


Just How Special Are Humans?

with Eric Priest, Celia Deane-Drummond, Joseph Henrich, and Mary Meyers, “Introduction to Symposium on ‘Just How Special Are Humans?’”; Eric Priest, “Human Uniqueness: Debates in Science and Theology”; Joseph Henrich, “How Culture Made Us Uniquely Human”; Agustín Fuentes, “Distinctively Human? Meaning-Making and World Shaping as Core Processes of the Human Niche”; Cristine Legare, “The Cumulative Quality of Culture Explains Human Uniqueness”; David Reich, “Human Uniqueness from a Biological Point of View”; Alan Mittleman, “The Mystery of Human Uniqueness: Common Sense, Science, and Judaism”; Jan-Olav Henriksen, “Experiencing the World as the Evolved Image of God: Religion in the Context of Science”; Jennifer A. Herdt, “Responsible Agency: A Human Distinctive?”; Celia Deane-Drummond, “Tracing Distinctive Human Moral Emotions? The Contribution of a Theology of Gratitude”; and John Bebr, “Nature Makes an Ascent from the Lower to the Higher: Gregory of Nyssa on Human Distinctiveness.”

HUMAN UNIQUENESS: DEBATES IN SCIENCE AND THEOLOGY

by Eric Priest 

Abstract. In both science and theology, there has been a revolution in our understanding of the nature of human uniqueness. As a background to this Symposium on the subject, a summary is here given of the history of *Homo sapiens* that is being revealed by fossil, archaeological, and genetic evidence. This is followed by a description of some of the distinctive characteristics of humans that have been proposed in the past, such as language, tool use, self-consciousness, art, and culture. Ideas from theology and philosophy that are salient for the dialogue with science are then mentioned, together with a summary of the scientific and theological insights on uniqueness from contributors to this Symposium in *Zygon: Journal of Religion and Science*.

Keywords: cultural evolution; evolution; genetics; *Homo sapiens*; human characteristics; human nature; human uniqueness; science; theology and science

INTRODUCTION

Here, I offer some simple opening ideas about human uniqueness, as pre-suppositions that a debate in theology and science needs to bear in mind

Eric Priest is Emeritus Professor of Applied Mathematics at the University of St Andrews, St Andrews, UK; email: eric.r.priest@gmail.com.

[*Zygon*, vol. 00, no. 0]

www.wileyonlinelibrary.com/journal/zygon

© 2023 The Authors. *Zygon*® published by Wiley Periodicals LLC on behalf of Joint Publication Board of *Zygon*. ISSN 0591-2385 This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

in order to develop more sophisticated positions within their own respective fields. In science, many of the characteristics previously thought to demarcate human beings have been discovered in other animals, such as language, tool making, culture, art, and self-consciousness. In theology, there is now an emphasis on humans as an integral part of nature with a duty to exercise care for it, as well as new insights into the implications of being made in the image of God.

In the following sections, I summarize the biological history of *Homo sapiens*, describe some distinctive characteristics of humans that are also present in other animals, present theological ideas about humanity, and summarize scientific and theological insights from contributors to this Symposium as extensions to the thumbnail sketches in the editorial.

A HISTORY OF *H. SAPIENS* FROM FOSSIL, ARCHAEOLOGICAL, AND GENETIC EVIDENCE

There are uncertainties and disagreements about definitions, timescales, and relationships among different species or subspecies, but the following is a brief summary. The term “hominins” refers to humans and their ancestors all the way back to but not including the ancestors of chimpanzees, whereas “hominids” also includes the great apes (chimpanzees, gorilla, and orangutans). Hominins are a group of primates that have largely walked upright and over the last couple of million years hominins have had relatively large brains. Humans are unusual primates who walk upright on two legs with specialized pelvis, hip and leg muscles, and an S-shaped spine. Compared with our fellow hominids, the chimpanzees, and gorillas, we have a short flat face with a protruding nose and very small canine teeth, and an infancy and childhood that are very prolonged. We have complex speech, abstract thought, and social institutions. We make and use complex tools.

Around 7–10 million years ago, the line that probably led to *H. sapiens* split from gorillas and about 5–7 million years from chimpanzees, our closest living relative. The earliest stone tools are known from 3.4 million years ago, the earliest fire use from 1.5 million years, cooking from 0.8 million years and clothes from 0.5 million years.

The genus *Homo* includes *Homo erectus* (1.9–0.4 million years), which probably led through *Homo heidelbergensis* to the species *H. sapiens*. They were first established in Africa (possibly Kenya or Ethiopia) about 500,000 years ago and were noted for their small faces, big brains and later a capacity for symbolic thinking. The earliest fossil evidence for *H. sapiens* is about 300,000 years ago.

Around the same time, other species of *Homo* emerged, including *Neanderthals* (who lived in Eurasia until 40,000 years ago) and *Denisovans* in Asia. Some regard these as subgroups of *H. sapiens* and others as

separate species. At the same time, there are also *Homo nailed* and *Homo floresiensis*, both small brained (relatively speaking) and generally not regarded as a subspecies of *sapiens*.

Around 70,000–50,000 years ago, *H. sapiens* spread into parts of Asia. By 47,000 years, modern humans had reached Australia and around the same time they are attested spreading into Europe. As *H. sapiens* spread out of Africa, they interbred with *Neanderthals*, so that modern humans of non-African origin have 1–3% Neanderthal genes. At the same time, *Denisovans* in Asia contributed genes to Australian Aborigines and Melanesians. Soon the *Neanderthals* and *Denisovans* became extinct, either due to competition with *H. sapiens* or climate change or disease. By 15,000 years ago, humans in Siberia crossed the land bridge to North America.

A previous idea was that *H. sapiens* can distinguished by “behavioural modernity,” which developed 200,000–50,000 years ago and includes: fully developed language, figurative art, early forms of religious behavior, increased cooperation, formation of settlements, and the making of sophisticated tools. It was also thought that *H. sapiens* evolved from a single region or population within Africa.

However, more recent evidence suggests that there were probably many different places of origin for *H. sapiens* in Africa, and that they continually evolved for 500,000 years (Scerri *et al* 2018). It is likely that humans evolved within a set of interlinked groups living across Africa, whose connectivity changed through time. Rather than split into separate subspecies, perhaps we evolved slowly together by the connections and socializations of a common culture, including the accumulation of knowledge, beliefs, and values. The physical diversity of Pleistocene human fossils suggests that morphologically varied populations lived throughout Africa. Also, genetic studies imply that present-day population structure within Africa extends to deep times. Thus, there is no evidence that one part of Africa produced all modern behavior from one location.

THE DISTINCTIVE CHARACTERISTICS OF HUMANS

Consider some different characteristics of human beings and whether they are also present in other animals.

Language

Many animals have a form of language, especially social animals. Apes can use language that has some similarities to human language, such as arbitrariness, discreteness, and productivity (Fernández and Cairns 2011). Also, they can be taught sign language. In the wild, chimps talk to one another about impending danger. They use a set of 80 gestures, each conveying a message to another chimp, some of which are used by human infants; indeed, it has recently been discovered that humans correctly

interpret the meaning of 50% of the gestures, suggesting that the last common ancestor we shared with chimps used similar gestures, and that these may have been a “starting point” for our language (Graham and Hobaiter 2023). Baboons are able, like humans, to distinguish real words from fake words based on the phonological order of the words. Songbirds can be highly articulate and most show vocal learning patterns and social learning, with some (such as parrots) being exceptional mimics (Lahti 2019).

Elephant communication is highly elaborate, involving a huge variety of trumpets, deep rumbles, chirps, and many different gestures, from which they can understand, for instance, the number and ages of elephants at a watering hole five miles away. Elephants may be recognized by their voices and they hold councils before deciding to move from a watering hole or to charge an enemy. Prairie dogs use alarm calls containing information about the size, color, and speed of a predator.

Dolphin communication is also highly sophisticated. Dolphins call each other by name and communicate a variety of different moods. Humpback whales make feeding calls and produce culturally distinct songs that are clearly socially learned, with new songs quickly spreading across large populations. Sea lions understand simple syntax when taught an artificial sign language.

Tool Construction and Use

Tool use was once thought to be a defining feature of humans, but there are many members of the animal kingdom who are adept tool users. For example, bottlenose dolphins use sponges to stir up the sand and uncover prey. Chimpanzees use stone tools without making them, although they do sometimes modify objects, such as tearing the leaves from a stem to use for termite fishing.

New Caledonian crows are highly adept at forming tools from twigs, leaves and their own feathers, and can even raise the level of floating food items in a jug by dropping stones into the water. Elephants are highly intelligent: they drop logs on electrified fences to short them out, plug water holes to stop other animals drinking them up, and modify branches to ideal lengths to swat flies.

Sea otters use stones to hammer molluscs off rocks, as do some long-tailed macaque monkeys, while sea otters swim on their backs and smash shellfish on a rock on their bellies. Gorillas use branches as walking sticks to discover water depth and to make bridges to cross swamps. Octopuses store coconut shells to use as armor. Sea urchins cover themselves with natural or human debris that functions to camouflage their bodies and protect them from UV radiation.

Self-Consciousness or Self-Awareness

Some scientists suggest that neuroscience will eventually explain human consciousness, since progress has been made in finding correlations between brain activity and subjective conscious experiences, but the *hard problem* of relating consciousness to brain activity remains unsolved.

The topic of animal consciousness is controversial. For example, Descartes in the seventeenth century said that only humans are conscious, while Thomas Nagel (Nagel 1991) in “What is it like to be a bat?” argued that it can never be known, since we can never really put ourselves into the mind of the animal and experience its world in the way it does itself. The problem of minds for animals is especially difficult because animals cannot describe their experiences.

But others have argued for the existence of animal consciousness by describing a range of behaviors that suggest animals hold beliefs about things they cannot directly perceive (Griffin 2001). In 2012, a group of neuroscientists signed the *Cambridge Declaration on Consciousness*, which unequivocally asserted that “humans are not unique in possessing the neurological substrates that generate consciousness,” since all mammals and birds, and many other creatures, such as octopuses, also possess them (Andrews, 2014).

A common, though debated, test for consciousness is the *mirror test*, where reaction to a mark on the skin that is visible only in a mirror is studied. Like humans, a variety of animals pass the mirror test and recognize themselves in the mirror, and so are thought to have an internal sense of self. They include apes (chimps, bonobos, orangutan, and gorillas), cetaceans (killer whales and bottlenose dolphins), and birds (magpies and pigeons).

Art

Art may be thought of as a uniquely human activity, but can animals construct art? Is a work of art something that is produced for the aesthetic appreciation of others or are there other motivations? Elephants in captivity have learnt to paint, holding the brush in their trunk and dipping it in a variety of paints. A weaver bird can build an intricate nest that seems a work of art, but it is evolutionarily preprogrammed, and its function is to hold eggs rather than inspire artistic appreciation. The male lyrebird does not learn its song from its parent, but puts together snippets of songs it has heard in order to attract females, and so composes noninnate music for the appreciation of others. Also, male bowerbirds make and decorate a twig sculpture in order to impress females.

Culture

Many animals show signs of complex culture (Whiten 2021). In chimpanzees and orangutans, they are composed of multiple traditions spanning diverse aspects of apes' lives, from tool use to social and sexual behavior. Orangutans pass on the knowledge of how to use bunches of leaves to make a whistle to warn off predators. Young macaques learn by observing others how to use hair from visitors at a shrine as floss to clean their teeth.

The way humans evolved to hunt large mammals and compete with specialist carnivores is probably by a human *socio-cognitive niche* due to intelligence and technology, but also due to key social elements such as cooperation, egalitarianism, mind-reading, language, and culture (Whiten 2018). This *deep social mind* emphasizes the coordination of individuals to group goals. Chimps do cooperate but do not have an elaborate division of labor. They are hierarchical rather than egalitarian. Remarkably, they understand both the goals and intentions of others as well as the perception and knowledge of others, but they appear unable to appreciate that others have mental representations of the world that drive their actions however unrelated those are to reality (Tomasello, 2019).

Comparisons of two-year-old humans and chimps imply that what is crucial in humans is not individual ability but collective cognition, namely, benefitting from the culture of previous generations and being better at sharing attention with others, communicating and reading the intentions of others (Tomasello 2000). Cooperative social interaction or "*shared intentionality*" is a possible key to our cognitive uniqueness, engendered by our new forms of collaborative and communicative interaction, and resulting in culturally created norms of right and wrong (Tomasello, 2016). Eight pathways possessed by great apes in rudimentary form are thought to lead to human uniqueness: social cognition, communication, cultural learning, cooperative thinking, collaboration, prosociality, social norms, and moral identity (Tomasello 2019). Around nine months, joint intentionality emerges, followed by collective intentionality at three years and finally, by six or seven years, children self-regulate their beliefs and conform with cultural norms.

Elephant culture is highly developed. Elephants have extraordinary memories, communication skills, and cleverness and are arguably as good as primates in problem solving, tool use, and general awareness. They also have an advanced sense of family, complex social interactions with a large network of friends, and loyalty that is long lived. Elephants apparently mourn and grieve for loved ones, and can return to the site of bones for years and place leaves and sticks on them. They are compassionate and aware, supporting and consoling one another when upset. They show many characteristics of advanced understanding and cooperation, often helping one another.

PHILOSOPHY AND THEOLOGY OF HUMANITY—BACKGROUND IDEAS

Different Philosophies

There are various philosophical and theological approaches to studying humanity, which we can do no more than touch upon here (Polkinghorne 1998). The subject of human nature is inherently interdisciplinary, with different insights coming from physics, biology and anthropology, anatomy and physiology, sociology, theology, and philosophy. If all these approaches are valid and they complement one another, we have a form of *holism*, when humanity is treated as an integrated package of complexity.

Many philosophies have been proposed. For *Physicalism*, the basic stuff of the world is matter described by physics, so that mental experience is an emergent property of matter. For *Idealism*, reality is indistinguishable from perception and understanding and is a mental construct closely connected to ideas. For *Dualism*, which was dominant from the seventeenth to the early twentieth century, humans consist of mental and material, of mind and body, but it is unclear how they are related to make up a human person. One reaction has been to propose *Dual-Aspect Monism*, for which there is one sort of stuff or substance, but it occurs in different forms of organization that produce material and mental. Again, the problem here is how?

Consciousness

The coming to be of consciousness (being aware of ourselves) is a remarkable event. It is as vital as the air we breathe, but introspection simply reveals what we are thinking about, not consciousness itself. Consciousness has been defined as: sentience (the capacity to feel, perceive or experience subjectively); or awareness (the state of being conscious of something); or subjectivity (possessing feelings, beliefs, and desires); or having a sense of self.

Two key issues arise, the first concerning reports of mental experience. Should we regard them as reliable or are they misapprehensions. A second issue is the notion of free will. Do we really have the option of doing one thing rather than another, or do we *only* think we can choose?

One model of consciousness is *Functionalism* (Dennett 1991), namely, a physicalist computer model of the brain, the essence of which is the processing of information, turning input signals to output of motor activity. Difficulties include: an explanation of conscious awareness; and the nature of computers, which can handle syntax but not semantics, that is, they can follow grammatical rules but are unable to deal with meaning. Another model is *Emergence*, where consciousness is not present in individual neurons, but, due to the interaction of a highly complex web of many

neurons, it appears as an emergent property. In other words, the system of many neurons possesses a property that none of the individual neurons possesses.

The Self and Soul

The self is a primary human concept linking youth to old age. The attraction of a dualist approach is assigning the soul as a carrier of the self, defining human identity. But many now reject dualism and treat a human as a *psychosomatic unity*, which was how the ancient Hebrews conceived of humanity. So, if we keep the term “soul,” how do we define the “self” or redefine “soul”? Maybe the self is composed of the immensely complex pattern in which matter is organized.

The need to acknowledge a psychosomatic unity and the existence of a carrier of human identity has a long philosophical history from Aristotle’s idea of the soul as the form or pattern of the body to Aquinas, who rejected the Platonic dualism of Augustine. Furthermore, if we are to include people with dementia or who are disabled, then a purely cognitive definition is unsatisfactory.

The Fall

The story of Adam and Eve’s disobedience has played a key role in Christian theology (though less important in Jewish thought). Its message is that humanity is a fallen race, but many people today feel that the story is a *myth*, that is, a truth conveyed in narrative form because only a story could convey the depth of meaning. The Fall is a symbol of the human condition, the moral twistedness of men and women and their alienation from God.

Christianity teaches that we are not independent beings whose fulfillment lies in going it alone, but are complete when we are reconciled to the Creator who is the ground of our being. But how did this alienation arise? How did God’s good creation become morally marred? Further, how is it that our species can be so much kinder but also so much nastier than other species, with its use of torture and genocide (Wrangham 2020)? The traditional answer from Augustine was from a literal act of disobedience by our first ancestors, but this is untenable for some today, due to earthquakes and animal deaths that preceded the appearance of humans.

So how can we reconceptualize the idea of the Fall in terms of evolution? Perhaps during hominin evolution there was a dawning of self-consciousness and of God consciousness, but at some point, there was a turning away from God to the self.

Some Biblical Insights

Further interesting insights have been presented by Fuller and Jasper (2021). In particular, an account of being human in the biblical tradition (Taylor 2021) compares Old and New Testament insights and stresses that a human is now often viewed as an integral person rather than a separate body and soul. Taylor compares the priestly P source and the Yahwist J tradition in Genesis, and stresses that the image of God can be understood not as looking like God but as reflecting or embodying the divine presence on Earth. In the New Testament, the creation narratives were reinterpreted in the Pauline and Johannine traditions. Christ is the image of the invisible God, whereas Christians are incomplete unclear images: indeed, the Christian life is a transformation into the image of Christ. In Christ, there is the potential for humans to fulfil God's purposes and for the tarnished divine image to be restored.

Humans and Praise

A focus on humans in praise of God (Davis 2021) stresses that religious faith is not failing in the modern world, since Christianity is the fastest growing religion in China, and humans are naturally religious with an innate capacity to believe—as *Homo religioso* (Eliade 1959). Indeed, the natural response to God is praying in adoration (*Homo orans*), worshipping (*Homo adorans*) and praising (*Homo laudans*), which lies at the heart of *H. religioso*. Thus, humans are born with a strong pull toward encounters with the holy, as they yearn to go beyond their own experience (Ratzinger 2004), and human identity in its fulness is achieved by going outside the self. Furthermore, to experience love one must experience a relationship with God, which involves praise (Williams 2018).

A Little Lower Than the Angels

The riddle of humanity being a “little lower than the angels” has been discussed (Hart 2021). Here, imaginative engagement is at the heart of our relationship with others (Murdoch 1999). As humans we encounter the universal and the particular at the same time: although the insider perspective is bound to fall short (Nagel 1986), the outside perspective of science remains grounded in the particularities of a human take on things (Polanyi 1958). Despite our desire and aspiration, we cannot experience everything there is. There is a bigger, more complete, more mysterious perspective on reality than science can describe or we can grasp, which Christians expect to find in God's eye view. For humans, the world is more than the material, since it has meanings, values, feelings, relationships, hopes, ideas, fears, and intentions, which make life significant. Indeed, humans are created for the goal of active sharing in God's life when in

Christ God brings heaven down to earth and suffuses the world with God's presence and glory.

Eastern Orthodox Insights

Interesting insights into theological anthropology have come from Eastern Orthodoxy (McLuckie 2021), in particular from the Buffalo Statement of 2015 *In the Image and Likeness of God: a Hope-Filled Anthropology* about the key orthodox doctrine of *theosis* or divinization, namely, the process of growth toward likeness with God through repentance and prayer. The Buffalo Statement affirms that God has become human not only that we may share in the divine life but that we might become fully human. Whereas the Thirty-nine Articles of the Church of England state that humans are by nature evil with no natural capacity to turn to God, Buffalo states that the divine image and likeness in humans have been obscured by the Fall but not obliterated by it. It recognizes positive human capacities such as God-awareness, self-awareness, self-sacrifice, freedom, self-expression, and responsibility for creation.

SCIENTIFIC INSIGHTS ON UNIQUENESS FROM THIS SYMPOSIUM IN *ZYGON*

Recent scientific insights on human uniqueness have focused mainly on human culture. The contributions to this Symposium in *Zygon: Journal of Religion and Science* are introduced in the editorial and briefly summarized further here.

Joe Henrich

Joe Henrich (this issue) suggests that culture drove human evolution by a process of *cumulative cultural evolution*. He argues that our uniqueness is not due to specific attributes but to the underlying cultural and genetic processes that produced them (Henrich 2016, Laland 2017, Boyd 2018), and also that much of our species genetic evolution has been driven by cultural evolution. Moreover, we depend on cultural products such as tools, technologies, and know how, which are not primarily due to individual brain power.

Important is the idea of *collective brains*, namely, the ability of human groups to socially interconnect and learn from one another over generations (Henrich 2016). Thus, larger and more connected groups of humans generate faster cultural evolution, since they produce more complex technologies, languages, institutions, and behaviors, which feedback to mold people's minds and brains, both culturally over short times and genetically over longer times.

Rapid cumulative cultural evolution has been aided by our ability to have faith in what we learn from others, going beyond our own intuition and experience, and by our sociality and attention which enable us to access and selectively learn from different people (Henrich 2016).

Our genetic and cultural evolution are interwoven in such a way that all the so-called “human attributes” are formed by culture-driven genetic evolution. These attributes include sophisticated technologies, complex languages, large brains, subtle cognitive abilities, rational heuristics, life history strategies, and cooperative institutions.

Effective technologies often arise by incremental additions or serendipity. Often, they occur simultaneously because the time is ripe. Human reliance on technological products of cumulative cultural evolution, such as fire, cooking, and water containers, have reshaped our bodies, improved our dexterity, shortened our colons, lightened our bones, altered our shoulders, weakened our muscles, and given us small teeth and jaws. Thus, culture explains many physiological differences between humans and other apes.

Languages represent repertoires of communicative tools that have been built from gestures, whistles, and spoken words. They have evolved culturally to fit our brains and to be learnable by children. Cultural evolution has produced rational thinking and a growing number of concepts, metaphors, reference systems, and other mental tools.

The massive rapid expansion of our brains may have been driven by cumulative cultural evolution, in order to acquire, store, organize, and transmit the body of information created by cultural evolution. Our mental abilities are primarily for learning from others, rather than, like chimpanzees, for trickery and out-maneuvering others.

Agustín Fuentes

Agustin Fuentes focuses on human and nonhuman primate interaction, communication, cooperation, and social evolution. One of the key factors enabling *Homo* to develop a distinctively human niche is the human capacity to imagine, to be creative, to hope and dream, to infuse the world with meaning and to share those meanings with others (Fuentes 2019). The distinctive way in which humans create meaning is a core element in the human niche, which is the structural, temporal, and social context in which humans exists. It includes the space, structure, climate, nutrients, and other physical and social factors experienced via competitors, collaborators, and other agents in a shared environment. But, since the mid-Pleistocene, the niche that *Homo* occupied has also included perceptual and conceptual elements.

Many aspects appeared in the *Homo* niche during the Pleistocene over the last two million years, including intensive collaboration, followed by

the emergence of cooperative parenting, together with caretaking and emotional commitment to others as a core process of human behavior. There was interdependence between ecological, cognitive, and neural systems, and the development of a “language ready brain,” followed by the emergence of language.

When culture is defined as “behavior transmitted via social facilitation and learning from others which endures for long enough to generate customs and traditions,” many animals possess it, such as chimpanzees, orcas, and corvids (Whiten et al 2017). Human culture, however, is distinctive because of our capacity to learn across time and generations, and to accumulate culture via shared knowledge, sophisticated communication, and the development of complex skills.

Although human culture includes many processes that are different in scale, impact, and structure from other species, one of the key distinctive properties is large-scale and dynamic meaning-making and a central capacity for belief, within which lies the capacity to be religious (Fuentes 2019). Meaning-making is inferred from the presence of materials interpreted as symbols, standing for something else agreed by a community, such as beads, engraved ochres and pendants, and Venus figurines. Belief represents the capacity that emerges to develop mental representations to see and feel and know something that is not immediately present to the senses.

Cristine Legare

Cristine Legare develops the idea of cumulative culture, which is the process by which new insights are incorporated into existing bodies of socially heritable knowledge, requiring an ability to learn from, and build upon, the cultural innovations of others (Legare this issue). Cultural acquisition and transmission are aided by preferences for similar others and for conformity, consensus, and social norms. Young children, however, are much better imitators than innovators, which is a sophisticated multistep process that builds on substantial cultural learning (Rawlings and Legare, 2021).

Humans are not the only animals to create, learn, and socially transmit culture, but human culture is unique in its variation, complexity, and cumulative quality (Laland, 2017). It has been seven million years since humans and chimpanzees shared a common ancestor. In that time, the list of tools in the human repertoire has exploded from stone choppers to spaceships, but at the same time chimpanzees have continued to use the same rudimentary nutcracking tools. Our powerful brains may be necessary to explain this, but they are not sufficient, especially since the most rapid technological increase has occurred in the past 10,000 years when there has been no increase in neural complexity or brain size.

But much more is needed, namely, cumulative cultural learning that is supported by cognitive capacities such as abstract reasoning, language, metaphor usage, prosociality, cognitive flexibility, theory of mind, cooperation, morality, imitation, and teaching. In all this, the ability to learn socially is critical. Indeed, unlike human children, nonhuman primates show very limited capacity for social learning (Whiten 2017). Children's minds are complex social learning systems, in the sense that learning by observing and interacting with another person is a social process. Her work reveals how children learn both individually and socially through several learning strategies, namely, exploration, observation, participation, imitation, and instruction (Legare, 2019). In addition, she considers how causal explanatory reasoning develops and how we reason in the absence of causal information.

The flexibility and plasticity of human cognition is unique among animals. The transmission of cultural practices is made possible by a brain that has evolved to understand the minds of others and to navigate complex social group behavior. Cumulative culture requires a mind that can readily build upon existing knowledge to develop new and improved solutions to problems.

David Reich

David Reich (Reich, 2018; this issue) provides insights from analyzing the human genome, which is written on two chains, each containing three billion chemical building blocks labeled A, C, T, and G. A gene consists of a small fragment of these chains, a few thousand letters long, whose function is to assemble a protein that is at work in cells. Occasional differences in DNA sequences are caused by random copying errors, numbering about three million in total. When the density of differences is higher on a particular segment, the time since the segment shared a common ancestor is longer, so that the density of differences provides a record of the time since key events occurred in the past.

Mitochondrial DNA has been used to reconstruct a family tree of maternal relations (Cann et al 1987), which suggests that the ancestors of all modern humans lived in Africa around 160,000 years ago, that the oldest branches of the tree are all Africans, while all non-Africans today descend from a late branch of the tree that expanded from Africa. The archaeological evidence is of anatomically modern human skeletons in Africa 300,000–200,000 years ago. Manufacture of stone tools became much more efficient and innovative around 50,000 years ago, while ostrich eggshell beads, polished bracelets, body paint from red iron oxide and the first representation art revealed glimpses of their aesthetic and spiritual life, although many of these predate 50,000 years. At the same time, Neanderthals who had evolved in Europe by 400,000 years ago went

extinct in Europe by 39,000 years ago, soon after the arrival of modern humans.

It was suggested that a genetic switch, a mutation of a single gene, may have primed humans for an enabling trait such as the ability to use conceptual language and so produced the Late Stone Age revolution in Africa and the Upper Palaeolithic revolution of Eurasia 50,000 years ago (Klein and Edgar 2002). Two mutations in the gene *FOXP 2* were discovered as possible candidates (Enard et al 2002), and later a whole genome sequence from a Neanderthal included 100,000 places in the genome where present-day humans carry genetic changes absent in Neanderthals. However, understanding the function of each mutation will be a huge undertaking, and the idea of a single genetic switch has now been disproved (Reich, this issue), so that probably many individual genetic changes have contributed to what makes humans distinctive.

Genetic studies have revealed widespread interbreeding between archaic and modern humans. For example, Neanderthals and Europeans interbred 59,000–54,000 years ago, so that most non-Africans today have inherited 2% of their DNA from Neanderthals. Also, Denisovans, another group of archaic humans, lived in Asia and interbred with modern humans spreading out of Africa, so that they contribute 3–5% of the DNA of present-day indigenous people from New Guinea and Australia, and roughly 0.2% of that of present-day East and South Asians. Thus, the emerging picture is one of many waves of human migration, so that today's populations are rich mixes of ancient ones and often carry genetic components from Neanderthals and Denisovans. In addition, he suggests that there may be no simple genetic causes of human uniqueness.

PHILOSOPHICAL AND THEOLOGICAL INSIGHTS FROM THIS SYMPOSIUM IN *ZYGON*

Alan Mittleman

Alan Mittleman, offering a Jewish philosophical approach, proposes rich ways of understanding human nature and personhood that preserve human dignity and distinction in a world of neuroscience and evolutionary biology (Mittleman 2015). He combines “commonsensical” and “scientific” perspectives on the human, in which a commonsense perspective typifies the stance of an agent, but a scientific perspective typifies that of a spectator. From a commonsense point of view, what separates human beings from animals and gives them a special purpose is that they are the organ through which Nature knows herself. Also, they are each unique, formed by God with his image upon them. Uniqueness is thus a matter of making judgments about intrinsic worth.

Although science began with common sense, there is now a gap between our familiar sense of how the world works and how it actually works. The “view from nowhere” (Nagel 1986) opens up space for scientific explanations from a third-person point of view to complement the first-person commonsense view. Scientifically, our powers of symbolic expression and intelligence are orders of magnitude beyond those of chimpanzees, but the means of comparison may support an evaluation of humans as differing in degree rather than kind, so that uniqueness would be contextual and relative rather than categorical. For example, consciousness is regarded as a functional or emergent property of brains, and so stances that consider the nonreductive reality of consciousness tend to be dismissed by neuroscientists, because they are not open to empirical research. Much of the gap between science and common sense on the issue of human uniqueness comes about because science avoids the value judgments that arise from a first-person view.

The Jewish tradition regards humans as both individuals and also part of a community. It gives credence to the authority of both science and common sense within their proper domains, namely, projects of explanation and evaluation. Rather than the Platonic duality of body and soul, it offers a different duality which gives us a unique status within life, namely, of being both “a little less than divine” and also “dust,” of being apart from nature and also part of it. One creation story in Genesis sees us as lordly creatures, made in the image of God, and standing apart from the rest of creation and ruling over it. The other views man as a creature of the earth, close to the rest of creation, participating in creation.

The mystery of human uniqueness is located in our fragmented nature, so that humans can become spectators, abstracted from nature, but we can also experience the world from a perspective charged with values, meanings, significance, and purpose. We are uniquely both spectators and agents but do not know how to integrate them.

Jan-Olav Henriksen

Jan-Olav Henriksen (Henriksen, this issue) has suggested that human evolution is closely tied up with religion, which may be regarded as a cluster of human practices by which we respond to and interact with reality. Some of these are linked to wisdom; others involve a sense of community; others lead to experience of another mode of being in the world that is different from the ordinary. Religions then result from learning processes that are developed as a response to a variety of experiences and challenges faced by humanity.

The practices may orientate, transform or entail reflection on human life. *Orientation* is continually needed by humans since it creates a background against which the significance of things and events appears, by

using a variety of stories, symbols, rituals, cooperation, and reflective practices. This helps humans feel more at home in the world.

Both social and personal *transformation* of the individual and the community may result from different resources offered by religions, which enhance religious engagement. Doctrine and belief are then developed by reflection on practices of orientation and transformation. Orientation and transformation are at the basis of human learning, but they take on a religious character when the ultimate comes into play.

Henriksen considers the role of religion in human distinctiveness, by building on the ideas of niche construction and the human capacities to imagine and infuse the world with meaning (Fuentes, this issue) as well as the key role of cumulative cultural evolution in human uniqueness (Henrich, this issue). Religious practices were an early part of the construction of the niche, with myths and narratives contributing to religious reasoning, built on the ability to conceptualize, reflect, and communicate. Important too were religious sites that contribute to the experience of the sacred, communal orientation, and meaning-making.

Finally, he discusses some theological consequences. It is now thought that it is not specific attributes that make humans distinct from other species but rather how they engage these in relation to various experiential dimensions and how they ascribe significance to some of them in light of their understanding of ultimate sources of orientation and transformation. Thus, whereas science's focus is knowledge as it describes and explains the world we inhabit, theology emphasizes wisdom as it represents attempts to orientate us in the world and suggest possible transformations. In particular, Jewish and Christian theology identify humans as images of God, as beings that mirror and represent God as the ultimate source of love by practicing love themselves.

Jennifer Herdt

Jennifer Herdt explores agent responsibility, which implies that an agent is responsible for an action, as a distinctive aspect of humans. Intentional action occurs whenever why questions can meaningfully be posed to an agent, and an answer be given in terms of beliefs and purposes, but what else is needed for agent responsibility?

An act of holding responsible is a matter of being disposed to adopt some reactive attitude toward another, but there are special features of the reactive emotions of resentment, indignation, and guilt, which are integrally connected with social expectations (Wallace 1994). The key ethical question concerns the conditions under which it is appropriate or justified to adopt particular reactive attitudes toward another agent (De Mesel 2017). Only when these attitudes are justified is it appropriate to attribute agent responsibility.

Reactive attitudes of certain kinds also occur in chimpanzees and other social animals, who are highly dependent on one another. A host of expectations concern how the other members of the group will behave: when they are violated, we observe not simply surprise, but reactions like anger and resentment, which are not unique to humans. However, chimpanzees do not appear to feel guilt, a specific negative feeling associated with conscious awareness of having violated a norm, or of having done something one knows to be wrong. In chimpanzees and dogs, and also young human children, emotional identification with these norms is not clearly seen. Chimpanzees are aware of what others know and do not know, and act accordingly, but adult humans also realize that others believe things that they themselves know to be false. In contrast, chimps simply track whether another individual is aware of the same things as themselves.

There is no evidence that other social animals consider whether their reactive attitudes are or are not justified. In contrast, for humans, symbolic language makes it possible to articulate reactions, which allows us to differentiate between our reactions and judgments they embody. Thus, we can ask whether the judgments are accurate and the reactions justified and can then recognize that it is proper to hold another responsible.

Accountability and the reactive emotions knit us together in communities of shared expectation and response, which humans share with other social animals, but none of us is ultimately responsible for our doings. In order to become agents capable of mature moral agency, we, like other social animals, first need secure attachment and stable social bonds, in which we are cherished. Trauma destroys our capacity to stand behind ourselves and our actions, but gentle care affirms us as potential objects of the reactive attitudes, potential participants in societies of shared responsibility.

Celia Deane-Drummond

Science and theology benefit from awareness of philosophical presuppositions but creative imagination is important in both. Scientific debates on the biological basis for cultural evolution of moral sentiments are ongoing and suggest fruitful theological input, but the theology needs to respond creatively to the science. One possibility is not to refer to the image of God if it is no longer consistent with an emergent understanding of humanity (Fergusson 2013). However, for centuries the idea of humans made in the image of God has held sway in theological circles as a marker of human uniqueness, so the preference here is to reinterpret its significance, by considering that image in terms of performance (Deane-Drummond 2012). In particular, Celia Deane-Drummond discusses gratitude, a distinctively human emotion.

Different philosophical definitions of gratitude have been proposed, but three stages are needed for it to qualify as a moral virtue: recognition of an

intentionally given benefit, a positive affective state toward a benefactor, and an increase in motivation to reciprocate. Also, many theological approaches have been offered. Thomas Aquinas, for example, asks whether gratitude is distinct from other virtues such as religion and piety, namely, what is specifically owed to parents. He regards the purpose of giving thanks as a type of paying back, both to God, then to one's parents, and finally to other benefactors.

Thus, gratitude is not simply a moral emotion, but is also related to cognition. For a kindly action to be morally good and so deserving of gratitude depends on the will or intent of the giver, but it is a discernment of intention together with a spontaneity and lack of calculation that make up the virtue of gratitude. For many Christians the Eucharist (which means thanksgiving) is central to worship, and so gratitude is important for a Christian narrative of creation and salvation history. For Ignatius of Loyola, for example, there is a direct correlation between gratitude and the spiritual life, and indeed reflecting on positive inner emotions and gratitude toward God is a key part of his *Spiritual Exercises*.

One difference between the evolutionary, psychological, and theological accounts of gratitude concerns the perceived benefits. Psychology focuses on positive feelings of gratitude connected with personal wellbeing and happiness. An evolutionary understanding relates gratitude to broader benefits in terms of prosociality. Theological accounts, on the other hand, value an individual's sacrificial offering for the well-being of the community, which may have been important in the origin of gratitude in early human evolution. Theology also links gratitude with senses of being forgiven and of gifts of grace.

John Behr

Theological reflection on the nature of humanity starts in Genesis with God speaking creation into being with a series of commands "Let there be" and then when God comes to humanity with quite different words "Let us make the human being according to our image and according to our likeness." This process is completed when Pilate presents Christ to the crowd with the words "Behold the human being" and as God finally rests on the Sabbath when Christ is in the tomb. Furthermore, Jesus Christ as proclaimed by the apostles shows what it is to be God and what it is to be human.

In the fourth century, Gregory of Nyssa took these ideas further in his work *On the Human Image of God*, as described in a newly edited and translated text (Behr this issue, 2023).

Following the pattern of Plato's *Timaeus*, Gregory first presents a vision of the human being. Next, he analyses the provision of God about the wavering inclination of our will, in the rise of nature toward a more perfect

form of life, completed in its fullness as the image of God, in Christ. Third, he shows how this economy is recapitulated in the life of each human being, starting in the womb, where it is nourished and grows, emerging into the world of sense-perception, where it continues to grow in body and soul, learning discernment by experience and growing in virtue. In this adult stage, each human needs to be exhorted to put away childish things and instead to be renewed in accordance with the image of God. In his work *On Those Who Have Fallen Asleep* (Heil 1967), Gregory deals with the role of death in life and the transformation through resurrection, in which the birth-pangs of death serve as a midwife assisting the birth of humans to another life.

One striking aspect of Gregory's insights is the way the "truth" of what it is to be "human" lies in the future and is an end toward which we must give our own "let it be." Another is that the distinctiveness of being human does not depend on the possession of intellect or a particular bodily form, but rather it lies in the growth that individually and collectively human beings undergo through time and especially the transformation to which they are called through their death.

CONCLUSION

Scientifically, as the articles in this Symposium illustrate, there has been a marked shift away from focusing on specific human characteristics and an enormous increase in understanding the sophistication and rich variety of subtle behavior in social animals. For humans the focus is very much on the nature of human culture and the surprising ways it has explosively evolved in terms of concepts such as shared intentionality, the human socio-cognitive niche, deep social mind, cumulative cultural evolution, collective brains, and the ability to suffuse the world with meaning and belief. Genetic insights have shown how European, African, and Asians are related and how parts of our DNA originate from Neanderthals and Denisovans, but greater insights are promised in future when the functions of multiple genetic changes that have contributed to what makes humans distinctive are identified.

Theologians, in contrast, have focused on the idea of humans as images of God, as beings that mirror and represent God as the ultimate source of love by practicing love themselves. One aspect that is distinctively human is our orientation and entering into transformation practices based on conceptions of the ultimate. Agent responsibility is another human distinctive feature, which implies that an agent is responsible for an action, and so humans can feel guilt. A further fact that separates humans from animals is that they are the organ through which Nature knows herself. Whereas humans can become spectators, abstracted from nature, they can

also experience the world from a perspective charged with values, meanings, significance, and purpose.

Scientific and philosophical or theological ideas on human origins and what makes humans special provide complementary insights on the nature of humanity. It is clear that further dialogue between the two has much to offer in future to enrich our understanding of human uniqueness.

ACKNOWLEDGEMENTS

I am very grateful to the authors of this thematic section of *Zygon* and to Andrew Whiten, David Reich, and my fellow guest editors for clarifying many issues and for correcting my misconceptions.

REFERENCES

- Andrews, Kristin. 2014. *The Animal Mind: An Introduction to the Philosophy of Animal Cognition*. London: Taylor & Francis.
- Behr, John. 2023. *Gregory of Nyssa, On the Human Image of God*. Oxford Early Christian Texts. Oxford: Oxford University Press.
- Boyd, Robert. 2018. *A Different Kind of Animal*. Princeton, NJ: Princeton University Press.
- Cann Rebecca L, Mark Stoneking, and Allan Wilson. 1987. "Mitochondrial DNA and Human Evolution." *Nature* 325 (6099): 31–36.
- Davis, John. 2021. Chapter 2 of Fuller and Jasper (2021).
- Deane-Drummond, Celia. 2012. "God's Image and Likeness in Humans and Other Animals: Performative Soul Making and Graced Nature." *Zygon: Journal of Religion and Science* 47 (4): 934–48.
- de Mesel, Benjamin. 2017. "Is Moral Responsibility Essentially Interpersonal? A Reply to Zimmerman." *Journal of Ethics* 21 (3): 309–33.
- Dennett, Daniel. 1991. *Consciousness Explained*. Boston: Little, Brown and Co..
- Eliade, Mircea. 1959. *The Sacred and the Profane: the Nature of Religion*. New York: Harper and Row.
- Enard, Wolfgang, Molly Przeworski, Simon Fisher, Cecilia Lai, Victor Wiebe, Takashi Kitano, and Anthony Monaco. 2002. "Molecular Evolution of Foxp2, a Gene Involved in Speech and Language." *Nature* 418:869.
- Fergusson, David. 2013. "Humans Created According to the Imago Dei: An Alternative Proposal." *Zygon: Journal of Religion and Science*, 48 (2): 439–53.
- Fernández, Eva, and Helen Cairns. 2011. *Fundamentals of Psycholinguistics*. Chichester, UK: Wiley Blackwell.
- Fuentes, Agustín. 2019. *Why We Believe: Evolution and the Human Way of Being*. New Haven, CT: Yale University Press.
- Fuller, Michael and David Jasper, eds. 2021. *Made in the Image of God: Being Human in the Christian Tradition*. Durham: Sacristy Press.
- Graham, Kirsty, and Catherine Hobaiter. 2023. "Towards a Great Ape Dictionary: Inexperienced Humans Understand Common Nonhuman Ape Gestures." *PLoS Biology* 21(1): e3001939.
- Griffin, Donald. 2001. *Animal Minds: Beyond Cognition to Consciousness*. Chicago: University of Chicago Press.
- Hart, Trevor. 2021. Chapter 3 of Fuller and Jasper (2021).
- Heil, Gunter. 1967. *On Those Who Have Fallen Asleep*, in GNO 9.1 (Leiden: Brill), 28–68.
- Henrich, Joseph. 2016. *The Secret of Our Success: How Culture Is Driving Human Evolution, Domesticating our Species and Making us Smarter*. Princeton, NJ: Princeton University Press.
- Klein Richard, and Blake Edgar. 2002. *The Dawn of Human Culture*. New York: Wiley.

- Lahti, David. 2019. "Tracking Cultural Evolution in House Finch Song." *American Ornithological Society News*, Part I: 21 February; Part II: 22 February.
- Laland, Kevin. 2017. *Darwin's Unfinished Symphony: How Culture Made the Human Mind*. Princeton, NJ: Princeton University Press.
- Legare, Cristine. 2019. "The Development of Cumulative Cultural Learning." *Annual Review of Developmental Psychology* 1(1): 119–47.
- McLuckie, John. 2021. Chapter 5 of Fuller and Jasper (2021).
- Mittleman, Alan. 2015. *Human Nature and Jewish Thought: Judaism's Case for Why Persons Matter*. Princeton, NJ: Princeton University Press.
- Murdoch, Iris. 1999. *Existentialists and Mystics*. London: Penguin.
- Nagel, Thomas. 1986. *The View from Nowhere*. New York: Oxford University Press.
- . 1991. "Ch. 12. What Is It Like To Be a Bat?" *Moral Questions*. Cambridge: Cambridge University Press.
- Polanyi, Michael. 1958. *Personal Knowledge*. London: Routledge and Kegan Paul.
- Polkinghorne, John. 1998. *Science and Theology: An Introduction*. London: SPCK.
- Ratzinger, Joseph. 2004. *Introduction to Christianity*. San Francisco: Communio Books.
- Rawlings, Bruce, and Cristine Legare. 2021. "Toddlers, Tools, and Tech: The Cognitive Ontogenesis of Innovation." *Trends in Cognitive Sciences* 25(1): 81–92.
- Reich, David. 2018. *Who We Are and How We Got Here: Ancient DNA and the New Science of the Human Past*. New York: Pantheon.
- Scerri, Elizabeth, Mark G. Thomas, Andrea Manica, Philipp Gunz, Jay Y. Stock, Chris Stringer, Matt Grove, Huw S. Groucutt, et al. 2018. "Did Our Species Evolve in Subdivided Populations across Africa, and Why Does It Matter?" *Trends in Ecology & Evolution* 33 (8): 582–94.
- Taylor, Nicholas. 2021. Chapter 1 of Fuller and Jasper (2021).
- Tomasello, Michael. 2000. *The Cultural Origins of Human Cognition*. Cambridge, MA: Harvard University Press.
- . 2016. *A Natural History of Human Morality*. Cambridge, MA: Harvard University Press.
- . 2019. *Becoming Human: A Theory of Ontogeny*. Cambridge, MA: Harvard University Press.
- Wallace, Jay. 1994. *Responsibility and the Moral Sentiments*. Cambridge, MA: Harvard University Press.
- Whiten, Andrew. 2018. "The Evolution and ontogeny of 'Deep Social Mind' and the Social Brain". In *Development of the Social Brain*, edited by Jed Elison and Maria Sera, 1–43. Hoboken, NJ: John Wiley & Sons.
- . 2021. "The Burgeoning Reach of Animal Culture." *Science* 372 (6537): eabe6514.
- Whiten, Andrew, Francisco Ayala, Marc Feldman, and Kevin Laland. 2017. "The Extension of Biology through Culture." *Proceedings of the National Academy of Sciences* 114 (30): 7775–81.
- Williams, Rowan. 2018. *Being Human: Bodies, Minds, Persons*. London: SPCK.
- Wrangham, Richard. 2020. *The Goodness Paradox: How Evolution Made Us Both More and Less Violent*. London: Profile Books.