

EAORC BULLETIN 1,211 – 30 August 2026

CONTENTS

NOTICES.....	2
FORMATTED VERSION OF THIS BULLETIN	2
PUBLICATION ALERTS	2
EDITORIAL INTERJECTIONS	2
NEWS.....	2
NATURE BRIEFING – Can AI ever be conscious?	2
SCIENCEADVISER – Later in life, language lasts	3
SCIENCEADVISER – 19 days	3
SCIENCEADVISER – It Could Be Otherwise	3
THE CONVERSATION – Brain not hardwired to read – here’s how we pull it off & why some are better at it.....	3
PUBLICATIONS.....	3
American Journal of Biological Anthropology	3
PAPERS.....	3
IAN TOWLE – Clades, Grades, and the Genus Problem: A Case for Revising Hominin Taxonomy	3
LLOYD A. COURTENAY & JULIA ARAMENDI – Missing Landmark Estimation Using Reverse Engineering: Challenges and Potential Solutions for the Study of Hominin Long Bones	4
WILLIAM J O’HEARN et al – Meat Acquisition Skill and Male Reproductive Success in Guinea Baboons	4
YUKA MATSUMOTO, NAOHIKO KANEMURA & NAOMICHI OGIHARA – Energetic Contribution of the Human Plantar Aponeurosis to Locomotor Economy During Bipedal Walking and Running	4
AYANA TANAKA et al – Reframing Mother–Child Closeness and Cooperative Caregiving: A Comparative Study of Two Hunter-Gatherer Populations.....	5
Animal Behaviour.....	5
PAPERS.....	5
RIVA J. RILEY et al – Social selection redefined: distinguishing features of social selection and the potential for runaway social evolution	5
JAMES F.A. TRANIELLO, PATRIZIA D’ETTORRE & AURORE AVARGUÈS-WEBER – Functional multiple intelligences: the diversity and adaptive value of social insect cognition	5
ZOË GOLDSBOROUGH et al – Development and social dynamics of stone tool use in wild white-faced capuchin monkeys	5
ZHULI CHENG et al – Social bonds between nonkin are common, but less stable, in a mixed-related society	6
Cell Reports.....	6
PAPERS.....	6
FRANCESCO DONNARUMMA et al – Inferential planning in the frontal cortex	6
eLife.....	6
PAPERS.....	6
HANS T. BILGER, MICHAEL J. RYAN & JULIA A. CLARKE – Measurement and comparison of acoustic space use in vocalizations of humans and close primate relatives	6
Evolutionary Anthropology	7
PAPERS.....	7
MIKI BEN-DOR & RAN BARKAI – Through Time and Across Traits: Evaluating Explanations of Human Evolution	7
Frontiers in Ecology and Evolution	7
PAPERS.....	7
PHARISEMÈNE TIBESAR et al with CATHERINE CROCKFORD & SIMONE PIKA – Who waits when? Age and interactional context shape turn-taking timing in sooty mangabeys (<i>Cercocebus atys</i>) in the wild	7
iScience.....	8
PAPERS.....	8
ELLEN SOETERS et al with CRICKETTE SANZ – Object manipulation scaffolds the development of tool use in children	8
Nature	8
REVIEWS.....	8
ABEBA BIRHANE – Can AI ever be conscious? The question stems from a misconception	8
Nature Communications	8
PAPERS.....	8
ANNE BILLOT et al – Preserved topography, lateralization, selectivity, and functional connectivity of the language network in older brains.....	8
YIQIN BAI et al – The cellular and molecular basis of gyrus-sulcus specialization in the primate brain.....	8

GRACIELA SOTELO et al – Fossil record biases skew inferences of mammal trait evolution	9
Nature Communications Earth & Environment	9
PAPERS.....	9
MASOUD YOUSEFI et al with FELIX RIEDE – No evidence for climate-driven fragmentation of Neanderthal habitats prior to their extinction	9
Patterns	9
PAPERS.....	9
THIJS SNELLEMAN, HOLGER HOOS & ODD ERIK GUNDERSEN – The cost of reproducibility in artificial intelligence	9
PLoS One.....	9
PAPERS.....	9
SUSANA CARVALHO et al with ELISABETTA VISALBERGHI – Small vertebrate consumption by capuchin monkeys (<i>Sapajus libidinosus</i>): Insights into the human predatory pattern.....	9
PNAS.....	10
PAPERS.....	10
JÖRG GROSS – The free-rider detection problem: How groups balance fairness and cooperation	10
Proceedings of the Royal Society B.....	10
PAPERS.....	10
YITZCHAK BEN MOCHA et al – Females cooperate, rather than monopolize reproduction, in multi-female groups of cooperatively breeding birds and mammals	10
Royal Society Open Science.....	10
PAPERS.....	10
XAVIER RAICK, CLAUDIA J. HERNÁNDEZ-CAMACHO & DAMIEN OLIVIER – Do sea lions fall silent when fish have something to say?.....	10
SAMSON ABRAMSKY et al – Open questions about time and self-reference in living systems	10
Trends in Cognitive Sciences	11
PAPERS.....	11
SAMI R. YOUSIF & RUSSELL A. EPSTEIN – Cognitive maps as a medium for thought	11
Trends in Ecology and Evolution.....	11
PAPERS.....	11
ANDREW J. KING et al – Evolutionary spandrels in collective animal behaviour.....	11
SUBSCRIBE to the EAORC Bulletin	11
UNSUBSCRIBE from the EAORC Bulletin	11
PRODUCED BY AND FOR THE EAORC EMAIL GROUP.....	11

NOTICES

FORMATTED VERSION OF THIS BULLETIN

A pdf formatted version of this Bulletin is available for download at martinedwardes.me.uk/eaorc/eaorc_bulletins.htm.

PUBLICATION ALERTS

If you have had a paper or book published, or you see something which would be of interest to the group, please send me a publication alert so that I can include it in the newsletter. Many thanks to those who have already sent in alerts.

If there is a journal you feel I should be tracking on a regular basis, let me know.

And if you have any other ideas for extending the “EAORC experience”, please contact me.

EDITORIAL INTERJECTIONS

Comments in curly brackets are editorial interjections. The Editor reserves the right to be wrong, and doesn’t object to being called out on it.

NEWS

NATURE BRIEFING – Can AI ever be conscious?

“In Intertwined Creatures, cognitive scientist Anthony Chemero explains how much of the buzz around the consciousness of artificial intelligence is built on, at best, reductive notions of cognition and consciousness and, at worst, a misconception of what human minds are and do,” writes cognitive scientist Abeba Birhane in her review. The whole idea of the human brain as a computer is misguided, agree Chemero and Birhane, because it ignores how interactions with other people and surroundings influence a person’s thinking. AI systems “do not inhabit worlds, form relationships or have feelings. They are not entities that can be conscious.”

<https://www.nature.com/articles/d41586-026-02571-9>

SCIENCEADVISER – Later in life, language lasts

Cognitive decline is a fact of aging. But not all parts of the brain regress the same—and new research shows just how resilient the part of the brain responsible for language may be.

To probe how aging affects the brain, researchers studied participants aged 17 to 39 and 41 to 80. They aimed to assess the “multiple demand network,” a brain system including the frontal and parietal lobes that is involved in complex functions such as decision-making. They also keyed in on the brain’s language network. The team gave participants cognitive and linguistic tasks such as remembering the location of squares in a grid and listening to stories and reading sentences.

In the older group, cognitive tasks revealed that the multiple demand network’s synchronization was reduced, its size was smaller, and its overall activation was weaker. But both participant groups showed similar brain activity and spatial distribution on the linguistic tasks. Other studies have shown that language processing abilities can even improve with old age because vocabulary and reading skills continue to grow.

The results suggest that specialized parts of the brain, such as those attuned to language, may experience less age-driven decline than the brain’s generalizable systems. “The multiple demand network is a different system in the sense that it’s not accumulating knowledge over time. It’s more like a flexible resource that you can deploy in all sorts of ways,” said author Evelina Fedorenko in a statement. “And somehow that’s the thing that is more vulnerable to aging. Why it’s so vulnerable—that is a very good question.”

<https://www.nature.com/articles/s41467-026-76598-x>

SCIENCEADVISER – 19 days

How long it took cybersecurity risk manager Jansen Tang to reproduce 363 cutting-edge papers presented at one of the world’s top computer science conferences.

The feat, accomplished by Tang’s suite of AI agents that he calls his “agentic minions on KRACK (Knowledge, Reasoning, Agency & Coherence Kernel),” made him the winner of a recent hackathon organized by the computing and research community platforms Hugging Face and alphaXiv.

<https://www.science.org/content/article/researchers-presented-6000-papers-major-meeting-could-ai-reproduce-their-findings>

SCIENCEADVISER – It Could Be Otherwise

Many people think science’s major contributions to humanity are the answers it provides about how the universe works. But in his review of *It Could Be Otherwise*, Sorin Krammer explains that author and cellular neuroscientist Stuart Firestein argues the opposite: “that science’s greatest gift to civilization is not the certainties it has produced but rather the structured, generative relationship with uncertainty it has invented.” The provocative title, Krammer adds, “is not a platitude but a hard-won philosophical revolution, one that took most of human history to arrive at and one that we are now, perversely, at risk of forgetting.”

Review of ‘*It Could Be Otherwise: Science in the age of uncertainty*’ by Stuart Firestein, Basic Books, 2026.

<https://www.science.org/doi/10.1126/science.aei1519>

THE CONVERSATION – Brain not hardwired to read – here’s how we pull it off & why some are better at it

There is not only one way to learn to read, as people who are deaf, blind or dyslexic demonstrate.

<https://theconversation.com/the-brain-isnt-hardwired-to-read-heres-how-we-pull-it-off-and-why-some-are-better-at-it-than-others-289919>

PUBLICATIONS

American Journal of Biological Anthropology

PAPERS

IAN TOWLE – Clades, Grades, and the Genus Problem: A Case for Revising Hominin Taxonomy

Taxonomic practice in evolutionary biology increasingly prioritizes the recognition of monophyletic groups (clades), yet paleoanthropology still applies this principle inconsistently. Here, I outline these inconsistencies and broader challenges in hominin taxonomy and propose a potential solution. *Australopithecus* is widely considered non-monophyletic. In addition, the temporal depth of *Homo* is shallow relative to most primate genera, with recently diverged genera often taxonomically unstable due to complex morphological and genetic signatures and extensive gene flow among closely related taxa. The hominin fossil record exhibits pronounced morphological mosaicism and homoplasy, with supposedly key traits increasingly blurred both within and among genera. This obscures putative adaptive distinctions and contributes to persistent taxonomic disagreement. One potential solution is the subsumption of *Australopithecus* and *Paranthropus* within an expanded genus *Homo*. Such a revision would help address problems of non-monophyly, avoid conceptual difficulties associated with genera with shallow time depths, and facilitate more coherent evolutionary comparisons within a more stable taxonomy. Within this framework, Hominini is best defined as the Pan-*Homo* clade, with Hominina retained as the appropriate subtribal designation for the human clade. Although similar proposals have been advanced previously, accumulating fossil and genetic evidence

makes this a timely moment to reconsider hominin taxonomy. This proposal has limitations, including the loss of taxonomic information relating to adaptive and ecological variation, particularly within *Paranthropus* and large-brained *Homo*. At a minimum, however, this article argues for greater consistency and transparency in distinguishing clades from grades in hominin taxonomy, and for more consistent criteria for the recognition of genera.

<https://onlinelibrary.wiley.com/doi/full/10.1002/ajpa.70344>

LLOYD A. COURTENAY & JULIA ARAMENDI – Missing Landmark Estimation Using Reverse Engineering: Challenges and Potential Solutions for the Study of Hominin Long Bones

Fragmentary preservation represents a fundamental limitation in palaeoanthropological research, particularly for postcranial elements where symmetry cannot be exploited and large portions of bone are frequently missing. Although a wide range of virtual reconstruction methods exist, many rely on strong anatomical priors, localized interpolation, or reference specimens that risk biasing reconstructions toward predefined morphologies. The present study introduces a new approach for estimating the coordinates of missing landmarks, termed the Reverse Engineering (RE) approach. This method establishes mathematical relationships between morphological patterns observed in complete reference specimens and those preserved in reduced portions of each bone, allowing missing regions to be inferred from patterns of covariation rather than local geometric proximity. We demonstrate that the RE approach performs consistently across a range of reconstruction scenarios, including cases where substantial portions of bone are missing, and in empirical applications to Neanderthal femoral and humeral specimens. Importantly, reconstructed specimens retain morphological signal in subsequent morphometric analyses, regardless of the extent of missing data. While limitations remain, as is the case for all reconstruction methods applied to fragmentary fossil material, the RE approach offers a robust and flexible alternative that does not depend on symmetry or a single reference specimen. As such, it represents a valuable addition to the methodological repertoire available to palaeoanthropologists working with incomplete postcranial remains.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.70334>

WILLIAM J O'HEARN et al – Meat Acquisition Skill and Male Reproductive Success in Guinea Baboons

In human foraging societies, hunting skill is often interpreted as a signal of male quality linked to reproductive success through his ability to provision his family and community. Similarly, in some bird and insect species, males offer mates food to indicate their quality as a provider. Among nonhuman primates, however, the relationship between meat sharing and reproductive success is underexplored, leaving the evolutionary origins of this phenomenon unresolved.

Guinea baboons (*Papio papio*) are a promising model to investigate whether meat sharing signals male quality, since females choose their mates, have been shown to rely on males to catch and transfer prey, and respond to male foraging skill. We combined records of 109 meat-eating events with 9 years of behavioral data to test whether males who more frequently acquired and transferred meat to females had more females in their social units for longer.

Contrary to our predictions, we found no evidence that females preferred males who acquired or transferred meat more frequently, suggesting that meat acquisition is not a signal of male quality in Guinea baboons.

One explanation may be the relatively low frequency of meat-eating events. Another is that females are less dependent on males for meat than previously reported. Our results revealed that nearly half (41%) of female meat intake originated from sources besides her unit male, including the first documented cases of female prey capture (11% of events) in this species. Thus, females likely apply other, more pertinent criteria in mate choice.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.70327>

YUKA MATSUMOTO, NAOHIKO KANEMURA & NAOMICHI OGIHARA – Energetic Contribution of the Human Plantar Aponeurosis to Locomotor Economy During Bipedal Walking and Running

The human plantar aponeurosis (PA) is a unique structure that spans the longitudinal arch of the foot, contributing to locomotor efficiency by storing and releasing elastic energy. It is traditionally believed that the PA primarily enhances running economy by reducing muscular effort and metabolic cost. However, the extent to which the PA contributes to walking versus running has not been quantitatively assessed. This study aims to quantitatively compare the mechanical contribution of the PA during walking and running, and to evaluate its relative contribution to whole-body metabolic energy expenditure per unit distance in each gait.

This study investigated the role of the PA in human locomotion by comparing its mechanical contribution during walking and running in 10 healthy adults. Using a detailed foot model and motion capture technology, we quantified PA strain, force, power, and energy release during gait cycles.

Peak power and shortening velocity were higher in running, resulting in a significantly larger total energy released by the PA per gait cycle. However, the relative contribution of PA energy to overall metabolic energy expenditure per distance was significantly greater during walking (1.8%) compared to running (1.1%), despite the greater absolute energy output during running.

These findings challenge the prevailing view that the PA evolved primarily to enhance running efficiency. Instead, the results suggest that the PA plays a relatively larger role in reducing energy consumption during walking, shedding light on the evolutionary adaptation of the human foot for bipedal locomotion.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.70347>

AYANA TANAKA et al – Reframing Mother–Child Closeness and Cooperative Caregiving: A Comparative Study of Two Hunter-Gatherer Populations

Caregiving during early childhood emerges from a dynamic interplay between maternal and allomaternal contributions. This study aimed to challenge polarized portrayals of hunter-gatherer childcare as either “mother-centered” or “cooperative” and provide empirical evidence for an integrative cross-cultural approach.

We compared caregiving structures in two hunter-gatherer populations positioned at contrasting ends of a continuum of child-rearing strategies: the !Xun in southern Africa, portrayed as emphasizing mother–child closeness, and the Baka in central Africa, described as exemplifying cooperative caregiving. Over 500 h of caregiving interactions involving 40 children (1–59 months) were recorded using a standardized focal-follow protocol with 30-s interval coding. Rates of maternal, allomaternal, and peer-based caregiving behaviors were analyzed using generalized additive mixed models.

Maternal holding did not differ between the !Xun and the Baka, underscoring the central role of mothers during infancy. However, breastfeeding was less frequent among the !Xun than among the Baka. Allomaternal holding was less frequent among the !Xun than among the Baka. When focusing on child and adolescent allomaternal caregivers, child-holding was more frequent among the !Xun than among the Baka during a period that included the likely !Xun weaning period. Care by young allomaternal caregivers may have played a supportive role during the earlier weaning period associated with sedentarization.

Human caregiving systems should not be understood as either “mother-centered” or “cooperative”. Rather, they should be understood as flexible combinations of interrelated components—including maternal, allomaternal, and peer-based care—shaped by ecological, social, and developmental factors.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.70345>

Animal Behaviour**PAPERS****RIVA J. RILEY et al – Social selection redefined: distinguishing features of social selection and the potential for runaway social evolution**

Natural selection encompasses a range of evolutionary processes that lead to differential survival and reproduction via ecological, sexual and social selection pressures. We argue that, despite playing a demonstrably profound role in the evolution of social species, social selection has not been sufficiently integrated into the broader evolutionary paradigm as a driver of evolutionary changes. Here we review social selection, including its various descriptions in the literature, and propose a new, unifying definition: social selection comprises the selection pressures imposed by the social environment, which are determined by group characteristics and/or any interindividual social interactions that lead to differential fitness for an acting individual and/or their groupmates. We additionally review how self-reinforcing social selection can generate a runaway process, and provide a second definition for runaway social selection. We argue that social selection illuminates behavioural evolution, potentially driving the evolution of complex sociality and offering insights into social systems beyond those gained from ecological or sexual selection alone.

<https://www.sciencedirect.com/science/article/pii/S0003347226002149>

JAMES F.A. TRANIELLO, PATRIZIA D'ETTORRE & AURORE AVARGUÈS-WEBER – Functional multiple intelligences: the diversity and adaptive value of social insect cognition

The remarkable behavioural capabilities of social insects vary between individuals across worker life spans, within colonies and between species, underpinning efficient task performance and fitness. Here we apply the concepts of human multiple intelligences, developed by Howard Gardner, and functional intelligence, from Jacob Freeman and colleagues, to social insect worker behaviour and collective actions. We propose a novel framework, functional multiple intelligences (FMI), to describe and analyse the evolution of social insect intelligence. Worker and colony FMI are composed of specialized cognitive modules such as kinaesthetic, quantitative, visual/spatial, intrapersonal and social intelligences. We hypothesize that these intelligences underlie variation in individual worker behavioural competences, skilled task specialization by polymorphic workers and age-related expert behaviour. Defining social insect intelligences using the FMI concept emphasizes the functionality of intelligence and its fitness consequences in natural sociobiological and ecological contexts at different levels of selection, providing a Darwinian foundation to explore the selective forces of adaptive intelligence in closely and distantly related clades.

<https://www.sciencedirect.com/science/article/abs/pii/S0003347226002150>

ZOË GOLDSBOROUGH et al – Development and social dynamics of stone tool use in wild white-faced capuchin monkeys

Percussive tool use for extractive foraging allows animals to access otherwise inaccessible resources and forage more efficiently, with potentially important implications for their fitness. The development of tool use proficiency has been well documented in nut-cracking chimpanzees, *Pan troglodytes*, and robust capuchins, *Sapajus* spp., and in shellfish-cracking longtailed macaques, *Macaca fascicularis*, where mothers and proficient tool users are the most important models for social learning. However, little is known about how tool use develops in populations where opportunities for social learning are

scarce. White-faced capuchins, *Cebus capucinus imitator*, on Jicarón Island, Panama, provide a unique opportunity to address this question: stone tool use is entirely male biased, meaning juveniles cannot learn from their mothers, and reduced group cohesion further limits opportunities for social learning. We investigated the acquisition and development of stone tool proficiency in this population using a data set collected over a 1-year period from camera traps placed at two experimental anvils. We assessed differences in proficiency between age classes, examined the development of tool use proficiency over time and explored patterns of social attention during tool use. Juvenile capuchins were less proficient than subadults and adults, but their proficiency remained stable over the 12-month study period, suggesting that skill development may require prolonged practice or physical maturation. In contrast to other primates, opportunities for social learning on Jicarón appeared to be limited and scrounging was rare, yet when social attention occurred, we found consistent patterns. Social attention to tool use mostly came from juveniles too young to use tools themselves, who observed proficient subadults that tolerated scrounging. Our results contribute to understanding how complex tool use behaviours are acquired and maintained. They highlight that even when tool use is largely solitary, directed social attention and social tolerance play an important role in the development of tool use proficiency.

<https://www.sciencedirect.com/science/article/pii/S0003347226002101>

ZHULI CHENG et al – Social bonds between nonkin are common, but less stable, in a mixed-related society

Members of social groups often form affiliative social relationships, which carry important fitness benefits. Kin selection predicts that these relationships should be prevalent between kin, yet there is increasing evidence that social relationships exist between nonkin of the same sex. Nevertheless, quantitative research on the prevalence and stability of nonkin social relationships, and the factors influencing their formation, remains rare, hampering our understanding of their nature and adaptive value. Here, we combined long-term social and pedigree data from semi-free-ranging adult female rhesus macaques, *Macaca mulatta*, to test the hypothesis that, despite known kin biases, social bonds with nonkin would be prevalent in a mixed-related society. We further hypothesized that nonkin bonds would be less stable than those with kin, and that their formation would be influenced by individual traits, including age and rank, and demographic variables such as kin availability. We found that, in line with kin selection theory and previous work, there was a clear kin bias in social bond partners. However, bonds with nonkin were nevertheless more prevalent than those with kin. We also found that bonds between nonkin were less stable (shorter in duration and more variable in strength across years) in comparison to bonds with kin. Finally, we found that younger individuals and those with fewer kin groupmates were more likely to have social bonds with nonkin. Rank, however, had no effect on the probability of bonding with nonkin. Together, this suggests that kin bonds might provide individuals with stable and predictable benefits, whereas nonkin bonds might be formed more opportunistically, to access specific or volatile resources, or compensate for a lack of kin. This work underscores that more research is needed to better understand the drivers of social bonds with nonkin, including how they are formed and maintained and what functions they serve.

<https://www.sciencedirect.com/science/article/pii/S0003347226001983>

Cell Reports

PAPERS

FRANCESCO DONNARUMMA et al – Inferential planning in the frontal cortex

How the brain plans and maintains sequences of future actions remains a central question in systems neuroscience. Studies in the frontal cortex revealed that multiple elements of a sequence are represented simultaneously in separable neural subspaces, challenging classical sequential planning models. Here, we show that these representations emerge naturally under inferential planning, in which sequential actions are inferred from sensory evidence and goals. Using a hierarchical generative model, we reproduce key neural phenomena observed in the primate frontal cortex, including the simultaneous activation of multiple plan elements, the emergence of (almost) orthogonal “memory” subspaces, and their reuse across forward and backward tasks. Our approach provides a mechanistic account of how probabilistic inference over control states produces distributed neural representations of plans. This framework unifies planning, working memory, and motor preparation, and generates predictions about the dynamics of active inference, the role of subspaces, and the impact of uncertainty on sequence processing.

[https://www.cell.com/cell-reports/fulltext/S2211-1247\(26\)00983-6](https://www.cell.com/cell-reports/fulltext/S2211-1247(26)00983-6)

eLife

PAPERS

HANS T. BILGER, MICHAEL J. RYAN & JULIA A. CLARKE – Measurement and comparison of acoustic space use in vocalizations of humans and close primate relatives

The human larynx, compared to those of closely related primates, lies deeper in the throat and lacks vocal membranes and air sacs. These shifts are usually analyzed regarding their acoustic effects on vowel-like vocalizations, since the evolution of speech was long thought to require an expansion of vocal range driven by vocal tract modifications. However, vowels are just one type of phoneme, and speech is just one class of human utterance. To understand the evolutionary underpinnings of known shifts in human vocal morphology, a broader bioacoustic comparison is needed. Specifically, the range of sounds used

in human speech must be compared to that employed in other human vocalizations and in the repertoires of extant close primate relatives. Here, we measure the acoustic-feature space occupied by human speech, non-linguistic, and musical vocalizations along with the calls of chimpanzees, bonobos, and chacma baboons. We use Mel-frequency cepstral coefficients to create an acoustic space depicting the spectro-temporal features of over 750,000 brief vocal segments sourced from published databases and other verified sources. Speech and song occupied significantly less volume in this acoustic space than human non-linguistic vocalizations. In addition, the acoustic-feature volumes of speech and song were not statistically distinct from those of non-human primates. These results suggest that speech was not enabled by an expansion of human vocal acoustic space. Anatomical shifts unique to humans may have led to an elaboration of non-linguistic utterances, but learned vocalizations use a surprisingly small fraction of this space. Our understanding of human vocal evolution will be further informed by additional systematic comparisons of the function and homology of non-speech vocalizations, along with the collection and incorporation of more complete non-human primate vocal datasets, especially from Gorilla and Orangutan.

<https://elifesciences.org/reviewed-preprints/112153>

Evolutionary Anthropology

PAPERS

MIKI BEN-DOR & RAN BARKAI – Through Time and Across Traits: Evaluating Explanations of Human Evolution

We argue that current explanatory practice misses two situations that can arise in any lineage, not only ours. The first is dynamic: traits continue changing in one direction when a lineage's own niche construction keeps enlarging the problem it faces. The second is unifying: many traits change together and may require one explanation rather than several. Both cases bear on Tinbergen's four questions, the test of explanatory completeness, and both require extending his function question: what is a trait for? An answer that names a problem of fixed size cannot explain continued change. We call a problem of rising magnitude a gradient, and one that serves many traits a unifying gradient. We set out five questions that any complete gradient explanation must answer, map the major hypotheses of human evolution onto this scheme, and use our Prey-Size Decline hypothesis as a worked example. The proposed framework does not depend on that example.

<https://onlinelibrary.wiley.com/doi/full/10.1002/evan.70046>

Frontiers in Ecology and Evolution

PAPERS

PHARISEMÈNE TIBESAR et al with CATHERINE CROCKFORD & SIMONE PIKA – Who waits when? Age and Interactional context shape turn-taking timing in sooty mangabeys (*Cercocebus atys*) in the wild

The evolution of language still remains a mystery. A recent hypothesis proposed that the cooperative mechanism of turn-taking may have predated language and represents an interactional scaffold from which language evolved. Testing this hypothesis requires systematic studies of turn-taking systems in closely related species that examine features directly comparable to human conversational organization, including multimodal exchange, composite turns, and adaptation to recipient characteristics. However, methodological approaches for examining these features in nonhuman primates remain limited. To address this gap, we examined turn-taking in 21 adult female sooty mangabeys (*Cercocebus atys*) living in Taï National Park, Côte d'Ivoire. Sooty mangabeys provide a useful model system because vocal and multimodal turn-taking have been documented in this species, and social factors shape their interactions. We addressed two research questions: (1) How is turn-taking organized in interactions of adult female sooty mangabeys? (2) Is signal-based turn-taking timing influenced by socio-demographic factors?

We collected video and behavioral data across three field seasons, from May 2022 to March 2024. This resulted in 407.17 hours of focal observation, an average of 18.51 hours per female, 117.98 hours of video recordings, and an average of 5.36 hours per female. From these recordings, we analyzed a total of 226 interactions based on distinct selection criteria (mean of 20.55 interactions/female), across five different contexts (affiliative, agonistic, feeding, grooming, and sexual contexts). We used a novel approach that quantified composite turns composed of actions, gestures, facial expressions, and vocalizations. We examined turn size, turn composition, and turn transitions and gap durations within signal-based exchanges. We then tested whether timing within signal-based exchanges varied with initiator age and rank, social relationship strength, and interactional context.

The results showed that turn-taking was organized differently across contexts. Signal-exchange gaps were generally short, and initiator age influenced gap duration in affiliative interactions only.

These findings suggest that turn-taking in adult female sooty mangabeys is multimodal, context-dependent, and partly socially structured, consistent with the hypothesis that core organizational features of conversational turn-taking predate human language.

<https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2026.1863007/full>

iScience

PAPERS

ELLEN SOETERS et al with CRICKETTE SANZ – Object manipulation scaffolds the development of tool use in children

Our species' extensive reliance on tool use is a key aspect of what makes us human, yet naturalistic data on the social and environmental drivers of tool-use development in children remain scarce. We examined the development of tool use in 31 children in Swiss daycares (age: 0.5–4.5 years, 17 females, $n = 467$ video focal follows). All children frequently engaged with objects. Simple object-manipulation bouts became shorter with age, and the number of complex tool-use bouts increased. Social learning opportunities increased the frequency of material engagement, whereas the mere presence of others reduced it. Higher object availability predicted both higher frequency and complexity of material engagement. In sum, children were intrinsically motivated to manipulate objects, and environmental and social factors further influenced tool-use development. Our naturalistic study paves the way for comparisons with non-human species—crucial to understand the evolution of material culture and cognition.

[https://www.cell.com/iscience/fulltext/S2589-0042\(26\)02680-5](https://www.cell.com/iscience/fulltext/S2589-0042(26)02680-5)

Nature

REVIEWS

ABEBA BIRHANE – Can AI ever be conscious? The question stems from a misconception

A book outlines how the fields of artificial intelligence, psychology and philosophy have neglected a key aspect of consciousness: the body.

Review of 'Intertwined Creatures: The Embodied Cognitive Science of Self and Other' by Anthony Chemero, Columbia University Press (2026).

<https://www.nature.com/articles/d41586-026-02571-9>

Nature Communications

PAPERS

ANNE BILLOT et al – Preserved topography, lateralization, selectivity, and functional connectivity of the language network in older brains

Healthy aging is associated with structural and functional brain changes. However, cognitive abilities vary in how they change with age: executive functions decline, while aspects of linguistic processing remain relatively preserved. This heterogeneity predicts differences among brain networks in whether and how they change with age. To evaluate this prediction, we used precision fMRI to examine the language-selective network and the Multiple Demand (MD) network, which supports executive functions, in older adults ($N = 64$) relative to young controls ($N = 483$). The MD network of older adults shows weaker, less spatially extensive, and more topographically variable activations during an executive function task and reduced within-network functional connectivity. In contrast, we find remarkable preservation of the language network in older adults: it responds during language comprehension as strongly and selectively as in younger adults, with similar left-hemispheric lateralization and within-network functional connectivity. These findings align with behavioral preservation of language comprehension in healthy aging.

<https://www.nature.com/articles/s41467-026-76598-x>

YIQIN BAI et al – The cellular and molecular basis of gyrus-sulcus specialization in the primate brain

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Gyri and sulci are key anatomical features of the primate cerebral cortex, distinguished by their structural and functional specialization, yet their cellular and molecular foundations remain poorly understood. Here we utilized single-cell spatial transcriptomics data from adult male macaque monkey brains and developed gsModel, a customized deep learning framework that distinguishes sulci from gyri. Relying solely on local cell-type composition, gsModel achieved over 90% accuracy in the classification task, outperforming alternative machine learning models and predictors based on anatomical features. By integrative analysis with diffusion MRI tractography, we found that these compositional distinctions align with systematic variations in structural connectivity, linking local molecular architecture to macroscale wiring. Embedding-guided analyses further revealed key cell types and marker genes contributing to sulcus-gyrus differences, highlighting prominent contributions from upper-layer glutamatergic neurons and oligodendrocytes, as well as distinct gene regulatory networks underlying their expression profiles. Together, this work establishes a molecular framework linking microscale molecular architecture to macroscale cortical organization, providing a basis for mechanistic studies of region-specific structural and functional specialization in the primate cortex.

<https://www.nature.com/articles/s41467-026-77086-y>

GRACIELA SOTELO et al – Fossil record biases skew inferences of mammal trait evolution

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The fossil record is key to elucidating past biodiversity dynamics, yet it remains incomplete and non-uniform, governed by factors such as sedimentation rates, species' range and body size, and sampling effort. How these biases distort inferences on evolutionary trends remains poorly understood. Here, we simulate a future fossil record of present-day land mammals to quantify the extent to which real evolutionary patterns can be recovered from fragmentary fossil data. Species are filtered according to sediment availability, species' range and body size, and spatial and taxonomic sampling biases under three preservation rates, and then systematically pruned from a baseline mammal phylogeny before analyses of body mass and diet evolution through phylogenetic comparative methods. We find that biological and taxonomic filters strongly skew these inferences, while spatial filters do not significantly distort them. Our results provide first-order estimates of how fossil record incompleteness can bias our interpretation of deep-time biodiversity change.

<https://www.nature.com/articles/s41467-026-77026-w>

Nature Communications Earth & Environment
PAPERS**MASOUD YOUSEFI et al with FELIX RIEDE – No evidence for climate-driven fragmentation of Neanderthal habitats prior to their extinction**

We're sharing this article early to provide faster access to peer-reviewed, accepted research. It is citable and carries a permanent DOI. This version is subject to further edits and will be replaced automatically by the final Version of Record. All legal disclaimers apply.

The role of climate-driven habitat fragmentation in Neanderthal extinction remains widely debated. Here, we test this hypothesis by reconstructing habitat suitability, connectivity, and landscape structure across the Neanderthal range from the Last Interglacial (LIG: ~130,000 years ago) to the period preceding their disappearance (40,000 years ago), using ensemble species distribution models and high-resolution paleoenvironmental data. Despite climatic changes, spatial patterns of habitat suitability remained broadly consistent, with core areas persisting in western Europe and along major coastal regions. Suitable habitat area declined modestly toward Marine Isotope Stage 3, but this was not accompanied by reductions in connectivity, increases in landscape resistance, or fragmentation of the habitat network. Instead, connectivity remained stable or even increased locally, and major dispersal pathways persisted across Eurasia. These results indicate that large-scale climate-driven habitat fragmentation did not intensify prior to Neanderthal extinction. Rather, Neanderthal habitats remained spatially extensive and connected throughout the Late Pleistocene. Our findings therefore provide little support for fragmentation-based extinction hypotheses and are more consistent with scenarios in which ecological and demographic factors, including interactions with expanding *Homo sapiens*, played a central role.

<https://www.nature.com/articles/s43247-026-03960-8>

Patterns
PAPERS**THIJS SNELLEMAN, HOLGER HOOS & ODD ERIK GUNDERSEN – The cost of reproducibility in artificial intelligence**

Insufficiently documented publications can make independent reproduction an unnecessarily laborious task. We define the cost of reproducibility as the resources required to reproduce the findings of a study and we propose five dimensions of cost, using objective characteristics such as code and data. We review 918 publications between 2022 and 2024 at top AI venues to evaluate the variation in reproducibility costs, with the hypothesis that publications at venues with stricter standards are less costly. Papers published at machine learning conferences are less costly to reproduce than publication from other venues, 12.91% less costly compared with journals, and 16.52% less costly compared with general AI conferences. Award-winning papers, however, are not less costly to reproduce than regular papers, and 6.72% of implementation repository links were broken. These findings suggest that reproducibility costs can be significantly reduced through compliance-based mechanisms—provided they receive community support. We recommend that venues require the inclusion of reproducibility checklists in their publications, permit appendices for comprehensive documentation, and adopt low reproducibility cost as a key criterion for awards.

[https://www.cell.com/patterns/fulltext/S2666-3899\(26\)00149-2](https://www.cell.com/patterns/fulltext/S2666-3899(26)00149-2)

PLoS One
PAPERS**SUSANA CARVALHO et al with ELISABETTA VISALBERGHI – Small vertebrate consumption by capuchin monkeys (*Sapajus libidinosus*): Insights into the human predatory pattern**

The consumption of small vertebrates occurs to varying degrees among many non-human primates. This dietary element may have constituted an important source of nutrition for early hominins, particularly during periods of food scarcity, providing a stepping stone to the exploitation of larger animals. Capuchin monkeys regularly consume small vertebrates

across their range. Expanding our knowledge of the contribution of animal matter to these primates' diets can shed light on the proximate and ultimate drivers of small vertebrate consumption across primate taxa, including humans. We report on the most extensive record of bearded capuchin (*Sapajus libidinosus*) vertebrate predation so far available: 45 months of observations of vertebrate predation in two sympatric groups in Fazenda Boa Vista, in northeastern Brazil. We estimated the effect of provisioning, sex, age class, fruit and insect availability, rainfall, humidity, and temperature on predation rates using a zero-inflated negative binomial algorithm with random effects. We found mammal and saurian consumption is habitual in this population of *S. libidinosus*. Prey brains and viscera tend to be accessed before the rest of the body. Predation rates were higher in males compared to females and in adults compared to infants across groups. Our results also identified small vertebrates as key energy sources for bearded capuchins under decreased fruit availability and show that provisioning reduces predation rates. Future work should assess small vertebrate predation as a possible stepping stone in the emergence of human exploitation of large animals by re-analyzing fossil faunal assemblages for evidence of small vertebrate predation. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0355204>

PNAS

PAPERS

JÖRG GROSS – The free-rider detection problem: How groups balance fairness and cooperation

<https://www.pnas.org/doi/abs/10.1073/pnas.2622914123>

Proceedings of the Royal Society B

PAPERS

YITZCHAK BEN MOCHA et al – Females cooperate, rather than monopolize reproduction, in multi-female groups of cooperatively breeding birds and mammals

Scholars have long sought to understand why, in some cooperatively breeding species, females care for the offspring of other group members while forgoing their own reproduction. Here, we analysed data from 101 cooperatively breeding populations of 73 bird and mammal species to advance research on this question. First, we illustrate the extent to which this question is relevant by mapping the substantial interspecific variation in the prevalence of multi-female groups (because only in these groups can females either compete or cooperate with respect to reproduction). Second, we show that in multi-female groups, females more often alloparent each others' offspring and share, rather than monopolize, reproduction. Third, we demonstrate the misleading effect of ignoring social composition when curating empirical data to test theoretical models of social behaviour by revisiting evidence presented to support the limited control model. Taken together, our findings uncover a high degree of reproductive cooperation in multi-female groups of cooperatively breeding birds and mammals. They thereby highlight the need for further research on the conditions that (i) favour the formation of multi-female groups (i.e. as a precondition for reproductive cooperation), and (ii) subsequently support the realization and maintenance of female cooperation once it becomes possible.

<https://royalsocietypublishing.org/rspb/article/293/2077/20261086/483072/Females-cooperate-rather-than-monopolize>

Royal Society Open Science

PAPERS

XAVIER RAICK, CLAUDIA J. HERNÁNDEZ-CAMACHO & DAMIEN OLIVIER – Do sea lions fall silent when fish have something to say?

Coastal soundscapes are complex systems composed of many biological sounds, among which fish often play a central role. Marine mammal vocalizations can also contribute substantially, either when animals pass through an area or because their loud calls can be heard from offshore. Sea lion colonies, known for their intense aerial vocalizations, may also represent a major sound source around breeding areas. However, how colonies shape the underwater acoustic environment remains poorly understood. This study focused on the barking of California sea lions (*Zalophus californianus*) at Los Islotes (Gulf of California), to quantify diel and seasonal patterns of vocal activity and its interaction with the surrounding biophony. We developed an AI-based detector trained on BirdNET to identify major biophony components. Barks dominated the diurnal soundscape, while fish sounds dominated just after the end of twilight. Their diel peak coincided with a reduction in sea lion vocalizations. Fish sound abundance increased from April–May to June–July. Bark abundance remained stable. The negative diel correlation between bark and fish sound abundance highlights temporal partitioning among taxa, illustrating the integration of aquatic–aerial soundscapes and demonstrating the potential of passive acoustics to study pinniped vocal behaviour and its interplay with reef biophony.

<https://royalsocietypublishing.org/rsos/article/13/8/rsos252026/483019/Do-sea-lions-fall-silent-when-fish-have-something>

SAMSON ABRAMSKY et al – Open questions about time and self-reference in living systems

Living systems exhibit a range of fundamental characteristics: they are active, self-referential, self-modifying systems. This paper explores how these characteristics create challenges for conventional scientific approaches and why they require new theoretical and formal frameworks. We introduce a distinction between 'natural time', the continuing present of physical processes, and 'representational time', with its framework of past, present and future that emerges with life itself.

Representational time enables memory, learning and prediction, functions of living systems essential for their survival. Through examples from evolution, embryogenesis and metamorphosis, we show how living systems navigate the apparent contradictions arising from self-reference as natural time unwinds self-referential loops into developmental spirals. Conventional mathematical and computational formalisms struggle to model self-referential and self-modifying systems without running into paradox. We identify promising new directions for modelling self-referential systems, including domain theory, coalgebra, genetic programming (GP) and self-modifying algorithms. There are broad implications for biology, cognitive science and social sciences, because self-reference and self-modification are not problems to be avoided but core features of living systems that must be modelled to understand life's open-ended creativity.

<https://royalsocietypublishing.org/rsos/article/13/8/261059/483065/Open-questions-about-time-and-self-reference-in>

Trends in Cognitive Sciences

PAPERS

SAMI R. YOUSIF & RUSSELL A. EPSTEIN – Cognitive maps as a medium for thought

Cognitive maps are essential for navigation, but to what extent are they involved in thinking more broadly? In this opinion article, we examine whether cognitive maps constitute a genuine vehicle for thought and how they relate to the notion of a language of thought. Integrating work from philosophy, psychology, and neuroscience, we suggest that map-like representations offer a distinct, flexible medium for encoding information and exhibit compositionality in both spatial and nonspatial domains. We then consider how dynamic neural mechanisms—replay, theta sequences, and vector computation—may transform map-based representations into sequential routelike formats that interface with cortical systems supporting propositional thinking. Cognitive maps may be complementary to symbolic cognition, jointly enabling flexible human reasoning.

[https://www.cell.com/trends/cognitive-sciences/abstract/S1364-6613\(26\)00181-6](https://www.cell.com/trends/cognitive-sciences/abstract/S1364-6613(26)00181-6)

Trends in Ecology and Evolution

PAPERS

ANDREW J. KING et al – Evolutionary spandrels in collective animal behaviour

Collective behaviour is widespread in the animal kingdom and can enhance individual fitness. Yet not all collective behaviours are adaptations. Instead, some may be nonadaptive or ‘evolutionary spandrels’—traits that originated as by-products in the sense proposed by Stephen Jay Gould and Richard Lewontin. Here, we argue that self-organising processes provide a route through which evolutionary spandrels in collective animal behaviour can occur, and we provide three examples: spatial organisation in primate groups, division of labour in ants, and insect chorusing. We then consider how such outcomes may be co-opted into adaptive roles through exaptation and conclude by outlining the challenges associated with testing adaptive and nonadaptive hypotheses in collective behaviour research using individual-based studies, phylogenetic comparative analyses, and agent-based models.

[https://www.cell.com/trends/ecology-evolution/abstract/S0169-5347\(26\)00209-0](https://www.cell.com/trends/ecology-evolution/abstract/S0169-5347(26)00209-0)

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