

EAORC BULLETIN 1,171 – 23 November 2025

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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.

OTHER PUBLICATIONS – What Do Lithics Tell Us About How Pleistocene Hominins Survived?

Archaeometry, 67:6, 70056 (2025)

JOHN J. SHEA – What Do Lithics Tell Us About How Pleistocene Hominins Survived?

Hominin fossils and lithic evidence can, considered together, shed light on major changes in hominin evolution. Correlated changes in hominin fossil and lithic evidence appear at three major inflection points, ca. 3.4, 1.7, and 0.3 Ma. These inflection points mark evolutionarily consequential changes in hominin survival strategies.

<https://onlinelibrary.wiley.com/doi/10.1111/arcm.70056>

NEWS

NATURE BRIEFING – Tiny figurine hints at ancient belief system

Researchers suggest that a small clay figurine from Southwest Asia’s ancient Natufian culture could be one of the oldest documented depictions of a mythological scene. The approximately 12,000-year-old figure could depict a woman with a goose on her back, which researchers say might represent the imagined mating between a human and an animal spirit. “The scene itself — depicting a sexualized interaction between a human and an animal — is part of a long tradition in myth” and often symbolizes fertility or the sacredness of life, says anthropologist and study co-author Natalie Munro.

<https://www.reuters.com/science/figurine-woman-geese-offers-peek-prehistoric-beliefs-2025-11-17/>

NATURE BRIEFING – Kissing evolved 21.5 million years ago

Most large apes kiss — defined as “a non-agonistic interaction involving directed, intraspecific, oral-oral contact with some movement of the lips/mouthparts and no food transfer” — and Neanderthals probably did too, according to a new analysis. Researchers combed the literature and YouTube — they admit these data are just “a starting point” — for observations of kissing in various species and used it to reconstruct the evolution of the act. “We think kissing probably evolved around 21.5 million years ago in the large apes,” says evolutionary biologist and study co-author Matilda Brindle. The question is, why? “We should be studying this behaviour, not just dismissing it as silly because it has romantic connotations in humans,” says Brindle.

<https://www.bbc.co.uk/news/articles/cr43gg61g2qo>

NEWS FROM SCIENCE – Have wild wolves learned to use tools?

Video captures a lone female pulling crab traps out of the water, but does it count as tool use?

<https://www.science.org/content/article/have-wild-wolves-learned-use-tools>

SCIENCEADVISER – When is a tool not a tool?

When I first began reporting my story about wild wolves in British Columbia learning to pull crab traps out of the water, I was fairly skeptical that the behavior—though certainly a sign of ingenuity—could be classified as tool use. But as study co-author Paul Paquet later explained to me, the definition of this term “is pretty elastic.” He and lead author Kyle Artelle ended up consulting with multiple other scientists, including the late Jane Goodall, to get their perspectives on what has proven to be an enduring discussion in animal research.

Some definitions of tool use, for example, require an animal to manufacture or modify an object in some way. New Caledonian crows, for example, are famous for fashioning spears and hooks out of sticks to “fish” for insect larvae. But such a definition would exclude sea otters, some of the animal kingdom’s most iconic tool users, which smash open shelled prey with rocks and other objects. Other definitions are more expansive, describing tool use as an animal using an object to intentionally achieve a goal. Some have argued that this definition could even include stick chewing by dogs.

“We put the word ‘potential’ in the title because of this question,” says Artelle. “I think it just really depends on the definition you’re using.” He notes that, while some definitions specifically exclude rope pulling as a form of tool use, the wolf described in the study was executing a sophisticated, purposeful series of steps, potentially justifying an exception to this rule. “Her movements are so efficient. It doesn’t look like random play.”

The study authors also note that, in this case, the wolf was interacting with the crab trap in almost exactly the same way a human would—and that we humans often engage in tool use even when we don’t entirely comprehend how those tools function. “These very words were typed on a computer whose inner workings the authors do not fully understand,” they write in *Ecology and Evolution*, “yet we believe (and hope) our use of them suggests that we too possess some measure of higher cognition.” As Artelle argues, it might be time for us to start thinking about tool use as more of a “continuum” than a binary—and to accept that tool use isn’t the be-all-end-all of animal intelligence.

Comparative psychologist Bradley Smith, who wasn’t involved in the study, says that while the wolf’s trap-pulling behavior may not be a “classic example” of animal tool use, it still serves as an example of “higher order problem solving and thinking in a wild animal.” As Artelle notes, wolves—which are already known to be highly intelligent—may simply not need to use tools the way other animals do. After all, why would they use an external object to obtain food when cooperative hunting already works so well?

I do wonder if these quibbles reflect the fact that, for a long time, humans believed that we were the only animals capable of using tools. That’s partly why Goodall’s observations of chimpanzees making and using tools proved to be such a paradigm shift. This tendency to think of ourselves as exceptional, along with what Paquet calls our “psychological blindness” to the interior lives of wild animals, may make it difficult for us to recognize more unconventional examples of animal tool use.

<https://www.science.org/content/article/have-wild-wolves-learned-use-tools>

SCIENCENEWS – No silly goose

A clay figurine, crafted some 12,000 years ago, appears to depict an encounter between a woman and a goose, perhaps an allusion to a myth or story. The object suggests spiritual artistry involving animals “started earlier than previously thought,” one expert said. “Clay might have been a medium that facilitated such new expressions.”

<https://www.sciencenews.org/article/figurine-geese-woman-storytelling-shift>

THE CONVERSATION – When did kissing evolve & did humans and Neanderthals get off with each other?

Humans are not the only animal to kiss.

<https://theconversation.com/when-did-kissing-evolve-and-did-humans-and-neanderthals-get-off-with-each-other-new-research-269210>

PUBLICATIONS

Current Biology

ARTICLES

LARA R. ARAUNA – Human evolution: Stature variation in the Neolithic

The Neolithic transition towards agriculture and animal husbandry is often associated with declining nutrition and health, which led to shorter human stature. A new study reveals that the reduction in height was modest and driven mainly by changes in genetic ancestry and mitigated by lactose tolerance.

[https://www.cell.com/current-biology/abstract/S0960-9822\(25\)01180-7](https://www.cell.com/current-biology/abstract/S0960-9822(25)01180-7)

KEVIN D. HUNT – Primatology: The gorilla in the trees

A new study reveals that gorillas spend much more time in trees than expected. This explains the many arboreal adaptations of gorillas and suggests that they evolved late, due to competition from monkeys.

[https://www.cell.com/current-biology/abstract/S0960-9822\(25\)01323-5](https://www.cell.com/current-biology/abstract/S0960-9822(25)01323-5)

PAPERS

SAMANTHA L. COX et al – Effects of ancestry, agriculture, and lactase persistence on the stature of prehistoric Europeans

Ancient DNA has revolutionized our understanding of human evolutionary history, but studies focusing solely on genetic variation tell an incomplete story by neglecting phenotypic outcomes. The relationships between genotype and phenotype can change over time, making it desirable to study them directly in ancient populations rather than in present-day data.

Here, we present a large-scale integration of ancient genomic and phenotypic data, analyzing femur length as a proxy for stature in 659 individuals with published whole-genome ancient DNA data across western Eurasia. Polygenic scores derived from modern European and East Asian genome-wide association studies retain predictive power in ancient populations, explaining up to 10% of phenotypic variance. Contrary to long-standing archaeological hypotheses,^{2,3} we find that Neolithic populations were only modestly shorter than preceding Mesolithic groups, with differences at least partly attributable to genetic rather than environmental factors, challenging narratives of systematic stature decline following the transition to

agriculture. Finally, we find that the lactase persistence allele had a large positive effect on stature in ancient individuals (0.20 standard deviations), even though it shows no association with height in present-day populations.⁴ This gene-environment interaction highlights the limitation of using present-day genetic data to infer past phenotypic relationships. Our results underscore the value of integrating genetic and morphological data from ancient populations to reconstruct the dynamics of human adaptation.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(25\)01401-0](https://www.cell.com/current-biology/fulltext/S0960-9822(25)01401-0)

ALICE BANIEL et al – Evidence for deceptive fertility in a wild primate

Animal signals typically convey reliable information, but deception can evolve when the sender and receiver have conflicting interests—especially in the context of mating. Here, we provide evidence from a Cercopithecine primate, the gelada (*Theropithecus gelada*), that females deceptively signal fertility when conception is unlikely, which functions as a counterstrategy in sexual conflict. In geladas, male takeovers are frequent and often lead to sexually selected infanticide, exacting high costs on lactating females. Using 14 years of demographic and hormone data from wild geladas in Ethiopia, we show that lactating females quickly resumed sexual swellings and mated with the new male following takeovers, but they took significantly longer to conceive than females resuming cycling at other times. Females that exhibited these post-takeover swellings were subsequently less likely to lose their infants to infanticide. Fecal hormone data revealed a surge in estrogens after takeovers, even among females with the youngest infants, suggesting that estrogens mediate both fertile (“true”) and non-fertile (“false”) swellings. These results support the idea that sexual swellings can deceptively blur fertility as an adaptive counterstrategy to infanticide.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(25\)01451-4](https://www.cell.com/current-biology/fulltext/S0960-9822(25)01451-4)

eLife

PAPERS

LEI LI et al – Mother-child dyadic interactions shape the developing social brain and Theory of Mind in young children

Social cognition develops through a complex interplay between neural maturation and environmental factors, yet the neurobehavioral mechanisms underlying this process remain unclear. Using a naturalistic fMRI paradigm, we investigated the effects of age and parental caregiving on social brain development and Theory of Mind (ToM) in 34 mother-child dyads. The functional maturity of social brain networks was positively associated with age, while mother-child neural synchronization during movie viewing was related to dyadic relationship quality. Crucially, parenting and child factors interactively shaped social cognition outcomes, mediated by ToM abilities. Our findings demonstrate the dynamic interplay of neurocognitive development and interpersonal synchrony in early childhood social cognition, and provide novel evidence for neurodevelopmental plasticity and reciprocal determinism. This integrative approach, bridging brain, behavior, and parenting environment, advances our understanding of the complex mechanisms shaping social cognition. The insights gained can inform personalized interventions promoting social competence, emphasizing the critical importance of nurturing parental relationships in facilitating healthy social development.

<https://elifesciences.org/articles/103017>

Evolution and Human Behavior

PAPERS

MATILDA BRINDLE, CATHERINE F. TALBOT & STUART WEST – A comparative approach to the evolution of kissing

Kissing can be observed across the animal kingdom. This presents an evolutionary puzzle, since the fitness benefits of kissing are unclear. We use a non-anthropocentric approach to define kissing as a non-agonistic interaction involving directed, intraspecific, oral-oral contact with some movement of the lips/mouthparts and no food transfer. Using this definition we collate basic observational data across the Afro-Eurasian primates and employ Bayesian phylogenetic methods to reconstruct the evolutionary history of kissing. We find that kissing occurs in most extant large apes, and likely also occurred in Neanderthals (*Homo neanderthalensis*), first evolving in the ancestor to this group ~21.5–16.9 mya. Additionally, we highlight various life history variables that correlate reasonably, but not perfectly, with kissing across the apes (multi-male mating systems, non-folivorous diets, and premastication). With a major caveat about the quantity of available data at present, we hope that our results provide a useful starting point for further research into the adaptive function of kissing that highlights hypothesis generation and testing within a phylogenetic framework.

<https://www.sciencedirect.com/science/article/pii/S1090513825001370>

Frontiers in Education

PAPERS

MARTINA MANNA, MAKARADZE & FEDERICA COMINETTI – How inclusive large language models can be? The curious case of pragmatics

This article provides a conceptual and critical analysis of the role of generative artificial intelligence (GenAI), particularly Large Language Models (LLMs), in supporting the development of pragmatic competence in language education, with a specific focus on the Italian language. While GenAI tools demonstrate remarkable capabilities for personalized feedback and

interactive instruction, their development is marked by a significant paradox: the very mechanisms that enable personalization are rooted in vast, centralized training corpora that are predominantly English-centric. This linguistic mediation introduces biases that risk distorting pragmatic norms in other languages, threatening communicative authenticity and linguistic inclusivity. This paper explores the implications of such biases for second language (L2) learning, highlighting potential risks to sociocultural communication norms and cognitive development. Grounded in postdigital and socio-material frameworks, and drawing on theories of cognitive extension, this analysis first problematizes the pragmatic profile of LLMs in Italian by critically reviewing the existing empirical landscape, including language-specific benchmarks. Identifying a crucial gap in pedagogically oriented research, the study then proposes a rigorous, multi-phase research agenda. This agenda aims to guide the co-design and validation of a GenAI tool that is ethically informed, pedagogically robust, and linguistically attuned to the nuances of Italian pragmatics. The ultimate contribution is a pathway toward ensuring that GenAI enhances rather than impoverishes learners' communicative capacities, avoiding the potential for cognitive deflation and fostering a more equitable integration of AI in education.

<https://www.frontiersin.org/journals/education/articles/10.3389/feduc.2025.1619662/full>

Frontiers in Psychology

PAPERS

IZUMI UEHARA – Developmental sequence of young children's understanding of “knowing,” “forgetting,” and “remembering”

This study focused on examining young native Japanese children's linguistic understanding of words associated with awareness of one's memory, such as “know,” “forget,” and “remember,” to explore the early developmental process of metamemory. To assess whether 4-, 5- and 6-year-olds understand these words, we created new tasks for “know” and “remember,” and used a modified episodic task for “forget,” adapted from a question used in previous research concerning the state of “placing something and forgetting it.” A total of 114 children, with 38 children in each age group, participated in this study. More than 80% of the 6-year-olds understood the mental states of “knowing,” “forgetting,” and “remembering,” whereas 4-year-olds did not. The performance of 5-year-olds fell between that of the 4- and 6-year-olds, with half failing to understand “remembering” and 30% failing to understand “forgetting.” These findings indicate a developmental progression in understanding, in the order of “know,” “forget,” and “remember.” The tasks developed in this study will contribute to future research on cognitive development, as well as to educational and support practices for young children.

<https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2025.1626407/full>

iScience

PAPERS

XIAO-WEI XV et al – Multidimensional Performance Trade-offs in Bipedal Standing of Common Chimpanzees and Implications for Human Bipedal Evolution

Bipedalism is a hallmark of human evolution, and investigating performance trade-offs in common chimpanzees (*Pan troglodytes*), our closest living relative, elucidating evolutionary constraints of our own lineage. Through musculoskeletal modeling and robotics-inspired analysis, we respectively simulated thousands of bipedal postures optimized for whole-body stability, head-top flexibility, head-top robustness, and femoral-head vertical supportance. Optimal joint configurations for each metric revealed insights into chimpanzees' postural strategies during foraging, vigilance, and arboreal navigation. Moderate hip and knee flexion with slight ankle dorsiflexion yielded the most stable postures but compromised head mobility and vertical support. These trade-offs explain chimpanzees' limited bipedal capabilities and short bout durations observed in the wild. Our findings illuminate biomechanical challenges shaping hominin bipedal evolution, provide perception into early hominin postural strategies, and offer implications for developing more efficient humanoid and biomimetic robots.

[https://www.cell.com/iscience/fulltext/S2589-0042\(25\)02316-8](https://www.cell.com/iscience/fulltext/S2589-0042(25)02316-8)

IOANA N. MELEG et al – Ancient biomolecules suggest a learned foraging strategy in extinct cave bears

Studying the behavioral ecology of long-extinct species is challenging due to the difficulty in measuring the behavioral phenotype and correlating this with genetic and environmental factors. However, a multidisciplinary approach integrating isotope analysis of diet and ancient DNA analysis of genetic relationships offers a potential framework to test the proximate causes of dietary preferences. Our study focuses on Late Pleistocene cave bears from the Romanian Carpathians. Stable isotope analysis of bone collagen reveals substantial lifetime variation in food plant preferences among individuals. We find that bears with similar diets do not cluster according to their population structure, sex, time period, climatic conditions, or location. This disconnect suggests that diet preferences in cave bears are not genetically inherited, and instead that individuals adapted their diets based on foraging experience. This integrative approach opens avenues for understanding Pleistocene animal behavior, leveraging ancient biomolecules synergistically to reveal insights otherwise inaccessible.

[https://www.cell.com/iscience/fulltext/S2589-0042\(25\)02181-9](https://www.cell.com/iscience/fulltext/S2589-0042(25)02181-9)

Nature**NEWS****Neanderthal DNA reveals how human faces form**

Subtle genomic variations between humans and Neanderthals provide clues to how DNA shapes our facial features.

<https://www.nature.com/articles/d41586-025-03697-y>

ARTICLES**FLORA GRAHAM – Daily briefing: Kissing might have evolved 21.5 million years ago**

Most large apes kiss, and Neanderthals probably did too. Plus, what a surge of measles in North America means for the world and what Canada's bold talent-attraction program means for scientists.

<https://www.nature.com/articles/d41586-025-03835-6>

PAPERS**ILINA BHAYA-GROSSMAN et al – Shared and language-specific phonological processing in the human temporal lobe**

All spoken languages are produced by the human vocal tract, which defines the limited set of possible speech sounds. Despite this constraint, however, there exists incredible diversity in the world's 7,000 spoken languages, each of which is learned through extensive experience hearing speech in language-specific contexts¹. It remains unknown which elements of speech processing in the brain depend on daily language experience and which do not. In this study, we recorded high-density cortical activity from adult participants with diverse language backgrounds as they listened to speech in their native language and an unfamiliar foreign language. We found that, regardless of language experience, both native and foreign languages elicited similar cortical responses in the superior temporal gyrus (STG), associated with shared acoustic–phonetic processing of foundational speech sound features^{2,3}, such as vowels and consonants. However, only during native language listening did we observe enhanced neural encoding in the STG for word boundaries, word frequency and language-specific sound sequence statistics. In a separate cohort of bilingual participants, this encoding of word- and sequence-level information appeared for both familiar languages in the same individual and in the same STG neural populations. These results indicate that experience-dependent language processing involves dynamic integration of both shared acoustic–phonetic and language-specific sequence- and word-level information in the STG.

<https://www.nature.com/articles/s41586-025-09748-8>

OBITUARIES**JAN WITKOWSKI – James Watson obituary: co-discoverer of DNA's double helix who reshaped modern biology**

He helped to reveal the structure of life's code, transformed science education and research, and remained a deeply controversial figure to the end.

<https://www.nature.com/articles/d41586-025-03761-7>

Nature Communications Biology**PAPERS****ELISE B. BARBEAU et al – Early but discontinued exposure to a language exerts lasting effects on white matter architecture in the brain**

Language experiences influence later cognitive development, but how they shape brain organization remains unclear. We investigated four groups of participants who differed in their early linguistic environments: International Adoptees (IA) from China, who discontinued their first language (L1) Mandarin in the first two years of life and only speak French since adoption; L1-Mandarin speakers with early acquisition and continued use of French; L1-French speakers; and English-French bilinguals. We used diffusion-weighted imaging to explore group differences in two white-matter tracts in the brain that play a role in language processing, the arcuate fasciculus and superior longitudinal fasciculus. Our findings revealed that despite discontinuing Mandarin early in life, IA participants exhibited structural features resembling those of native Mandarin speakers, including smaller tract volumes in the left hemisphere and more balanced tract volumes across hemispheres. In contrast, English-French bilingual and L1-French groups exhibited similar white-matter characteristics, which were distinct from the two tone-language exposed groups, suggesting a structural organization specific to tonal language experience, and not bilingualism in general.

<https://www.nature.com/articles/s42003-025-08954-4>

Nature Human Behaviour**ARTICLES****ANNEMARIE VERKERK & RUSSELL D. GRAY – Shared universal pressures in the evolution of human languages**

Despite the great diversity of human languages, recurring grammatical patterns (termed 'universals') have been found. Using the Grambank database of more than 2,000 languages, spatiophylogenetic analyses reveal that while only a third of 191 putative universals have robust statistical support, there are still preferred feature configurations that have evolved

repeatedly — consistent with shared cognitive and communicative pressures having shaped the evolutionary dynamics of languages.

<https://www.nature.com/articles/s41562-025-02355-7>

Nature Molecular Psychiatry

PAPERS

SVENJA SEUFFERT et al – Linking speech patterns to brain structure in affective and psychotic disorders: an integrative natural language processing approach

Language disturbances are central features of serious mental illnesses, yet traditional clinical assessments often rely on subjective evaluation that may overlook subtle speech anomalies. This study employs natural language processing (NLP) to objectively analyze spontaneous speech in a transdiagnostic sample comprising individuals with affective ($n = 119$ Major Depressive Disorder, $n = 27$ Bipolar Disorder) and psychotic disorders ($n = 37$ Schizoaffective Disorder, $n = 11$ Schizophrenia), as well as healthy controls ($n = 178$). Participants provided approximately 12 min of speech elicited via four pictures from the Thematic Apperception Test, which were transcribed and analyzed for semantic and syntactic features. Explorative factor analysis identified three latent linguistic dimensions: (1) Syntactic Complexity, (2) Lexical Diversity and Fluency, and (3) Narrow Thematic Focus. These dimensions were differentially associated with clinical ratings of formal thought disorder and neuroanatomical measures obtained through structural and diffusion-weighted MRI. Notably, Syntactic Complexity and Lexical Diversity correlated with decreased fractional anisotropy (FA) in frontotemporal white matter tracts, while Narrow Thematic Focus was linked to reduced gray matter volume in the right posterior insula. Importantly, these associations persisted after controlling for diagnosis, medication status, and verbal IQ. These findings suggest that NLP-derived speech metrics can serve as sensitive indicators for language dysfunction in psychiatric conditions, offering a scalable approach to elucidate brain-behavior relationships and advance models of psychopathology.

<https://www.nature.com/articles/s41380-025-03347-9>

Nature Neuroscience

PAPERS

MIGUEL VIVAR-LAZO & CHRISTOPHER R. FETSCH – Neural basis of concurrent deliberation toward a choice and confidence judgment

Decision confidence plays a key role in flexible behavior and (meta)cognition, but its underlying neural mechanisms remain elusive. To uncover the latent dynamics of confidence formation at the level of single neurons and population activity, we trained nonhuman primates to report a perceptual choice and the associated level of confidence with a single eye movement on every trial. Monkey behavior was well fit by a bounded accumulator model, where choice and confidence are processed concurrently, but not by a serial model, where choice is resolved first, followed by postdecision accumulation for confidence. Neurons in the lateral intraparietal area (LIP) reflected concurrent accumulation, showing covariation of choice and confidence signals across the population, and within-trial dynamics consistent with parallel updating at near-zero time lag. The results demonstrate that the primate brain can process a single stream of evidence in service of two computational goals simultaneously and suggest area LIP as a candidate neural substrate for this ability.

<https://www.nature.com/articles/s41593-025-02116-9>

Nature Reviews Neuroscience

PAPERS

EDOARDO CHIDICHIMO et al – Towards an informational account of interpersonal coordination

Human sociality is grounded in the dynamic coordination of individuals as they interact with one another. Indeed, various levels of interpersonal coordination — neural, behavioural, physiological, affective, linguistic — are hallmarks of successful social communication and cooperation. However, describing these complex, interdependent dynamics has been limited by current methodological approaches, owing to a restrictive repertoire of tools and the absence of a unified, standardized methodological framework. Here, we identify information theory — the mathematical theory of communication — as a particularly well-suited conceptual framework to address this shortfall, given its appropriate sensitivity to complex dynamics, including potential nonlinearity and higher-order interactions, and its data-driven, model-agnostic foundations. With deep roots in computational, cognitive and systems neuroscience, the formal introduction of information-theoretic quantities and methods into the study of interpersonal coordination is perhaps overdue. In this Perspective, we advance the case for a unified information-theoretic framework for the field while paving the way for a new generation of empirically testable, theoretically grounded research questions.

<https://www.nature.com/articles/s41583-025-00989-0>

Nature Scientific Data

PAPERS

SOJUNG HAN, et al – A curated dataset of great ape genome diversity

Studying the genetic diversity of non-human great apes is important for research questions in evolution as well as human diversity and disease. Genomic data of the three great ape clades (Pan, Gorilla, Pongo) has been published across multiple studies over more than one decade. However, unlike in humans, no comprehensive dataset on great ape diversity is available, due to different scopes of the original studies. Here, we present a curated dataset of 332 high coverage (≥ 12 -fold) whole genomes, including 198 chimpanzee, 16 bonobo, 77 gorilla and 41 orangutan individuals sequenced on the Illumina platform. By integrating data from captive individuals, we contextualize them with data from wild individuals. We discuss issues with previously published data leading to removal of individuals due to low sequencing depth, missing data, or occurrence of duplicate individuals. This resource of files in CRAM and gVCF format, as well as segregating sites per clade, will allow researchers to address questions related to human and great ape evolution and diversity in a comparative manner.

<https://www.nature.com/articles/s41597-025-06124-z>

Nature Scientific Reports

PAPERS

ANGELLE ANTOUN, ROHINI MURUGAN & BENJAMIN WILSON – Abstract rule learning and generalization in human and nonhuman primates

Abstract rules are central to human language, allowing for the generalization of grammatical rules to novel contexts. However, the evolutionary origin of the ability to learn and generalize these rules is unclear, and evidence for these capacities in nonhuman primates is equivocal. In a three-alternative forced-choice task, rhesus macaques and human participants learned to discriminate between sequences of trial-unique, colored stimuli based on three abstract rules ('ABA', 'AAB' or 'BAA'), demonstrating that, like humans, monkeys can learn and generalize abstract rules. However, follow-up testing demonstrated that unlike humans, monkeys learned slowly, showed limited cognitive flexibility in rule switching, and did not generalize across stimulus domains (from color to shape), suggesting that monkeys acquire more limited, context-specific representations. These results suggest that a critical open question regarding the uniqueness of human cognition is not only what animals are able to learn, but how they learn and represent abstract rules.

<https://www.nature.com/articles/s41598-025-24523-5>

BRENT ADRIAN et al – A new species of the mud terrapin *Pelusios* offers insights into early hominin habitats at the Pliocene Hadar Formation of Ethiopia

A novel extinct species of mud terrapin *Pelusios awashi* sp. nov. is described from the Hadar Formation in Ethiopia. Referred specimens include articulated and isolated specimens from multiple individuals that represent most elements of the shell and a holotype skull, which is the first known from the fossil record of *Pelusios*. The new species is distinct from extant *Pelusios* species by a unique combination of: a broad maxilla with an extensive triturating surface, a neural series reaching the suprapygal, and moderately convex lateral hypoplastral margins. *Pelusios* is unique among pleurodires for its kinetic plastral hinge at the hyo-mesoplastral junction, and the angled hinge of the new species demonstrates a plesiomorphic condition. Specimens found at the "First Family" locality (A.L. 333) in the Denen Dora Member suggest overlap between hominins and terrapins in habitats with aquatic resources. Crocodile bite marks denote likely chelonivory by *Crocodylus* and may indicate increased predation risk for sympatric hominins. The paleoecology of *Pelusios awashi* sp. nov. probably resembled that of *P. sinuatus*, consistent with phylogenetic and climatic niche conservatism in modern turtles. However, the broader maxilla of the new species suggests a more durophagous diet.

<https://www.nature.com/articles/s41598-025-24655-8>

QUENTIN COSNEFROY et al with JOHANNES KRAUSE – Highly selective cannibalism in the Late Pleistocene of Northern Europe reveals Neandertals were targeted prey

The Troisième caverne of Goyet has yielded the largest assemblage of Neandertal remains in Northern Europe with clear evidence of anthropogenic modifications. However, its skeletal fragmentation has long limited detailed morphological and behavioural study on the assemblage. In this study, we integrate palaeogenetic, isotopic, morphometric, and structural analyses of the long bones to assess the biological profiles of the Neandertals from Goyet and explore whether they present particularities that could shed light on the formation of this unique cannibalised assemblage. We identify a minimum of six individuals, including four adult or adolescent females. Compared to *Homo sapiens* and Neandertals—including regional specimens—the females from Goyet display short statures and reduced diaphyseal robusticity of their long bones. They lack skeletal markers associated with high mobility despite isotopic evidence for non-local origins. The overrepresentation of short, morphologically gracile, non-local females, alongside two immature individuals, suggests a strong selection bias in the individuals present at the site. Dated between 41,000 and 45,000 years ago, a period marked by Neandertal cultural diversity, biological decline and the arrival of *Homo sapiens* in Northern Europe, the cannibalised female and juvenile Neandertals from Goyet indicate exocannibalism, possibly linked to inter-group conflict, territoriality, and/or specific treatment of outsiders.

<https://www.nature.com/articles/s41598-025-24460-3>

NICOLAS DOLLION et al – Influence of phylogenetic proximity on children's empathy towards other species

Empathy is an essential social skill that develops progressively during childhood. Although mainly studied in the context of human intra-specific interactions, it also extends towards other species. Various factors influence the strength of empathy towards other species, including phylogenetic distance. The present study aimed to examine if this parameter also affects children's empathy towards other species. Three hundred and eight children - aged 5 to 12 years old- were given an empathic choice test on an extended photographic sample of organisms, followed by a scale measuring their empathic tendencies towards human peers. Results highlighted that children's empathy towards other living beings decreased with phylogenetic distance, and that this trend strengthened as age increased. Interestingly, presence of animals in the household tended to be positively related to children's empathy towards their peers. Comparison with data collected in previous studies revealed that although the effect of phylogenetic distance was stronger in adults than in children, no difference was observed compared to adults with autism spectrum disorder (ASD), except for human beings. This research sheds new light on children's empathy towards other species and provides elements to consider for their sensitization to animal welfare and wildlife protection, as well as new insights on the specific status that animals can have for people with ASD.

<https://www.nature.com/articles/s41598-025-24289-w>

Neuron

PAPERS

SHANNON S. SCHIERECK et al – The orbitofrontal cortex updates beliefs for state inference

While the orbitofrontal cortex (OFC) is implicated in learning and inferring latent states, the precise computation performed by the OFC for state inference is unclear. Here, we show that the rat OFC updates beliefs about states, and this process is decipherable from OFC dynamics in rats performing state inference but not alternative strategies. We trained rats to perform a temporal wagering task with hidden reward states. Well-trained rats used state inference when deciding how long to wait for rewards, and OFC inactivations impaired belief updating about states. Electrophysiology and novel population analysis methods identified latent neural factors reflecting inferred states in rats performing inference, but not other strategies. Neural firing rates and latent population factors showed abrupt changes following trials that were informative of state transitions. These results identify a precise computation performed by OFC and reveal neural signatures of inference.

[https://www.cell.com/neuron/fulltext/S0896-6273\(25\)00805-0](https://www.cell.com/neuron/fulltext/S0896-6273(25)00805-0)

New Scientist

NEWS

Ancient silver goblet preserves oldest known image of cosmic creation

The images hammered into the sides of a goblet found in Palestine give us an idea of what people living more than 4000 years ago imagined the creation of the cosmos looked like.

<https://www.newscientist.com/article/2504102-ancient-silver-goblet-preserves-oldest-known-image-of-cosmic-creation/>

ARTICLES

BENJAMIN TAUB – We can finally hear the long-hidden music of the Stone Age

Ancient rock art was meant to be heard as well as seen and now acoustic archaeologists are bringing the sounds of prehistoric rituals to life.

<https://www.newscientist.com/article/2502898-we-can-finally-hear-the-long-hidden-music-of-the-stone-age/>

PLoS One

PAPERS

HUW S. GROUCUTT et al with MICHAEL D. PETRAGLIA – Novel archaeological and palaeontological findings in cave and palaeoriver landscapes of inland northeast Arabia

Knowledge about environmental change and the evolutionary history of hominins in Arabia has been rapidly developing over the last two decades. Interdisciplinary research on humans and environments across the vast and heterogenous landmass of the Arabian Peninsula remains, however, highly spatially uneven. Here we present the results of archaeological, hydro-geological, and palaeontological research in inland northeastern Arabia, a poorly studied area with diverse landscape features including caves, palaeorivers, and chert outcrops. Hominin use of the landscape appears to be sparse in comparison to other regions of Arabia, though archaeological evidence spanning from the Lower Palaeolithic to the historic era was identified, including finds from the Middle Palaeolithic, which is the most well represented period. The caves of inland northeast Arabia contain a rich record of past climate change in the form of speleothems, as well as abundant faunal assemblages. Our survey results highlight the significant potential of these records to cast light on environmental, faunal, and cultural changes over time while demonstrating regional variation across Arabia.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0337005>

IVAN PUGA-GONZALEZ et al – The rise and fall of religion: An agent-based model of secularisation, security and prosociality

The relationship between religion, society, and individual behaviour has been a subject of extensive inquiry, drawing upon a rich collection of historical and contemporary perspectives. The scientific study of religion at the social level has often found its roots in the foundational work of Durkheim (Durkheim, 1912), who posited that religion serves as a catalyst for social order and the promotion of prosocial behaviour. At the same time, Malinowski's observations regarding the connection between ritual and anxiety have led to a number of lines of inquiry that have come to extend to other aspects of religion. Yet, taken together, these two approaches create friction by simultaneously linking religion to low and high levels of environmental threats and anxiety. This becomes particularly relevant in discussions of secularisation in general and existential security in particular. This study embarks on a theoretical exploration of these approaches, connecting them through an agent-based computer simulation. By linking together some of the intricate mechanisms that underlie the dynamics of religion, prosociality, and anxiety, we aim to shed light on the conditions that give rise to highly religious societies and the subsequent decline in religiosity, with a view to the significance of central institutions that ensure cooperation without recourse to religion in this complex narrative.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0327674>

PNAS**PAPERS****LAURENT DAVIN, NATALIE D. MUNRO & LEORE GROSMAN – A 12,000-year-old clay figurine of a woman and a goose marks symbolic innovations in Southwest Asia**

Paleolithic representations of human–animal interaction are rare, with only a few painted or engraved examples recorded in Upper Paleolithic contexts, mostly from Europe. Such scenes, depicting real or imagined interactions, are of major importance for understanding a wide range of past human perspectives, starting with how people conceived of their ontological relationship with the environment and nonhuman beings. In the Early Neolithic in Southwest Asia, shifts in perspective led human communities to manipulate and transform their environment while simultaneously depicting new forms of art featuring human–animal interactions. Here, we describe the recent discovery of the earliest figurine depicting a human–animal interaction—a woman and a goose—from the Late Epipaleolithic (c. 12,000 years cal. BP) village of Nahal Ein Gev II in northern Israel. The artistic techniques and raw materials that were used and the mythological scene that was depicted appear earlier than previous examples, foreshadowing the more monumental changes in symbolic expression that occur in the following Neolithic periods. Through technological, archaeometric, and dermatoglyphic analyses, we demonstrate that this unique figurine was meticulously modeled from clay using innovative techniques that created perspective using form and light. Importantly, the figurine captures a mythological scene between the woman and the goose that is consistent with an animistic belief system. Through our combined multidisciplinary approach, this study provides important original data regarding the antiquity and development of symbolic expression using clay at the end of the Epipaleolithic at a crossroads between early sedentary and fully Neolithic societies in Southwest Asia.

<https://www.pnas.org/doi/abs/10.1073/pnas.2517509122>

Science**PAPERS****INBAL ARNON et al with W. TECUMSEH FITCH, SUSAN GOLDIN-MEADOW & SIMON KIRBY – What enables human language? A biocultural framework**

Explaining the origins of language is a key challenge in understanding ourselves as a species. We present an empirical framework that draws on synergies across scientific disciplines to facilitate robust studies of language evolution. The approach is multifaceted, seeing language emergence as dependent on convergence of multiple capacities, each with their own evolutionary trajectories. It is explicitly biocultural, recognizing and incorporating the importance of both biological preparedness and cultural transmission as well as interactions between them. Biocultural and multifaceted perspectives are increasingly appreciated, but there remains a need to integrate them within a unified framework and demonstrate how this advances understanding. We do so in this paper through three case studies examining the evolution of different facets of human language (vocal production learning, linguistic structure, and social underpinnings), each synthesizing the latest findings from multiple fields to generate valuable insights and setting a new agenda for future research.

<https://www.science.org/doi/10.1126/science.adq8303>

The Innovation**PAPERS****JIEYANG PENG et al – Insights into Knowledge Evolution based on Semantic Representation and Dynamic Visual Analytics**

In the field of knowledge science, understanding the structure and dynamic evolution of knowledge is essential for advancing disciplinary development and anticipating research trends. However, current methodologies lack a unified semantic framework for the structured representation of knowledge, which impedes the quantitative analysis of its evolution and

limits the ability to uncover complex relationships among knowledge entities. To bridge these gaps, we propose a structured knowledge representation method based on semantic embedding, enabling a deeper and more consistent understanding of semantic relationships within knowledge units. Building on this foundation, we introduce the concept of Knowledge Transfer Flow to quantitatively analyze and visualize the dynamic evolution of knowledge hotspots over time, revealing the underlying mechanisms that drive knowledge transformation. Furthermore, we develop the KnowFlowViz System, which leverages interactive visual analytics to uncover intricate structural patterns and evolutionary dynamics within knowledge systems, thereby supporting decision-making and guiding future research directions. Our study reveals that established knowledge domains (such as long-standing disciplines) tend to maintain their dominant positions, while newly emerging knowledge entities often preferentially connect with these domains to form interdisciplinary linkages. This phenomenon of advantage accumulation and preferential attachment accelerates the growth and recognition of newcomers. The findings underscore the importance of fostering a more equitable and inclusive knowledge network, and they support the development of policies that nurture emerging disciplines and sustain a diverse, vibrant knowledge ecosystem.

[https://www.cell.com/the-innovation/fulltext/S2666-6758\(25\)00382-0](https://www.cell.com/the-innovation/fulltext/S2666-6758(25)00382-0)

Trends in Cognitive Sciences

PAPERS

IDO SHALEV & FLORINA UZEFOVSKY – Empathic disequilibrium: theoretical implications and clinical relevance

Empathy is central to social cognition, yet efforts to link it with neurodiverse and clinical conditions have yielded contradictory findings, often reinforcing a deficit-focused narrative that conflicts with individuals' experiences. While traditional models distinguish cognitive (understanding others' emotions) from emotional empathy (being affected by others' emotions), they often neglect how their interplay shapes individual outcomes. Addressing these limitations, this article focuses on the emerging concept of empathic disequilibrium, the intrapersonal imbalance between cognitive and emotional empathy. We synthesise current evidence linking empathic disequilibrium with individual differences in autistic traits and mental health, discuss its potential mechanisms, and propose a framework that recognises empathy as a multifaceted system with interacting components, with implications for advancing theory and practice across cognitive sciences.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(25\)00289-X](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(25)00289-X)

A. ROSS OTTO, ANDREW WESTBROOK & JEAN DAUNIZEAU – Why is cognitive effort experienced as costly?

A widespread observation is that people avoid mentally effortful courses of action, and much recent work examining cognitive effort has explained subjective effort evaluation – and, consequently, preferences – in economic terms, which assumes that the expenditure of cognitive effort is experienced as costly. However, this economic perspective is largely tacit about the source of these costs. Here, we review recent theoretical treatments of effort costs, which take vastly different perspectives (information-theoretic, psychological, and biological) to explain how the subjective experience of cognitive effort arises from controlled information processing, exploring their predictions concerning the simple observation that people experience tasks with high (versus low) working memory demands as costly. Finally, we identify open questions that might help bridge across these accounts.

[https://www.cell.com/trends/cognitive-sciences/abstract/S1364-6613\(25\)00287-6](https://www.cell.com/trends/cognitive-sciences/abstract/S1364-6613(25)00287-6)

Trends in Ecology and Evolution

PAPERS

STINE KEIBEL BLOM, CHRISTY ANNA HIPSLEY & GUOJIE ZHANG – Phenotypic signatures of incomplete lineage sorting in hominids

Incomplete lineage sorting (ILS) generates widespread genomic discordance in rapidly radiating lineages, yet its phenotypic impacts remain poorly understood. Among hominids, over 30% of the human genome supports conflicting phylogenetic trees due to ILS, affecting numerous genes with morphological functions. We present a trait-based approach integrating comparative morphology, population genomics, and functional experiments to identify and validate ILS-affected traits in hominids, often interpreted as convergent adaptations. Phylogenetically incongruent traits are frequent in the craniofacial and appendicular skeletons, highlighting priority areas for ILS investigation and ascertainment bias. This approach requires collaborative models bridging morphological and genomic data gaps in non-human hominid research, illuminating the forces shaping great ape evolution and establishing a roadmap for exploring ILS consequences in diverse taxonomic groups.

[https://www.cell.com/trends/ecology-evolution/abstract/S0169-5347\(25\)00294-0](https://www.cell.com/trends/ecology-evolution/abstract/S0169-5347(25)00294-0)

JAIME GRIMM et al – Co-producing knowledge with Indigenous Peoples: challenges and solutions for academic institutions

Co-producing knowledge with Indigenous partners may be required for research on Indigenous Lands and Waters. However, academic paradigms challenge the development and maintenance of partnerships with Indigenous communities. As researchers with experience co-producing knowledge with Indigenous partners, we share challenges to this work and provide actionable solutions for academic institutions.

[https://www.cell.com/trends/ecology-evolution/abstract/S0169-5347\(25\)00297-6](https://www.cell.com/trends/ecology-evolution/abstract/S0169-5347(25)00297-6)

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