

Building blocks of language



Authors:

Chris Jones¹ Juri van den Heever² 

Affiliations:

¹Department of Systematic Theology and Ecclesiology, Faculty of Theology, Stellenbosch University, Stellenbosch, South Africa

²Department of Botany and Zoology, Faculty of Science, Stellenbosch University, Stellenbosch, South Africa

Corresponding author:

Chris Jones,
chrisjones@sun.ac.za

Dates:

Received: 02 June 2021

Accepted: 13 Sept. 2021

Published: 29 Oct. 2021

How to cite this article:

Jones, C. & Van den Heever, J., 2021, 'Building blocks of language', *HTS Teologiese Studies/Theological Studies* 77(3), a6895. <https://doi.org/10.4102/hts.v77i3.6895>

Copyright:

© 2021. The Authors.
Licensee: AOSIS. This work is licensed under the Creative Commons Attribution License.

Read online:



Scan this QR code with your smart phone or mobile device to read online.

Articulate language is a form of communication unique to humans. Over time, a spectrum of researchers has proposed various frameworks attempting to explain the evolutionary acquisition of this distinctive human attribute, some deploring the apparent lack of direct evidence elucidating the phenomenon, whilst others have pointed to the contributions of palaeoanthropology, the social brain hypothesis and the fact that even amongst contemporary humans, social group sizes reflect brain size. Theologians have traditionally (largely) ignored evolutionary insights as an explanatory paradigm for the origin of humankind. However, an increasing number are, of late, contributing to a worldview of humanity which accommodates both the epistemological realities of evolutionary biology as well as insights from theology. This includes reviewing and assessing the origins of articulate language and the physiological attributes necessary for its development. It is in this sense that the evolution of language is relevant from a theological perspective. The association between mental capacity and articulate language, already noted by Darwin, is relevant in explaining the larger group sizes found amongst humans, as is the incipient role played by the evolution of laughter in triggering the neuroendocrine system promoting bonding, to the eventual development of articulate language. Our aim is to review a selection of contemporary perspectives on the evolution of language, amongst others, reasons for the ease with which young children acquire language competency, and whether we may be hardwired for language from birth. Further reading is suggested in the footnotes.

Contribution: This article is part of a special collection reflecting on the evolutionary building blocks of our past, present and future. It is based on historical thought and contemporary research with regards to the evolutionary emergence of language. It fits well with the intersectional and trans-disciplinary nature of this collection and journal.

Keywords: language; social and vocal grooming; gossip; laughter; singing; primate vocalisation; speech; bonding.

Introduction

Several perceptive and influential theologians have extensively campaigned over time for recognition of the evolved personhood of humans. They have stressed the fact that in their religious endeavours, humans display biologically evolved characteristics such as a natural moral stance, independent of any religious domain (see Van den Heever & Jones 2019 for a more detailed discussion) and linguistic abilities that evolved from social intelligence.

It seems evident then that a paradigm shift has already been effected regarding those aspects of human existence traditionally claimed as the sole province of theology. Advances in evolutionary epistemology from neurobiology to palaeontology, now present a unified explanation for the human condition in all its manifestations, and, as a direct result, convincingly deconstruct traditional theological claims regarding the cosmos, the existence of life on earth, as well as the ubiquitous belief in simplistic supernatural explanations for the human condition. This has resulted in theologians rethinking religious approaches over a wide spectrum of interpretations.

Consequently, influential theologians now explore an interdisciplinary approach regarding theology and science, inviting their contemporaries to a cognitive shift aimed at establishing an explanatory partnership between evolutionary epistemology and theology.

Richard Grigg (2008:88) has been explicit about the reality of science as a rational, cross-cultural witness to the real world. Contrary to the oft stated attempts by more traditional theologians to define an essentially science-free theology, he stresses the cumulative nature of peer-reviewed

Note: Special Collection: Challenging Building Blocks, sub-edited by Chris Jones (Stellenbosch University) and Juri van den Heever (Stellenbosch University).

scientific discoveries and the consequent contribution to the font of human knowledge. 'The ability to begin the theological and spiritual quest with this empirically sound, demonstrably accurate account of nature is of inestimable value' (Grigg 2008:88).

Van Huysteen (2006) notes that:

[A] sense of the ineffable, the sacred, the spiritual is part and parcel of how human beings have coped with their personal and social universe, and in this coping process the role of language in the evolution of the uniquely human mind was crucial. (p. 226)

Van Huysteen (2006) further points out that:

[... K]nowing the prehistory of the human mind will provide us with a more profound understanding of what it means to be uniquely human. It certainly helps us to understand a little better the origins of art and of religion (p. 226)

In this respect, Dan Dedui and Stephen Levinson (2013:1) have pointed out the importance for the social sciences to recognise the deep antiquity of language, comparing it to the paradigm shift effected by the Uniformitarianism of Charles Lyell (1830) in the magisteria of Geology, Palaeontology and Evolutionary Biology. The time is therefore long gone when the complexities of human origins and existence could be explained solely from a traditional religious point of view. Evolutionary epistemology has contributed rational solutions to the origin of humanity to the extent that for a cognitive theology to survive, it will have to take the evolutionary history of humans on board, and it is in this vein that we believe our review of some current thoughts on the building blocks of human language will, in some small way, contribute to the discussion.

Comments on current perceptions

Rudolf Botha and Martin Everaert (2013:1) comment on the lack of readily available evidence for the evolution of language and speech, and the fact that language does not petrify. For them, the absence of direct evidence relating to the evolution of language necessitates the utilisation of associated phenomena, albeit indirect, that contribute evidential support.

The now famous statement by Theodosius Dobzhansky (1973:125) that: '[n]othing in Biology makes sense except in the light of evolution' is particularly applicable to the developmental history of humanity and, as Anderson (2013:21) points out, the uniquely human attribute of language defines its biological origins and makes a compelling case for an evolutionary origin.

A case in point would be the transition from alpha-male dominance, typical of non-human primate societies, to the egalitarian social systems of mobile hunter-gatherers. What is known as the Language-Based Conspiracy hypothesis (Wranghan 2019:7) is based on the idea that the advent of a language complex would have empowered non-alpha males to collectively conspire to and conduct an overthrow or execution of a dominant alpha-male, an action beyond the

abilities of a single non-alpha. As can be expected, this exclusively human behaviour is foreign to chimpanzee society but is still a feature of modern-day hunter-gatherer societies.

As with most subjects associated with biological evolution, Charles Darwin ([1871] 2013:43) was pre-eminently equipped to comment on human language and brain development pointing out our unique cognitive capacity for effectively linking '... definite sounds with definite ideas ...'

Francisco Ayala (2012:179) agrees with Darwin that mental capacity is a pre-requisite for uniquely human language. This marks a definitive gap between communication as seen in bees (dancing), ants and crickets (pheromones and tactile clues), and fish, reptiles, birds and mammals (intricate display behaviour, which may include an extensive array of sounds) and is a far cry from the complexity and embedded meanings of human syntax.

Ayala (2012:182) contends that the speed at which children discover correct syntax relates to a postulate of Noam Chomsky¹ that we possess an evolved and therefore innate capacity to speak. Linguistically, we are thus equipped to construe and tell stories, as opposed to non-human animals which universally lack the ability to communicate by means of words or word combinations.

This is confirmed by Rebecca Stanborough (2019) when she writes:

Humans are storytelling beings. As far as we know, no other species has the capacity for language² and ability to use it in endlessly creative ways. From our earliest days, we name and describe things. We tell others what's happening around us. (n.p.)

Stanborough supports Chomsky's proposition that newborns have an innate understanding of the workings of language. '... But according to Chomsky, we *can* acquire language *because* we're genetically encoded with a universal grammar – a basic understanding of how communication is structured' (Stanborough 2019:n.p.).

According to the Linguistic Society of America³ (LSA), Chomsky's idea has become widely accepted⁴ (LSA 2021). It states that children:

[A]cquire language quickly, easily, and without effort or formal teaching. It happens automatically, whether their parents try to teach them or not. Although parents or other caretakers don't teach their children to speak, they do perform an important role by talking to their children. Children who are never spoken to will not acquire language ... And it is just as easy for a child to acquire two or more languages at the same time, as long as they are regularly interacting with speakers of those languages. (n.p.)

1. See Chomsky's groundbreaking book in this regard (1957): *Syntactic Structures*.

2. For more information see: Mohny (2017) and Piazza, Jordan and Williams (2017).

3. The Linguistic Society of America has been advancing the scientific study of language since 1924: <https://www.linguisticsociety.org/resource/faq-how-do-we-learn-language>.

4. For further information see: Pecchi (1994), Pinker (1994) and Smith (1989).

The Society (LSA 2021) further postulates, and this is in line with other research already referred to (see footnote 4), that the:

[S]pecial way in which many adults speak to small children also helps them to acquire language. Studies show that the ‘baby talk’ that adults naturally use with infants and toddlers tends to always be just a bit ahead of the level of the child’s own language development, as though pulling the child along. This ‘baby talk’ has simpler vocabulary and sentence structure than adult language, exaggerated intonation and sounds, and lots of repetition and questions. All of these features help the child to sort out the meanings, sounds, and sentence patterns of his or her language. (n.p.)

The LSA (2021) explains significantly how small children are able to master a complex language system:

Although the ‘baby talk’ that parents use with small children may help them to acquire language, many linguists believe that this still cannot explain how infants and toddlers can acquire such a complicated system so easily. (n.p.)

It is far easier for a child to acquire language as an infant and toddler than it will be for the same child to learn, say, French in a college classroom 18 years later. Many linguists now say that a new-born’s brain is already programmed to learn language, and in fact that when a baby is born he or she already instinctively knows a lot about language. This means that it is as natural for a human being to talk as it is for a bird to sing or for a spider to spin a web. In this sense, language may be like walking: The ability to walk is genetic, and children develop the ability to walk whether or not anybody tries to teach them to do so. In the same way, children develop the ability to talk whether or not anybody tries to teach them. For this reason, many linguists believe that language ability is genetic. Researchers believe there may be a ‘critical period’ (lasting roughly from infancy until puberty) during which language acquisition is effortless. According to these researchers, changes occur in the structure of the brain during puberty, and after that it is much harder to learn a new language. By studying languages from all over the world, linguists hope to find out what properties all languages have in common, and whether those properties are somehow hard-wired into the human brain. If it is true that babies are born with a lot of language knowledge built in, that will help to explain how it is possible for a very small child – with no teaching, and regardless of intelligence level – to quickly and easily acquire a system of language so complex that no other animal or machine has ever mastered it.

Stanborough (2019) reminds us in this regard that languages across the world are composed of similar elements and collectively share the attribute of recursion.⁵ ‘With rare exceptions, all languages use structures that repeat themselves, allowing us to expand those structures almost infinitely’ (Stanborough 2019:n.p.). She builds her argument further by referring to Chomsky and others who ‘have argued that because almost all languages share these characteristics despite their other variations, we may be born

5.For more information see: Traxler, Boudewyn and Loudermilk (2012).

preprogrammed with a universal grammar’ (Stanborough 2019:n.p.). Linguists like Chomsky ‘have argued for a universal grammar in part because children everywhere develop language in very similar ways in short periods of time (De Carvalho et al. 2015) with little assistance’ (Stanborough 2019:n.p.). Those researchers who ‘espouse the idea of a universal grammar say it’s more likely that they have an innate understanding of how words function, even if they don’t know the words themselves’ (Stanborough 2019:n.p.). She makes the important point that we all learn a language in the same sequence of steps (See: Mayo Clinic Staff 2021). In her opinion, many linguists agree that this shared development pattern consists of three basic stages, namely ‘learning sounds, learning words [and] learning sentences’ (Stanborough 2019:n.p.). More specifically,⁶ its essential features are as follows:

We perceive and produce speech sounds, we babble, usually with a consonant-then-vowel pattern, we speak our first rudimentary words, we grow our vocabularies, learning to classify things, [and] we build two-word sentences, and then increase the complexity of our sentences. (Stanborough 2019:n.p.)

However, ‘[d]ifferent children proceed through these stages at different rates (See Kaplan 2018). But the fact that we all share the same developmental sequence may show we’re hardwired for language’ (Stanborough 2019:n.p.).

The historical origins of language

Robin Dunbar, an important contributor to the debate around the evolution of language, is of the opinion that ‘... speech and language evolved through a series of stages individually designed to break through successive glass ceilings on group size’ (Dunbar 2017), and that:

[L]anguage was simply the last of these (and hence evolved late in hominin evolution), but its precursors (laughter and singing) each played a crucial role in preparing the way for speech production. (p. 209)

He reasons that somewhere between the rise of early *Homo* and the appearance of modern humans approximately 200 000 years ago, ‘hominins began to increase the size of their social groups significantly beyond those typical of monkeys and apes’ (Dunbar 2017:209; also see Dunbar 2014; Gowlett, Gamble & Dunbar 2012). As we know from research (See: Dunbar 1992, 1998, 2011), social group size correlates with brain size across primates, including modern humans. Dunbar thus argues that:

[S]ince we know where we started (as a great ape) and where we ended up (as modern humans), it follows that hominin community size must track the changes in brain size in between. (Dunbar 2017:209; also see Dunbar 2014; Gowlett et al. 2012)

Any hypothesis of this kind must necessarily also be able to account for the way in which the primary glue of primate communities, social bonding, was affected by the increase in community numbers.

6.For further reading: Hutaauruk (2015).

Ponce de León et al. (2021) reflect on the difference in brain size between humans and the great apes and that the human brain ‘... bear evidence of important structural reorganization, notably in cortical association areas related to higher cognitive functions, such as toolmaking and language capabilities’ (p. 165). They note that ‘[i]n modern human brains, the inferior frontal lobe is an important neurofunctional substrate for advanced social cognition, toolmaking and tool use, and articulated language’ (Ponce de León et al. 2021:170). Their investigation of fossil crania has shown that these changes took effect between 1.7 Ma and 1.5 Ma, and that these changes concurred with advances in techno culture. We hypothesize that this pattern reflects interdependent processes of brain culture coevolution ‘... where cultural innovation triggered changes in cortical interconnectivity ... and ultimately in external frontal lobe topography’. From these results, they also infer that ‘... the cerebral innovations that characterise *Homo* at ~1.5 Ma might have constituted the foundations of the “language-ready” brain of later *Homo* species’ (Ponce de León et al. 2021:170).

Dunbar (1996:192) sums up his social bonding hypothesis by referring to the reciprocal relationship between the size of the group and that of the neocortex, restricting non-human primate groups to 50 individuals. Whereas the larger human cortex, facilitating our complex language, has driven social group numbers up to 150, because grooming-at-distance, through language, enables the bonding of a larger number of individuals in the available time, as well as releasing opiates that fortify the effects of grooming.

Increasing group sizes appears to be correlated with climate change and the consequent emergence of the arid African savanna. Abandoning the shrinking forests to scavenge the savanna, exposed our distant ancestors to significantly higher predation risks. In this respect, Dunbar (1996:110) points out that ‘... primates in general exhibit two responses to increased predation: they grow physically bigger and they increase the size of their groups. Our ancestors appear to have done both’.

Dunbar (1996:36) reveals that ‘[i]n fact, we now know that grooming stimulates the production of the body’s natural opiates, the endorphins; in effect, being groomed produces mildly narcotic effects’. Unfortunately, vocalisations are just that, and unlike grooming do not generate the release of opiates:

However, suppose that as language develops, signals associated with language themselves begin to stimulate opiate production. Smiling, and particularly, laughing⁷ do just this, and this may well explain why smiling and laughing are such important components of conversation. (Dunbar 1996:191)

Dunbar (1996) points out that language:

[A]llows you to say a great deal about yourself, your likes and dislikes, the kind of person you are; it allows you to convey in

⁷See in this regard Dunbar (2017:210). Here he suggested ‘that laughter (as a form of wordless, amusical chorusing) evolved very early during human evolution as a way of increasing the size of the grooming group’; Provine (2000); MacLarnon and Hewitt (1999).

numerous subtle ways something about your reliability as an ally or friend. (p. 78)

A further important attribute of language is the reciprocal flow of information about other individuals, obviating the need to observe their behaviour. ‘For monkeys and apes, all this has to be done by direct observation’ (Dunbar 1996:79).

As groups increased in size after 500 ka, Dunbar (2017:210) hypothesises that ‘[a]t this point, something else was needed to break through this constraint and allow still larger social groups. The answer seems to be singing, or musical chorusing’. He makes the relevant point that:

[S]inging shares with laughter and speech two important features, namely segmentation and breath control. Segmentation is important for the syntactical structuring of long sentences, but breath control is crucial in that it makes possible the long exhalations on which speech depends for its fluency. (Dunbar 2017:210)

In addition, Dunbar (2017) emphasises that:

[T]he appearance of archaic humans seems to have been associated with a crucial change in the capacity for breath control and, possibly, articulation of a kind that was not needed for laughter but was later needed for language. This might mark the point at which speech evolved. But equally, it might mark the point at which some other form of vocalization short of speech evolved. Given the ‘primitive’ and intensely emotional aspect of music, I would suggest, as did Mithen (2005), that this in fact marks the appearance of a form of wordless singing, or humming. (p. 210)

Dunbar (2017:210) points out that singing, like grooming and laughter, also causes the release of endorphins, whilst simultaneously promoting social bonding. The overall benefit appears to be that singing, in contrast to laughter and grooming, seems to lack upper limit with regard to participants.

Dunbar (2017) and others (Roebroeks & Villa 2011) also make the point that fire and the regular use of hearths started almost overnight:

The archaeological record demonstrates rather clearly that, although hearths occur sporadically from about 1.0 Ma, they do not become a regular feature of hominin fossil sites until around 400 ka, after which they are everywhere. (p. 211)

This extended the working day, gathering around the fire in the evening preparing food and bonding, with one crucial limitation in that ‘... only a handful of individuals can sit around a hearth, and the circle of light it provides does not extend more than a meter or so’ (Dunbar 2017:211).

Because ‘... laughter needs a trigger, and this has to be either physical (slapstick) or verbal (jokes), while jokes depend on significantly higher levels of cognitive processing’ (Dunbar, Launay & Curry 2016) than archaic humans could aspire to (Dunbar 2014). However, something else was needed and his suggestion is that wordless chorusing ‘... would have

provided a natural template for the evolution of voiced speech, and hence language, by the very short additional step of mapping meaning onto sound ...' (Dunbar 2017:211). He continues that here, 'spoken language is crucial; gesture is difficult to make out across the half-light of the fireside, but spoken language carries far beyond from one hearth to the next' (Dunbar 2017:211). This led people to tell stories and jokes which played a crucial role in social and communal bonding '... by creating a sense of belonging to a community through the transmission of a common culture' (Dunbar 2017:211).

As an adjunct to the proposals of Dunbar, it is worthwhile to mention the latest empirical findings, as opposed to previous anecdotal reports, concerning the effect of storytelling on children in a potentially stressful environment. Brockington et al. (2021) note that:

[S]torytelling is a distinctive human characteristic that may have played a fundamental role in human's ability to bond and navigate challenging social settings throughout our evolution. However, the potential impact of storytelling on regulating physiological and psychological functions has received little attention. (p. 1)

Their findings in this regard unequivocally indicate that storytelling as a behavioural intervention to hospitalised children, resulted in a decisive increase in the secretion of oxytocin, a decrease in cortisol levels, less pain and an increase in positive emotions as well as a more positive attitude to hospitalisation:

Listening to stories necessitates children to utilize abstractions that enhance their understanding of their own emotions and the emotions of their caretakers (including nurses and doctors, acquaintances, and relatives). Stories possess a symbolic dimension that seems to create a natural bridge to the core of our humanity. (Brockington et al. 2021:5)

It goes without saying that during periods of our evolution when life was undoubtedly nasty, brutal and short, the linguistic ability to conceive and relay stories appropriate to the occasion, served an important function.

Africa as the Cradle of Humankind claims a dominant role in elucidating the intricacies of hominin evolution as well as providing interesting material evidence pertaining to the evolution of human language. Curtis Marean (2010) has extensively investigated the trials and tribulations of anatomically modern *Homo sapiens* at Pinnacle Point, a locality close to the town of Mossel Bay in the Southern Cape, South Africa, during a period known as the Marine Isotope Stage 6 (MIS6). The MIS6 represents a period of glaciation that lasted from 195 000 to 123 000 years ago, during which he states that the human population plummeted from around 10 000 breeding individuals to just hundreds, forming a crucial bottleneck in the evolutionary history of *Homo sapiens*.

Research predominantly done at the cave known as Pinnacle Point Cave 13B (PP13B), and others in the vicinity, have yielded a remarkable scenario of anatomically modern

human activities in the time period between 164 000 and 35 000 years ago. 'The remains also debunk the abiding notion that cognitive modernity evolved long after anatomical modernity: evidence of behavioral sophistication abounds in even the oldest archaeological levels at PP13B' (Marean 2010:56). Marean points out that the intellectual capacity observed at PP13B would have stood the denizens of Pinnacle Point in good stead, enabling them to utilise the abundant coastal resources, a unique combination of plants and animals, geophytes from the surrounding fynbos, which uniquely contained easily digestible carbohydrates, especially suited as a baby food, including the highly nutritious marine resources of the Southern Cape coastline:

With its combination of calorically dense, nutrient-rich protein from the shellfish and low-fiber, energy-laden carbs from the geophytes, the southern coast would have provided an ideal diet for early modern humans during glacial stage 6. (Marean 2010:57)

One of the most interesting aspects of life on the coast is the habit of marine foraging 164 000 years ago. By 110 000 years ago, the diet had expanded to mussels, limpets and sea snails living in the treacherous intertidal zone:

Along the southern coast, safe harvesting with sufficiently high returns is only possible during low spring tides, when the sun and the moon align, exerting their maximal gravitational force on the ebb and flow of the water. Because the tides are linked to the phases of the moon, advancing by 50 minutes a day, I surmise that the people who lived at PP13B^A which 164 000 years ago was located much farther inland, two to five kilometers from the water, because of lower sea levels – scheduled their trips to the shore using a lunar calendar of sorts, just as modern coastal people have done for ages. (Marean 2010:58)

The ability to mentally link the behaviour of two ostensibly disparate natural phenomena like the moon and the ocean, and construct predictive conclusions which, as it turns out, are validated by repeated observation strongly favours the existence of a well-developed cognitive sophistication. This underlines the incipient understanding that natural phenomena can manifest as harbingers of beneficence, or perhaps, as in the case of the well-known occurrence of periodic wildfires in the fynbos, calamity.

However, reaping shellfish is not the only evidence pointing to unique behaviour at Pinnacle Point, as is evinced by the sophistication of the tools they produced. Marean (2010:58) reports significant numbers of small 'bladelets' amongst the stone tools recovered from PP13B at 164 000 years ago. '... tiny flakes twice as long as they are wide – that are too small to wield by hand' (Marean 2010:58). These bladelets need to have been hafted and used as projectiles. He quite rightly pointed out that the construction of composite tools (weapons) is indicative of considerable technological know-how, and the blades at PP13B are amongst the oldest known examples.

As most of the tools found along the South African coast are manufactured of quartzite, a rock unsuitable for bladelet

production, a further surprise at Pinnacle Point revealed that the bladelets at PP13B were lithologically different in that they were uniformly manufactured from silcrete. In its raw form, silcrete is almost impossibly difficult to shape into bladelets. The colour of the PP13B bladelets offered a clue to the manufacturing process and by employing techniques of thermoluminescence, magnetic susceptibility and gloss metering, it was determined that intentional heat treatment was the dominant manufacturing technique 72 000 years ago at Pinnacle Point, and had been in intermittent use from 164 000 years ago.

The technique of employing pyro technology to produce useful tools from silcrete, relates directly to the mental conception of creating functional implements using available technology, thus '... turning poor-quality rock into high-quality raw material' (Marean 2010:59). In order to produce these weapons, the people of PP13B employed a complex production method by '...building a sand pit to insulate the silcrete, bringing the heat up slowly to 350 °C, holding the temperature steady and then dropping it down slowly'. Even if the original discovery that silcrete was a useful material to produce bladelets was discovered by accident, conceiving of a standardised method of production and conveying its intricacies to a wider audience across generations would certainly require the effective use of language.

We would thus argue that the contributions of Marean (2010) and Ponce de León et al. (2021) albeit considered as associated phenomena in the sense of Botha and Everaert (2013:1), provide an increasingly stable footing for the antiquity of human language. It is worthwhile to note that the people of PP13B were not only adept at the technological control of fire, but also able to draw on the added benefit of extending their day-time activities into the night by socialising around a fire, in contrast to non-human primates who were active only during the day and inescapably spent their nights in darkness. Dunbar (2017) is sensitive to this scenario when he states that the:

[A]bility to exploit the evening hours seems to have been crucial in facilitating the evolution of language as a final step in the accumulation of novel, specialized bonding mechanisms that helped break through a series of successive glass ceilings. I suggest (1) that language evolved directly from primate vocalization, and not via an intermediate gestural stage, (2) that it did so in effect via an intermediate musical phase ..., (3) that its use was explicitly social, mainly in the form of story-telling, and (4) that language as we know it evolved late. (p. 211)

Dunbar according to Zimmerman (2002) argues

[T]hat only then were our ancestors living in groups that were too large for grooming to work as a social tool. People would have had to have substituted language for grooming and other primitive ways of interacting in order for hominid society to hold together. (p. 290)

Thus, Dunbar's (1998:106) proposal that 'the need to evolve large groups drove brain size upwards, and this in turn eventually required the evolution of language as a more effective bonding device'. He concludes his argument, stating that:

[I]f our brains evolved to handle social problems, then the same is likely to be true of language. Both the functions of language and its *modus operandi* must be sought in the social rather than the physical world. (Dunbar 1998:106)

For him the:

[F]unction of grammar is to enable complex thoughts to be transmitted efficiently, but the function of language (as an activity) is to facilitate the management of social relationships ... I am happy to leave grammar to the grammarians (Dunbar 1998:107)

Conclusions

Complex language performs a pivotal role in the world at large and is of continuing importance and consuming interest, as it is perhaps the only truly uniquely human attribute that defines us. This natural system of communication deeply embedded in our evolutionary history, enigmatically still offers only tantalising hints as to its true origin, yet every normal child acquires language competency purely by listening to others using it.

Our brief survey shows that it is abundantly clear that this complex phenomenon cannot be circumscribed by facile interpretations but needs rational input from a wide variety of disciplines including palaeoanthropology, comparative anatomy, neurophysiology, genetics and linguists. It also seems inevitable that ongoing advances in technology-based research methods will in future contribute substantially to all these disciplines.

The association of culture and brain size as well as the emergence of language as an agent to enhance and extend bonding in growing social groups, seems well established, as is the proposal that language contributed to the establishment of egalitarian hunter-gatherer communities.

The proposal that language arose from primate vocalisation via a musical phase, eschewing a gestural period, and that its practice was exclusively social with a heavy emphasis on story-telling, clearly suggests a rational framework for further research. In similar vein, the complex activities involved in pyro technology in terms of method, the selection and location of suitable material, possibly through instructions to minions and the regular use of a moon calendar, all bear the imprint of a certain level of linguistic sophistication. In terms of the origin of language, these propositions are of capital interest and will certainly bear closer scrutiny.

In this brief survey, we have touched on a range of possible building blocks of language from an essentially empirical point of view. We have chosen to review and discuss specific perspectives on the historical origin and modern practice of human language, which for reasons of available space, does not by any means, constitute a complete survey. However, our stated intention was and remains that this contribution should also acknowledge current trends in theological approaches to linguistics and, in doing so, hopefully draw the attention of a wider and more diverse audience.

Acknowledgements

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

The authors conceptualised and wrote the article together, and contributed equally in writing and finalising the article.

Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

Funding information

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Data availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

References

- Anderson, S.R., 2013, 'What is special about the human language faculty and how did it get that way?', in R. Botha & M. Everaert (eds.), *The evolutionary emergence of language: Evidence and inference*, pp. 18–41, Oxford University Press, Oxford.
- Ayala, F., 2012, *The big questions: Evolution*, Quercus Publishing Plc., London.
- Botha, R. & Everaert, M., 2013, 'Introduction: Evidence and inference in the study of language evolution', in R. Botha & M. Everaert (eds.), *The evolutionary emergence of language: Evidence and inference*, pp. 1–17, Oxford University Press, Oxford.
- Brockington, G., Moreira, A.P.G., Buso, M.S., Da Silva, S.G., Altszyler, E., Fischer, R. et al., 2021, 'Storytelling increases oxytocin and positive emotions and decreases cortisol and pain in hospitalized children', *Proceedings of the National Academy of Sciences* 118(22), 1–7. <https://doi.org/10.1073/pnas.2018409118>
- Cheney, L.C. & Seyfarth, R.M., 2018, 'Flexible usage and social function in primate vocalization', *Proceedings of the National Academy of Sciences* 115(9), 1974–1979. <https://doi.org/10.1073/pnas.1717572115>
- Chomsky, N., 1957, *Syntactic structures*, Walter de Gruyter, Berlin.
- Darwin, C., [1871] 2013, *The descent of man and selection in relation to sex*, Wordsworth Editions Limited, Ware, Hertfordshire.
- De Carvalho, A., He, A.X., Lidz, J. & Christophe, A., 2015, *18-month-olds use the relationship between prosodic and syntactic structures to constrain the meaning of novel words*, viewed 21 April 2021, from https://www.researchgate.net/publication/303372495_18-month-olds_use_the_relationship_between_prosodic_and_syntactic_structures_to_constrain_the_meaning_of_novel_words.
- Dobzhansky, T., 1973, 'Nothing in biology makes sense except in the light of evolution', *The American Biology Teacher* 35(3), 125–129. <https://doi.org/10.2307/4444260>
- Dunbar, R.I.M., 1992, 'Neocortex size as a constraint on group size in primates', *Journal of Human Evolution* 22(6), 469–493. [https://doi.org/10.1016/0047-2484\(92\)90081-j](https://doi.org/10.1016/0047-2484(92)90081-j)
- Dunbar, R.I.M., 1996, *Grooming, gossip and the evolution of language*, Harvard University Press, Cambridge, MA.
- Dunbar, R.I.M., 1998, 'Theory of mind and the evolution of language', in J.R. Hurford, M. Studdert-Kennedy & C. Knight (eds.), *Approaches to the evolution of language*, pp. 92–110, Cambridge University Press, Cambridge.
- Dunbar, R.I.M., 2010, 'The social role of touch in humans and primates: Behavioral function and neurobiological mechanisms', *Neuroscience and Biobehavioral Reviews* 34(2), 260–268. <https://doi.org/10.1016/j.neubiorev.2008.07.001>
- Dunbar, R.I.M., 2011, 'Evolutionary basis of the social brain', in J. Decety & J. Cacioppo (eds.), *Oxford Handbook of social neuroscience*, pp. 28–38, Oxford University Press, Oxford.
- Dunbar, R.I.M., 2014, *Human evolution*, Pelican, Hammondsworth.
- Dunbar, R.I.M., 2017, 'Group size, vocal grooming and the origins of language', *Psychonomic Bulletin & Review* 24, 209–212. <https://doi.org/10.3758/s13423-016-1122-6>
- Dunbar, R.I.M., Baron, R., Frangou, A., Pearce, E., Van Leeuwen, E.J.C., Stow, J. et al., 2012, 'Social laughter is correlated with an elevated pain threshold', *Proceedings of the Royal Society* 279(1731B), 1161–1167. <https://doi.org/10.1098/rspb.2011.1373>
- Dunbar, R.I.M., Launay, J. & Curry, O., 2016, 'The complexity of jokes is limited by cognitive constraints on mentalizing', *Human Nature* 27, 130–137. <https://doi.org/10.1007/s12110-015-9251-6>
- Gowlett, J.A.J., Gamble, C. & Dunbar, R.I.M., 2012, 'Human evolution and the archaeology of the social brain', *Current Anthropology* 53(6), 693–722. <https://doi.org/10.1086/667994>
- Grigg, R., 2008, *Beyond the God delusion: How radical theology harmonizes science and religion*, Fortress Press, Minneapolis, MN.
- Hutauruk, B.S., 2015, 'Children first language acquisition at age 1–3 years old in Balata', *IOSR Journal of Humanities and Social Science (IOSR-JHSS)* 20(8), 51–57, viewed 21 April 2021, from <http://www.iosrjournals.org/iosr-jhss/papers/Vol20-issue8/Version-5/F020855157.pdf>.
- Kaplan, A., 2018, 'Language milestones: 1 to 2 years', *Healthline Parenthood*, viewed 21 April 2021, from <https://www.healthline.com/health/baby/toddler-language-milestones>.
- Linguistic Society of America (LSA), 2021, *Language acquisition*, viewed 21 April 2021, from <https://www.linguisticsociety.org/resource/faq-how-do-we-learn-language>.
- Lyell, C., 1830, *Principles of geology* 1, John Murray, London.
- MacLarnon, A. & Hewitt, G., 1999, 'The evolution of human speech: The role of enhanced breathing control', *American Journal of Physical Anthropology* 109(3), 341–363. [https://doi.org/10.1002/\(SICI\)1096-8644\(199907\)109:3%3C341::AID-AJPA5%3E3.0.CO;2-2](https://doi.org/10.1002/(SICI)1096-8644(199907)109:3%3C341::AID-AJPA5%3E3.0.CO;2-2)
- Marean, C., 2010, 'When the sea saved humanity', *Scientific American*, August 2010, pp. 54–61.
- Mayo Clinic Staff, 2021, *Language development: Speech milestones for babies*, viewed 21 April 2021, from <https://www.mayoclinic.org/healthy-lifestyle/infant-and-toddler-health/in-depth/language-development/art-20045163>.
- Mithen, S., 2005, *The singing Neanderthals: The origins of music, language, mind and body*, Harvard University Press, Cambridge, MA.
- Mohney, G., 2017, *In Russia, French and Chinese, 'baby talk' is universal*, viewed 21 April 2021, from <https://www.healthline.com/health-news/baby-talk-is-universal>.
- Pearce, E., Launay, J., Van Duijn, M., Rotkirch, A. & Dunbar, R.I.M., 2016, 'Singing together or apart: The effect of competitive and cooperative singing on social bonding within and between sub-groups of a university fraternity', *Psychology of Music* 44(6), 1255–1273. <https://doi.org/10.1177/0305735616636208>
- Pecchi, J.S., 1994, *Child language*, Routledge, London.
- Piazza, E.A., Jordan, M.C. & Williams, C.-L., 2017, 'Mothers consistently alter their unique vocal fingerprints when communicating with infants', *Current Biology* 27(20), 3162–3167. <https://doi.org/10.1016/j.cub.2017.08.074>
- Pinker, S., 1994, *The language instinct*, W.W. Morrow, New York, NY.
- Ponce de León, M.S., Bienvenu, T., Marom, A., Engel, S., Tafforeau, P., Warren, J.L.A. et al., 2021, 'The primitive brain of early homo', *Science* 372(6538), 165–171. <https://doi.org/10.1126/science.aaz0032>
- Provine, R.R., 2000, *Laughter: A scientific exploration*, Viking, London.
- Roebroeks, W. & Villa, P., 2011, 'On the earliest evidence for the use of fire in Europe', *Proceedings of the National Academy of Sciences, USA* 108(13), 5209–5214. <https://doi.org/10.1073/pnas.1018116108>
- Smith, N., 1989, *The Twitter machine: Reflections on language*, Blackwell, Oxford.
- Stanborough, J., 2019, 'Born this way: Chomsky's theory explains why we're so good at acquiring language', *Healthline*, June 14, 2019, viewed 21 April 2021, from <https://www.healthline.com/health/childrens-health/chomsky-theory>.
- Traxler, M.J., Boudewyn, M. & Loudermilk, J., 2012, 'What's special about human language? The contents of the "narrow language faculty" revisited', *HHS Public Access* 6(10), 611–621. <https://doi.org/10.1002/Inc3.355>
- Van den Heever, J. & Jones, C., 2019, 'The evolution of morality', in J. Van den Heever & C. Jones (eds.), *Moral issues in the natural sciences and technologies*, pp. 1–26, AOSIS, Cape Town.
- Van Huysteen, W.J., 2006, *Alone in the world? Human uniqueness in science and theology*, William B. Eerdmans Publishing Company, Grand Rapids, MI.
- Wranghan, R.W., 2019, 'Hypotheses for the reduced reactive aggression in the context of human self-domestication', *Frontiers in Psychology* 10, 1914. <https://doi.org/10.3389/fpsyg.2019.01914>
- Zimmerman, C., 2002, *Evolution: The triumph of an idea*, HarperCollins Publishing, New York, NY.