover by themselves what is going on in other people, or even that this might be important in the first place. Therefore, it would not be surprising if learning to read other minds were to take longer in the absence of mentalistic discourse than it does in a context in which other minds are discussed frequently and frankly. Correspondingly, both Samoan and Junín children tend to pass false belief tasks at a later age (Mayer & Träuble, 2013, 2015; Vinden, 1996). Alternatively, enculturation guided by an opacity theory may not necessarily impede children's emerging understanding of other minds but would at least interfere with it by providing conflicting signals. After all, these children are taught to ignore, and perhaps even distrust, their intuitions about others' mental states (Astuti, 2012; Keane, 2008). And if all the people around the child justify, evaluate, and sanction a person's behavior based on its consequences rather than on the mental states that motivated it, then drawing inferences on others' mental states from observable behavior should be not only more difficult but also less relevant (Bender & Beller, 2019; and see Astuti & Bloch, 2015).

The lack of large-scale surveys prevents us, for the time being, from drawing any conclusions about how widespread the cultural deemphasizing of mind reading might be. Still, the positive instances from broadly different populations do indicate the importance of cultural scaffolding for the development of ToM abilities, specifically for explicit mind reading (Heyes & Frith, 2014), and they point to the cultural diversity both in the content of folk theories of mind and their implications for mental-state reasoning (Lavelle, 2021). Interestingly enough, recent studies suggest that even in adults, the ability to distinguish between one's own and others' beliefs need not be routinely deployed when interpreting the actions of others (Conway et al., 2017; Heyes, 2014; Keysar et al., 2003; Phillips et al., 2015). Moreover, the degree of this dissociation, again, varies cross-culturally, with Western participants performing relatively poorly compared to participants from East Asian or Amerindian groups (Leung & Cohen, 2007; Unsworth, 2008; Wu & Keysar, 2007).

### ***ToM in Early Sapiens Cognition***

The first strategy for dealing with cultural diversity when reconstructing past cognition aims at filtering the diversity out in an attempt to identify which aspects of contemporary human cognition are widely shared, consequently allowing for a generalization back in time to core components of cognition in the Pleistocene. When trying to reconstruct the components of early sapiens cognition involved in mental-state reasoning, we therefore take as a starting point the set of abilities that humans share with their closest relatives, tentatively complemented by those that appear to be universal in cognitive development and shared across human populations. As detailed above, the abilities shared with nonhuman primates almost certainly include Level 1 perspective taking. Accordingly, our hominin ancestors would have been able to understand that another individual may or may not have access to the same information as they do, and hence may or may not know what they know. More tentatively, still, even an implicit understanding of false belief might have been part of pre- and early sapiens cognition,

as has been reported for both human infants and nonhuman primates (albeit subject to debate).

At the same time, research across diverse human populations and specifically with home signers highlights the role of language for scaffolding the full set of ToM abilities. Our attempt to reconstruct early sapiens cognition would therefore crucially depend on whether or not our ancestors had a full-fledged language at their disposal. Although this has remained an unresolved and controversial issue, scientists seem increasingly prepared to predate the emergence at least of the use of symbols, if not of language itself, by an order of magnitude (Barham & Everett, 2021; Brooks et al., 2018; Dediu & Levinson, 2013; Fisher & Marcus, 2006; Henshilwood et al., 2018; Johansson, 2011; Lieberman, 2015), and hence well into the reach of the populations under scrutiny. Even if we take language use for granted, however, inferences about the scope of their ToM abilities would then depend on the extent to which these languages contained recursive structure and mental-state vocabulary. Under the hypothesis that these early languages were similar to present-day languages, it would be safe to infer that their users were capable of mind reading, including advanced false belief understanding. Still, the degree to which they practiced and routinely activated these abilities would have further depended on their ethnopsychological theories. Alternatively, one might hypothesize that, when languages developed, the absence of explicit guidance would have rendered it harder to comprehend the subjectivity of mental states (as described by Pyers & Senghas, 2009). On this account, mental-state vocabulary would have been a downstream development occurring later in time.

Unaided by firm evidence on the availability of language, we are then unable to infer when our ancestors became fully capable of Level 2 perspective taking: recognizing that another individual might both believe something that conflicts with one's own beliefs and then behave based on this diverging belief. However, it would be safe to assume that they were aware of other people's mental states and of the motivational force that such mental states may exert on behavior. Indeed, we might even conjecture that becoming able to communicate mental states in the interest of shared intentionality and cooperation would have been a potent driving force in the development of both more general language abilities and of mentalistic content. Note, though, that with the increasing ability to elaborate ethnopsychological theories against this backdrop, the cultural esteem for mind reading may have shifted, with some groups, throughout human history, emphasizing its value and setting incentives for practicing it and others discouraging its application.

### **Capitalizing on Cultural Diversity**

The strategy described in the previous section is to *filter out* cultural diversity in order to identify the widely shared aspects of contemporary human cognition that would, in turn, afford the vantage ground from which to unlock core components of cognition in the Pleistocene. An alternative strategy *capitalizes* on precisely this cultural diversity and harnesses it to retrace the evolutionary trajectories that spawned it, all the way back to the ancestral states.

One means to achieve this ambitious goal is the phylogenetic comparative method, a cluster of Bayesian computational models borrowed from evolutionary biology (Harvey & Pagel, 1991; Mace & Pagel, 1997). The three major ingredients of this method are an initial estimate of group relatedness, one or several sets of

contemporary data related to the trait under scrutiny from as many groups as possible, and a concrete model of the evolutionary dynamics assumed (Cornwell & Nakagawa, 2017; Levinson & Gray, 2012). Evolutionary processes vary along several dimensions, including the rate of substitutions or changes, the extent to which cross-lineage borrowing (horizontal transmission) and hybridization take place, or whether traits are discrete versus continuous (Nascimento et al., 2017, p. 1447). For instance, when studying ethnolinguistic groups, “history” can take several forms: passive inheritance from an ancestral condition, diffusion, or local innovation (character replacement). While standard Bayesian models tailored for branching trees account well for inheritance and innovation, a high degree of borrowing requires network models that reflect the particular dynamics of many phenomena of cultural evolution (Greenhill et al., 2009; Nelson-Sathi et al., 2011).

For questions of cultural evolution, the world’s languages serve as a proxy for the initial delineation of the phylogenetic structure. To reflect the uncertainty regarding single branching patterns and the amount of evolution along branches, models operate on a set of plausible trees rather than a single tree by applying Bayesian (Markov Chain Monte Carlo) algorithms (Levinson & Gray, 2012).

For the actual analysis, data points on the trait under scrutiny (say, information on how these groups trace descent) are mapped onto the tips of the language tree in order to rerun evolution and infer ancestral states of the trait (here: how the common ancestor of the groups was tracing descent). When adding a second set of data (say, whether or not each of these groups keeps large livestock), the approach can be used to determine the degree to which the two traits coevolve and even which of the two, if any, has driven the transformation of the other (for the example used here, the analysis showed that when Bantu-speaking groups acquired cattle, they changed from matrilineal to patrilineal or mixed descent; Holden & Mace, 2003).

Importantly, such a phylogenetic approach addresses two problems that afflict more traditional approaches: It controls for *Galton’s problem* (i.e., that cultural groups may be related to varying degrees), and it establishes causal direction, whereas cross-cultural comparisons only generate correlational data at best. Each of its three components comes with a degree of uncertainty, though. First, tree-building methods are not perfect, especially when sampling (be it of genomes, terminal taxa, or ethnolinguistic groups) is limited, such that nodes can be misplaced and ancestral nodes wrongly inferred. Second, for most analyses based on a phylogenetic approach, the variable under scrutiny is described in terms of present/absent trait lists, thereby ignoring within-group variation. And third, the model chosen may not be adequate to capture the complex dynamics of trait evolution through space and time (Cornwell & Nakagawa, 2017).

Keeping these caveats in mind, phylogenetic comparative models can still be powerful tools. In fact, for the task at hand, they generate valuable insights by helping not only to detect whether, when, and how a trait changed but also whether such changes are the outcome of systematic transformations rather than random changes and under which conditions they are likely to occur (Levinson & Gray, 2012; Mace & Holden, 2005). In the last two decades, a phylogenetic approach has been used to address a diverse set of questions, ranging from migration history (Gray et al., 2009; Gray & Jordan, 2000) to the evolution of linguistic patterns (Dunn et al., 2011; Hua et al.,

2019), sociocultural traits (T. E. Currie et al., 2010; Jordan et al., 2009), and even cognitive representations (Haun et al., 2006).

In the following, we illustrate the approach for one of the most ephemeral phenomena of human cognition—religious beliefs—in an attempt to trace the diversification of their content back into the prehistoric past.

### *Beliefs as Cornerstones of Religion*

Religion is a complex, multidimensional, and largely ubiquitous part of human culture that evades consensual definitions (Willard, 2018). As the social and emotional dimensions of religion in particular tend to account for the attractiveness and proliferation of distinct religious traditions, these dimensions have also garnered a considerable amount of research in the social sciences, with a primary focus on their role in fostering group cohesion (e.g., Alcorta & Sosis, 2005), promoting trust and prosocial behavior (Norenzayan et al., 2016; Norenzayan & Shariff, 2008), and creating an experience of others’ presence (Luhmann, 2020), as well as an interest in the motivational power of rituals, their role in cultural transmission, and their grounding in the proclivity for high-fidelity copying (e.g., Atran & Henrich, 2010; Nielsen, 2018; Nielsen et al., 2020; Whitehouse, 2021). Our focus, by contrast, is on the *cognitive* content of religions, which is furnished by and large by the set of beliefs revolving around certain supernatural entities and/or forces. These beliefs are regarded as so pivotal to religious traditions that the latter are often categorized in terms of the former. Hazarding oversimplification, the remainder of this presentation will adopt a categorization into five fundamental types of beliefs, as used in recent attempts to reconstruct their evolutionary trajectories (Peoples et al., 2016):

- animistic beliefs in a vital force entailing intentionality, as permeating all living beings as well as major natural phenomena
- beliefs in an afterlife
- beliefs in the abilities of shamans (and presumably ritual specialists more generally) to communicate with the spirit world in the service of group cohesion and healing
- beliefs associated with ancestor worship, such as that the spirits of deceased kin continue to take an interest in their group’s life (from inactive observers to active participants that can influence and be influenced by the living)
- beliefs in supreme beings, such as single creator deities or moralizing high gods (again from inactive to active observers, judges, and prosecutors)

To be regarded as religious rather than idiosyncratic, beliefs have to be culturally shared and transmitted. This does not imply that all members of a group subscribe to all the beliefs circulating within it, supernatural or otherwise (Gatewood, 2011, 2012). Interindividual variation is substantial also in this domain and has probably been so throughout human history (Caldwell-Harris, 2012; Luhmann et al., 2021; Norenzayan & Gervais, 2013). Still, religious beliefs have been part of every known human society, permeating everyday life for the faithful and being intertwined, to different degrees, with a range of cultural domains, from social norms and values to political ideologies and organization.

As such, religious beliefs are a hallmark of human ways of thinking and the very epitome of diversification. In fact, few other domains so central to human culture are more strongly fragmented and separated by (occasionally subliminal) differences, with every new twist creating a new denomination and even the attempt to reconcile two closely related denominations likely culminating in the creation of a third denomination. Since religious beliefs are contingent on transmission and therefore subject to cultural evolution (including borrowing and hybridization), their present-day diversity provides a potent leverage to untangle past transformations and ancestral states of such beliefs.

### **Retracing the Evolution of Religious Beliefs**

The origin of religious beliefs has been a topic of both armchair speculation and scientific study for centuries. Much of the effort in this regard has focused on identifying, through purely logical analysis, the most “elementary form of religious life” (for an excellent overview and discussion of such early theories of primitive religion, see Evans-Pritchard, 1965). For instance, Tylor (1871), the founder of British social anthropology and of the anthropological investigation of religion, regarded animism as the ancestral state of all religions. Marett (1914), who succeeded Tylor as Reader in Anthropology at Oxford, considered belief in *mana* (termed “animatism” by others) as a preanimistic religious belief. Scottish anthropologist Lang (1900), and especially the padres of the Vienna school of anthropology (e.g., Schmidt, 1912–1955), advocated a primeval belief in a supreme being. Much more recently, psychologists Rossano (2006) and Dunbar (1998, 2013) have joined those who favor shamanistic manifestations such as ecstatic states, social bonding, and healing rituals as foundational (see also Eliade, 1959; Lewis-Williams, 2010).

Despite this age-old history of conjecture about the earliest forms of religion and the driving forces in its evolution, researchers have only recently begun to systematically test the proposed hypotheses. Among these, a small handful of studies have sampled present-day diversity to explore the evolution of religious traits (e.g., Basava et al., 2021; Matthews, 2012; Peoples et al., 2016; Watts et al., 2016) or the conditions under which specific beliefs emerge and thrive, mostly with a focus on moralizing high gods (Botero et al., 2014; Peoples & Marlowe, 2012; Watts et al., 2015). Of specific interest to the goal of our article are those studies that attempt to reconstruct ancestral states closer to the origins of religion and the probable order(s) of transition.

The most pertinent of these studies (Peoples et al., 2016) analyzed data on religious traits for a global sample of 33 hunter–gatherer societies. Because contemporary hunter–gatherers do not belong to a single language family, the authors adopted a phylogenetic supertree method combining linguistic and genetic data (Duda & Zrzavý, 2016). Their variable of interest was the content of religious belief, categorized as one of the five types outlined above, two of them (ancestors and high gods) with two manifestations each, one passive and one active. Each society in the sample was coded for each of the seven types (present or absent); the codings were then mapped onto the supertree and subjected to phylogenetic analyses in order to reconstruct ancestral states and retrace their evolutionary trajectories, including the direction of change.

This approach not only revealed that animistic beliefs are present among all of the contemporary hunter–gatherer groups in the

sample—an observation that does not hold for any of the other types of belief—but also indicated that these beliefs would have been the one major ingredient of the religious world of ancestral hunter–gatherer groups. The results were more equivocal regarding beliefs in an afterlife (present in 79% of contemporary groups), shamans (79%), and ancestor worship (45%), but all were more likely to have emerged in the presence of animistic beliefs. Moreover, they likely occurred in the order of mention, that is, afterlife beliefs tend to arise once animism is established, and shamanism once both animistic and afterlife beliefs are established. Ancestor worship, finally, appears to presuppose and depend upon afterlife beliefs and shamanism. Interestingly, none of these—not even the belief in an afterlife—has coevolved with a belief in high gods. The latter is not widespread in contemporary hunter–gatherer groups (39% for all forms of high gods, 15% for active gods), and given that the egalitarian ethos of mobile and self-sufficient hunter–gatherer groups runs counter to an acknowledgment of supremacy, such a belief, especially in a single and active supreme being, is unlikely to have been endorsed by ancestral groups (Peoples et al., 2016).

In a nutshell, the findings obtained by Peoples et al. (2016) support Tylor’s (1871) account according to which animism is the core of all religions and their most probable origin—an account that also stands to reason from a theoretical perspective: Assuming a vital force (or “soul”) inherent in all living beings would be the conceptual foundation for further elaboration, such as that it may persist after the death of the body or that ritual specialists like shamans are capable of having it embark on a spiritual journey. Such findings are not incompatible with Rossano’s (2006) proposal, in which notions of the supernatural are preceded by ecstatic states and rituals for social bonding—at least insofar as these do not rely on a shamanistic worldview—but they do refute the supposition of a primeval belief in an active supreme being, as advocated by Lang (1900) or Schmidt (1912–1955).

The latter conclusion that the belief in high gods was not a prevalent part of ancestral religion is further supported by a second phylogenetic study based on data from 96 Austronesian ethnolinguistic groups, which tested the relationship between creed and political complexity. The authors found moralizing high gods to be a distinctly downstream phenomenon that follows from political complexity (Watts et al., 2015).

As engaging as the approach described here may be, it depends on a careful selection of evolutionary model, phylogenetic tree, and coding strategies (e.g., Slingerland et al., 2023). Moreover, it is constrained by the established time depth of available language phylogenies (in the case of typical phylogenetic analyses) or written sources (e.g., when using the global history databank *Seshat*; Turchin et al., 2015). Extrapolating evolutionary trajectories further into the past therefore requires triangulation with additional data sets, such as the genetic data informing the supertree method proposed by Duda and Zrzavý (2016), or with complementary approaches such as that outlined earlier for filtering out cultural diversity.

### **Triangulation Across Diversity-Based Approaches**

In the previous sections, we presented two strategies for dealing with cultural diversity when reconstructing past cognition—one that attempts to filter it out and the other that tries to capitalize on it—and we illustrated them for ToM abilities and religious beliefs,

respectively. These two examples not only represent key cognitive abilities but are also tightly linked to one another, with beliefs in and about nonphysical and nonvisible conditions featuring centrally in both ToM reasoning and religion (Luhmann & Weisman, 2022). This allows us to combine what we know about each of them in order to triangulate our inferences.

In marked distinction to the prevailing tendency in mainstream cognitive science, the cognitive science of religion (J. L. Barrett, 2011; Pyysiäinen, 2013) considered the diversity of its subject from the outset. The establishment that—despite variation in content—religious beliefs do share some fundamental characteristics was thus a major achievement rather than the unquestioned starting point. In search for the psychological mechanisms that would account for these systematic patterns, this line of research recognizes the continuity of regular and religious cognition and also explores the extent to which the latter may be beneficial and adaptive (e.g., Atran & Norenzayan, 2004; J. L. Barrett & Lanman, 2008; Boyer, 1994, 2003; Guthrie, 1993), thereby offering a rational explanation for apparently irrational beliefs. Combining the two diversity-based approaches can therefore advance our understanding of how religious beliefs evolved by addressing key questions such as: Which mechanisms generate and perpetuate the human propensity for beliefs in counterintuitive claims? Which factors have caused or constrained changes in such beliefs? And when in the history of our genus did these come within reach?

### ***Cognitive Underpinnings of Religious Beliefs***

A commonality of most religious beliefs is the combination of characteristics that bolster their credibility and persistence. Typically revolving around supernatural entities or incidents, such beliefs appear strongly counterfactual to all but the faithful. At the same time, they tend to be only minimally counterintuitive. Supernatural agents, for instance, combine a few implausible physical features with largely plausible psychological features, thus remaining so similar to natural agents that social relationships can be entertained. This combination of features renders religious beliefs both interesting and comprehensible, which makes them intuitively compelling and easier to remember—hence facilitating cultural sharing, retention, and transmission (Atran & Norenzayan, 2004; J. L. Barrett, 2000; Boyer & Ramble, 2001; Kelly & Keil, 1985; White et al., 2021; for a critical assessment, see Purzycki & Willard, 2016).

Due to their largely counterfactual nature, religious beliefs are still harder to buy into, though (Luhmann, 2020; Willard et al., 2016). Often, they refer to incidents for which more “natural” explanations are also available, without necessarily replacing them. Religious beliefs can coexist with other (say, magical or technical) beliefs held by the same person on the same subject and even with conflicting beliefs, for instance, about whether life ends with death. To a certain extent, religious beliefs thus provide a complementary account for the same situation but from a different, culturally revered perspective (Astuti & Harris, 2008; Legare et al., 2012; Luhmann & Weisman, 2022). This important role of cultural transmission and embedding for the stabilization of such supernatural beliefs is also attested to by the observation that they appear to be relatively weak in children and grow stronger with age (Astuti & Harris, 2008; H. C. Barrett & Behne, 2005; Bering et al., 2005; Lane & Harris, 2014).

In terms of content, most religious beliefs share the presupposition of a vital force inherent in living beings, endowing them with

life, will, and occasionally communicative capacities, all of which are cues of agency. Like the vital force on which it is predicated, agency may be distinctively conceived, assigned to a variable range of species and major natural phenomena, and/or extended to inanimate, invisible, if not nonexistent entities. Since Tylor (1871), scholars have proposed that such beliefs might be triggered and reinforced by experiencing the presence of others in dreams or that images and ideas simply “cross one’s mind” out of the blue, suggesting a porous boundary between mind and world (Luhmann & Weisman, 2022).

Importantly, while vitalistic concepts and assignment of agency appear to be foundational to all beliefs in the supernatural, they do not necessarily engender them, as they may also be implicated in “purely” folk-biological reasoning (Inagaki & Hatano, 2002; Solomon & Zaitchik, 2012), even if stretched beyond the range of species generally deemed appropriate (ojalehto et al., 2017a, 2017b). It is precisely because of its relevance for identifying biological entities that the ability to detect agency in one’s natural environment may have leveraged the emergence of supernatural beliefs. So central is this ability in regular everyday cognition, and so early does it manifest in ontogenetic development, that many researchers propose a cognitive system specifically dedicated to this task (Leslie, 1994; Saxe et al., 2005; Spelke & Kinzler, 2007). And as it would clearly be more advantageous to err on the side of false positives, the prevailing theory in the field attributes the emergence of religious beliefs, and especially of animistic beliefs, to this system being hypersensitive and hence overreacting (e.g., Guthrie, 1993; and see Atran & Norenzayan, 2004; J. L. Barrett & Lanman, 2008; Boyer, 2008). Combined with a strong tendency for anthropomorphization, this overreaction paves the way to more easily, say, “see” faces in some features of landscape, “hear” voices in the rustle of leaves, or “perceive” will and intention in the movements of clouds, in the activities of thunderstorms and fires, or the obstinacy of traffic lights and computers.

Taken together, the characteristics outlined above could account for both the early emergence, the wide distribution, and the persistence of such beliefs: While a hypersensitive system for agency detection would have induced some individuals to believe in supernatural agency, the “minimally counterintuitive” nature of some such beliefs would have rendered them ideal tokens of cultural sharing and transmission, further supported by their service for group cohesion (Boudry, 2019; Dissanayake, 1979; Van Leeuwen & van Elk, 2019). So, how might such an account help us narrow down the time period in which religious beliefs would have emerged in the history of our species?

### ***Religious Beliefs Within Early Sapiens Cognition***

In the last three decades, a number of authors have proposed explicit accounts of the origin of religion, specific religious beliefs (including disbelief), and their social functions (e.g., Atran & Henrich, 2010; Boyer, 1994, 2003; Dunbar, 2013; Luhmann, 2020; Murray & Moore, 2009; Nielsen et al., 2020; Norenzayan & Gervais, 2013; Norenzayan & Shariff, 2008; Peoples & Marlowe, 2012; Sterelny, 2018). Two accounts that explicitly address early sapiens cognition and either focus on religious beliefs more generally or include them as the key component are the phylogenetic study of religious beliefs described earlier (Peoples et al., 2016) and a theoretical account of the evolution of religion in terms of the

“religious mind” (Rossano, 2006). Each takes a hyperactive agency detection system as the starting point but also involves ToM abilities as crucial for religious beliefs.

As noted earlier, the phylogenetic analyses conducted by Peoples et al. (2016) supported the hypothesis that animism was the earliest trait of religion. The authors consider this way of thinking to be a natural byproduct both of those processes devoted to agency detection and of a more general ToM mechanism. As this ToM mechanism is also claimed to have predated language, Peoples et al. conjecture that such animistic beliefs “would have been present in early hominins” (2016, p. 274), that is, prior to *H. erectus* broadly defined (i.e., *H. erectus sensu lato*, according to Antón, 2013).

Linking insights into the religious mind with data from anthropology and archeology, Rossano (2006) proposes a three-stage model of how religion evolved: from “prereligion” (arising at 300,000 years ago [300 kya]) via “transitional religion” (150 kya) to “Upper Paleolithic religion” (35 kya). In this sequence, shamanistic manifestations such as ecstatic states and rituals for social bonding are considered foundational, whereas supernatural beliefs would have emerged relatively late, evoked by some rudimentary overassignment of agency in the transitional stage. In Rossano’s view, however, this would have spawned a conception of the supernatural not before the Upper Paleolithic, when modern human brains were believed to have emerged. Only then would our ancestors have achieved the capacities for remembering and interpreting altered states of consciousness, which, together with language, allowed them to generate overarching supernatural frameworks. Like Peoples et al. (2016), Rossano (2006, p. 356) links agency detection to ToM abilities, but he goes further by asserting that supernatural agency even presupposes several levels of metarepresentation attainable only in higher order ToM reasoning.

In claiming ToM to be a precondition for the emergence of even the most basic religious beliefs, both Peoples and colleagues and Rossano follow Dunbar (2003; and see Dunbar, 2013), who, however, focuses on the social dimension of religion and hence foregrounds concepts and rituals that he takes to serve social cohesion and compliance with rules and norms. Our approach deviates from this group of suppositions on two crucial points.

First, based on the insights compiled so far, we concede that ToM abilities might have been conducive to integrating larger social groups, but we dispute the asserted indispensability of ToM abilities for ancestral religious beliefs. If Peoples et al. (2016) are correct that animistic beliefs are ancestral for and foundational to subsequent types of religious beliefs, and if such beliefs result from an overassignment of agency (Guthrie, 1993), then advanced ToM abilities would neither be required for explaining the emergence of religious beliefs nor would they have had to predate them.

If the account of a hyperactive agency detection system described in the previous section holds any water, then individual sensations of supernatural agency would have become possible as soon as that system was in place (or turned hyperactive). For all we know, this might not be confined to the human species or even the hominin line. Detecting agency in its simplest forms—that is, *animate agency* and *intentional agency* (as opposed to *mentalistic agency*; Gonçalves & Carvalho, 2019)—gets by with attention to basic cues for life (such as self-propelled motion) and intentional behavior (such as goal-directed activities), respectively (e.g., Carey, 2009; Csibra et al., 1999; Heider & Simmel, 1944). Neither of these abilities is reliant on an elaborate concept of mental states or perspective taking. What

is more, sensitivity to these agency cues is also observed in nonhuman species (Gonçalves & Carvalho, 2019; Taylor et al., 2012), and if hypersensitivity to such cues is adaptive in humans, there is no reason to assume that this would be any different in our closest nonhuman relatives. They, too, would benefit from overascribing life and potentially harmful intentions to hidden sources of unaccounted perceptions. On this view, animistic thinking (as the most ancestral state of religious beliefs) might actually be phylogenetically old enough to be within reach for several presapiens species (one caveat is discussed below), but in either case substantially older than the Upper Paleolithic.

Accordingly, whether the source of agency is regarded simply as an abstract vital force or conceptualized as a distinct entity to which, for lack of a better generic term, we might tentatively refer as “soul” (i.e., the very essence of animistic beliefs), holding such a belief would not require any advanced ToM abilities. Even if this vital force or “soul” is believed to linger on after the death of the body, mentalistic notions need not be implicated. It is only when such souls or spirits are conceived of as interfering with one’s affairs and communication with them is sought (as in shamanism, ancestor worship, or sacrifices and prayers to gods) that these beliefs involve an awareness of mental states that may differ from, or conflict with, one’s own mental state, such as knowledge diverging from one’s own knowledge. Put differently, to the extent that more ToM abilities come within reach, those already holding animistic beliefs might be increasingly prepared to incorporate mental agency: by adding a notion of “spirit” to that of vital force or “soul,” ascribing more mental states to their supernatural agents, coming up with novel features such as that this soul/spirit can temporarily leave (e.g., in trance) or outlive the body (afterlife), and even designing novel agents (such as ancestral spirits and gods). Moreover, to the extent that more advanced ToM abilities are recruited for incorporating mentalistic concepts into religious beliefs, the latter would—and increasingly so—become subject to impacts of cultural traditions and practices that are as similarly diversifying as ToM itself.

The second aspect in which our approach deviates significantly from the proposals discussed earlier is its emphasis on language. Even though individuals (human as much as nonhuman) in the same situation may experience similar apparitions based on similar interpretations of the same perception, the emerging beliefs would remain isolated, idiosyncratic mental representations that may be revised by new experiences or consolidated via superstitious behavior. To qualify as *religious* beliefs, such individual representations would have to become communal. Sharing them with others not only results in greater distribution of their content but may also lead to them being incorporated into an explanatory framework, having meaning assigned to them, and being culturally reinforced and transmitted. In turn, this may even calibrate the cognitive processes that generated those beliefs so that, over time, perceiving the respective entities or activities becomes easier once a belief in them has gained a foothold. To the extent, however, that assignment of meaning to, and sharing of, mental representations presupposes a tool for communication powerful enough to capture and denote ephemeral notions and counterfactual states, it would be contingent on language. On this view, religious beliefs were indeed confined to hominins as the only line known to have developed such a powerful communication tool.

To sum up, combining the two methodological approaches described in the previous sections yields new insights that constitute a critical step forward for our understanding of the cognitive abilities of our early sapiens ancestors and of how these abilities emerged and evolved: Compared to previous proposals, such as those of Dunbar (2003) or Rossano (2006), it allows us to substantially predate the origins of religious beliefs, conjecturing animistic thinking and its extension to entities beyond the biological domain as a part of early sapiens cognition from the outset. And although sympathetic to the overassignment of (animate and intentional) agency as the causal mechanism for the emergence of such beliefs, it shifts the focus from ToM abilities to the language faculty as the major enabling precondition for the formation of religious beliefs.

### Conclusion

The impact of culture on human cognition, as a scaffold in both development and evolution and as a source of variation, is profound. And yet, most approaches in human evolution studies underestimate or neglect the extent of cognitive diversity in the past as in the present. Human culture rests on the predisposition for shared intentionality, instructional teaching, and language. Jointly, these enable knowledge, practices, and behaviors to be transmitted and accumulated but also diversified, the latter via mechanisms such as innovation, borrowing, and cultural exaptation. As one case in point, language in particular appears to be fundamental in both unlocking and shaping characteristic human cognitive traits such as mental-state reasoning. By allowing humans to express and communicate mental states in distinct ways, the linguistic repertoires for mind reading also engender cultural differences in the developmental trajectories of such abilities. This becomes palpable, for instance, in the order of steps in which mentalizing unfolds in English- versus Samoan- and Quechua-speaking children.

The main argument developed here is that culture plays a dual role for cognition—both as a scaffold and as a means of diversification—and that for any attempt to reconstruct early sapiens cognition, this cognitive diversity must be taken seriously, regardless of the challenges it poses. Yet, we also propose how to remedy the challenges. Specifically, we suggest harnessing, and ideally combining, two complementary strategies: one that aims at filtering out diversity and the other at capitalizing on it.

The former strategy builds on cross-cultural and interspecies comparisons, alongside studies on cognitive development, to aid in inferring the presence or absence of certain key aspects of cognition among pre- and early sapiens populations. We illustrate the strategy for ToM abilities, building on current views of ToM as composed of different sociocognitive skills. Some of these skills are present in several nonhuman animals (including Level 1 perspective taking being found in great apes) and must therefore have been widespread among hominins. Level 2 perspective taking, by contrast, does seem to be uniquely human, subject to cultural variation, and closely linked to linguistic communication. Our comparative approach thus indicates that this latter ability would only have arisen with, or soon after, the acquisition of language abilities.

The second strategy capitalizes on cognitive diversity to trace the cultural evolution that produced it, illustrated for the classic anthropological question on the origin of religious beliefs. Analyzing massive data sets with phylogenetic comparative

methods supports the hypothesis that animistic thinking lays the foundation for human religious beliefs.

Combining the two strategies, finally, points to Level 1 perspective taking as one of the psychological mechanisms underpinning religious cognition, as it triggers the attribution of agency, intentionality, and social motivation to other living and even nonliving entities. Because Level 1 perspective taking is thought to have been available to pre- and early sapiens populations, we consider it likely that animistic thinking, too, may have emerged early in the history of our genus. Turning such individual sensations into religious beliefs, though, depends on communication and cultural sharing. On this view, the emergence of religious beliefs would have been predicated on language rather than on higher order ToM abilities, as has often been claimed (for debates on potential interdependences between the two, see, e.g., Dunbar, 1998; Stade, 2020; Sterelny, 2012).

By now, it will have become clear that a great deal of our ability to reconstruct early sapiens cognition hinges on estimates of when, exactly, humans began to develop and use full-fledged languages. While still hotly debated, this timing is increasingly ascribed to a deep chronology, predating our species. The implications of, hence, not early language but early languages, are vast and involve substantial cultural and cognitive diversity of both early and possibly even presapiens groups. For instance, we should consider the possibility that different populations of Neanderthals and early *Homo sapiens*, each with their own language(s), would have had different cognitive approaches and arrived at different solutions to similar problems. This could partly explain the disparity of the archeological record despite the comparable brain size and cognitive power of these groups.

As Lewontin (1983) suggested, one of Darwin's greatest contributions was to show that variation should be the object of study for the natural sciences. We argue that, similarly, culturally induced diversity should receive more attention in cognitive research, as it is the locus of continuous selection and thus the driver of cognitive and behavioral evolution. Focusing on diversity further opens the door to multi- and interdisciplinary collaborations and to a plurality of methods and theories, with the potential to help us better understand the kind of mind that was at work in those famous South African caves—and ultimately how we became what we are today.

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