EAORC BULLETIN 1,174 – 14 December 2025

CONTENTS

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

JOHN TEMPLETON FOUNDATION – The Varieties of Generosity

Generosity is a peculiar phenomenon. Researchers in recent years have observed, analyzed, and classified seemingly "generous" behavior—they have run experiments, drawn conclusions, and gained insight—but there's a limit: no human can see inside another's heart. For philosophers like Wake Forest University's Dr. Christian Miller, however, accounting for the heart is critical.
https://www.templeton.org/news/the-varieties-of-generosity

NATURE BRIEFING – Podcast: Neanderthals made fire ages ago

Neanderthals might have been lighting their own fires 400,000 years ago — 350,000 years earlier than thought. Among other evidence, "one of the remarkable things is that we also found iron pyrite", archaeologist Nick Ashton tells the Nature Podcast. Iron pyrite is a well-known fire-starting tool, but very rare where it was found at the site in Barnham, England. "The implication is that humans brought the pyrite specifically to Barnham to make fire."
https://www.nature.com/articles/d41586-025-04059-4

SAPIENS – The Tomb That Told of a Women's Kingdom

An archaeologist unspools the story of a female leader buried over 1,000 years ago on the Tibetan Plateau.
https://www.sapiens.org/archaeology/ancient-female-leader-tibet-tomb-gurugyam-cemetery/

SCIENCEADVISER – Artificial Intelligence: Bots can change minds with facts—even facts they make up

People often say that facts don't change minds—if you want to get that one uncle of yours to vote differently, you have to do more than simply provide the evidence for your position. But apparently, if the information comes from a chatbot, it can be enough.
Researchers surveyed thousands of people in the U.S., U.K., Canada, and Poland about their preferred candidates or policy positions in an upcoming election. Then, the participants spent several minutes conversing with a chatbot that was instructed to either coax them to change their choice or further cement it using several different strategies. When the researchers followed up a month later, they discovered that these brief conversations could potentially shift election results by up to 15 percentage points—and it was by spewing information, not making emotional appeals or telling good stories, that the bots changed minds. "Even for attitudes about presidential candidates, which are thought to be these very hard-to-move and solidified attitudes, the conversations with these models can have much bigger effects than you would expect based on previous work," social scientist David Rand, a co-author on the papers published last week in Nature and Science, told New Scientist.
At the same time, the more info a chatbot provided, the more likely it was to say something untrue. Ultimately, between 15% and 40% of the claims made by the bots were false. "If you need a million facts, you eventually are going to run out of good ones and so, to fill your fact quota, you're going to have to put in some not-so-good ones," explained Rand to Science News. Taken together, the findings suggest AI could become "a very dangerous thing," computational scientist Lisa Argyle told Nature. "Instead of people becoming more informed, it's people becoming more misinformed." Therefore, "researchers, policymakers, and citizens alike need to urgently attend to the potential negative effects of AI-propagated misinformation in the political sphere and how to counteract it," she wrote in a related Science Perspective.
https://www.science.org/doi/10.1126/science.aea3884
https://www.nature.com/articles/s41586-025-09771-9

SCIENCEADVISER – Neanderthals' nose not for cold

One suggestion for why Neanderthals had much larger noses than our species was that they were adapted for colder air. But an extremely well-preserved skull refutes this notion. "What we found is that, yes, Neanderthals had bigger noses, but that the inner structure of their noses was not so different from our own," explained one of the researchers. "They were simply larger, and worked more efficiently."
https://www.pnas.org/doi/10.1073/pnas.2426309122

SCIENCEADVISER – Neanderthals made fire

When I was growing up, Neanderthals were portrayed as more ape than human. It's been fascinating watching our understanding of them shift from languageless brutes to being so much like us that they figured out how to make fire.
https://www.nytimes.com/2025/12/10/science/archaeology-humans-neanderthals-fire.html

PUBLICATIONS

Current Biology

PAPERS

MARCO FELE et al – Dominant baboons experience more interrupted and less rest at night

Sleep is a fundamental biological process. The amount and quality of sleep individuals get can impact various aspects of human and non-human animal health, ultimately affecting fitness. For wild animals that sleep in groups, individuals may disturb one another's sleep, but this aspect of social sleep has been understudied due to methodological challenges. Here, using nighttime rest (absence of bodily movements) as a proxy for sleep, we test the hypothesis that an individual's social dominance affects nighttime rest in a troop of wild, highly hierarchical chacma baboons (Papio ursinus). First, we show that the troop's nighttime rest (determined by 40 Hz acceleration data) is highly synchronized. Next, we link nighttime rest dynamics to daytime spatial networks and dominance hierarchy (from 1 Hz GPS data and direct observations). We show that baboon nighttime states (activity and rest) are more synchronized between similarly ranked individuals and, unexpectedly, that more dominant baboons experience more interrupted and less nighttime rest than lower-ranked baboons. We propose that this hierarchy effect is explained by higher-ranked baboons resting closer to more group members, which leads them to exert a greater influence on each other's nighttime behavior compared with lower-ranked individuals. Our study provides the first evidence for the impact of social hierarchies on aspects of sleep in a wild primate, suggesting that dominance status may impose trade-offs between social rank and the quality and quantity of sleep.
https://www.cell.com/current-biology/fulltext/S0960-9822(25)01336-3

CLARA HOZER et al with KLAUS ZUBERBÜHLER – Rank and social context influence sleep in wild chimpanzees

Sleep is subject to Darwinian fitness and thereby constrained by ecological and social factors. Nevertheless, most comparative research on sleep is conducted in laboratory settings, detached from environmental and social influences, which is problematic for evolutionary theories. We examined the natural sleeping patterns of wild chimpanzees in Budongo Forest, Uganda, using a remote-controlled, infrared camera system. We found that sleep in chimpanzees was significantly affected by social factors, including the sleeper's own rank and the composition of the nearby sleeping party. Nesting in groups increased sleep duration and decreased sleep fragmentation compared with sleeping alone, despite the fact that it delayed nesting times and advanced wake times. Rank had little impact on female sleep but a strong influence on male sleep, with high-ranking males generally experiencing shorter and more fragmented sleep compared with subordinate males. The presence of sexually active females also reduced sleep duration, by delaying nest building, advancing wake time, and increasing sleep fragmentation. Our data show that natural sleep patterns in chimpanzees are largely determined by social variables that continue to exert their influence into the night. We discuss the implications of studying sleep patterns of our closest relatives in ecologically and socially valid situations for future research on the evolution of sleep.
https://www.cell.com/current-biology/fulltext/S0960-9822(25)01564-7

eLife

PAPERS

ANTONIO LEITAO et al – Evidence of social learning across symbolic cultural barriers in sperm whales

Reviewed Preprint v3 December 9, 2025, Revised by authors

We provide quantitative evidence suggesting social learning in sperm whales across socio-cultural boundaries, using acoustic data from the Pacific and Atlantic Oceans. Traditionally, sperm whale populations are categorized into clans based on their vocal repertoire: the rhythmically patterned click sequences (codas) that they use. Among these codas, identity codas function as symbolic markers for each clan, accounting for 35-60% of codas they produce. We introduce a computational method to model whale communication, which encodes rhythmic micro-variations within codas, capturing their vocal style. We find that vocal style-clans closely align with repertoire-clans. However, contrary to vocal repertoire, we show that sympatry increases vocal style similarity between clans for non-identity codas, i.e. most codas, suggesting social learning across cultural boundaries. More broadly, this subcoda structure model offers a framework for comparing communication

systems in other species, with potential implications for deeper understanding of vocal and cultural transmission within animal societies.
https://elifesciences.org/reviewed-preprints/96362

EUGENIO PIASINI et al – How Occam's razor guides human decision-making
Reviewed Preprint, v1December 9, 2025, Not revised
Occam's razor is the principle that, all else being equal, simpler explanations should be preferred over more complex ones. This principle is thought to guide human decision-making, but the nature of this guidance is not known. Here we used preregistered behavioral experiments to show that people tend to prefer the simpler of two alternative explanations for uncertain data. These preferences match predictions of formal theories of model selection that penalize excessive flexibility. These penalties emerge when considering not just the best explanation but the integral over all possible, relevant explanations. We further show that these simplicity preferences persist in humans, but not in certain artificial neural networks, even when they are maladaptive. Our results imply that principled notions of statistical model selection, including integrating over possible, latent causes to avoid overfitting to noisy observations, may play a central role in human decision-making.
https://elifesciences.org/reviewed-preprints/109113

RUIDA ZHU et al – Human neurocomputational mechanisms of guilt-driven and shame-driven altruistic behavior
Version of Record, December 9, 2025
Although prior research has examined the psychological and neural correlates of guilt and shame, the cognitive antecedents that trigger them, as well as their transformation into social behavior, remain insufficiently understood. We developed a novel task to investigate how two cognitive antecedents, harm and responsibility, elicit guilt and shame, and how these emotions subsequently drive compensatory behavior, by combining functional magnetic resonance imaging (fMRI) with computational modeling in human participants. Behaviorally, we found that harm had a stronger impact on guilt, whereas responsibility had a stronger impact on shame. Moreover, compared to shame, guilt exerted a greater effect on compensation. Computational modeling results indicated that the integration of harm and responsibility by individuals is consistent with the phenomenon of responsibility diffusion. The fMRI results revealed that brain regions associated with inequity representation (posterior insula) and value computation (striatum) encode this integrated measure. Individual differences in responsibility-driven shame sensitivity were associated with activity in theory-of-mind regions (e.g. temporoparietal junction). Guilt-driven and shame-driven compensatory behavior recruited distinct neural substrates, with shame-driven compensatory sensitivity being more strongly linked to activity in the lateral prefrontal cortex, a region implicated in cognitive control. Our findings provide computational, algorithmic, and neural accounts of guilt and shame.
https://elifesciences.org/articles/107223

Frontiers in Computer Science

PAPERS

DIMOSTHENIS KONTOGIORGOS & DAVID SCHLANGEN – Beyond speech: leveraging mouse movements for information adaptation in voice interfaces
As human speakers naturally adapt their linguistic styles to one another, voice user interfaces that prompt similar linguistic adaptations can augment human-like interaction. In this study, we leverage a corpus of human instructions to model the effectiveness of incremental instruction generation in artificial agents. Participants interacted with agents that guided them in selecting virtual puzzle pieces, varying the amount of information provided in each instruction. Through an empirical examination of the Gricean maxims in utterance construction, our initial perception study highlighted the significance of adaptive instruction generation. By employing mouse movements as a proxy for user understanding, we developed computational models that enabled agents to detect user uncertainty and refine instructions incrementally. Comparing speaker-based and listener-based models, we found that agents encouraging linguistic adaptations were preferred by users. Our findings offer new insights into the value of mouse movements as indicators of user comprehension and introduce a methodological framework for developing adaptive interactive systems that generate instructions dynamically.
https://www.frontiersin.org/journals/computer-science/articles/10.3389/fcomp.2025.1634228/full

Frontiers in Neuroimaging

PAPERS

LUIS MARTINEZ AGULLEIRO et al – Brain plasticity underlying acquisition of new organizational skills in children: A Rashomon analysis
We used resting-state functional magnetic resonance imaging to identify changes in brain functional connectivity (FC) associated with Organizational Skills Training (OST).
In an open, waitlist-controlled, randomized clinical trial (NCT04108273), 51 children aged 8–12 years with deficient organizational skills were assigned to immediate tele-health OST treatment (twice weekly, 10 weeks) or waitlist. We obtained

Children's Organizational Skills Scale-Parent version (COSS-P) scores and examined FC changes between dorsal anterior cingulate cortex (dACC) and preregistered subcortical anterior ventral striatum (aVS) regions-of-interest.
OST produced significantly lower COSS-P scores compared to waitlist, with a large effect size (Cohen's f2 = 0.77). Initial imaging analyses revealed a significant increase (instead of the predicted decrease) in FC between dACC and the aVS component of the default mode network in the immediate treatment group (ΔFC = 0.092 ± 0.041, 95% CI [0.009, 0.175], $p < 0.05$). Analyses were then performed with two additional analytic pipelines, neither of which detected any significant effects.
Although improvements in organizational deficits were associated with increased FC within a circuit linking dACC and the default mode network region of the aVS in one analysis, the direction was the opposite of predicted and results did not replicate. Thus, we highlight the tentativeness of our findings; we have de-identified all the data and made it available for investigators to examine and to combine with other datasets in mega- and meta-analyses. Future studies should also include alternative control conditions and larger samples.
https://www.frontiersin.org/journals/neuroimaging/articles/10.3389/fnimg.2025.1671310/full

Frontiers in Veterinary Science

PAPERS

DANIEL MOTA-ROJAS et al with TEMPLE GRANDIN – The enriched mind: cognitive stimulation and behavior in non-human primates

Non-human primates (NHPs) possess high cognitive abilities that enable them to respond effectively to complex social, ecological, and psychological challenges. These abilities need to be stimulated in non-human primates under human care in zoos, conservation centers/sanctuaries, or research facilities, where stereotypies and behavioral and/or psychobiological disturbances are frequently associated with captivity. Cognitive enrichment (CE), a type of environmental enrichment that facilitates decision-making skills, problem-solving, and control over the environment, is one way to promote primate welfare by encouraging engagement in cognitive tasks. Currently, non-technological and technological cognitive enrichments are implemented for NHPs under human care to enhance positive behavioral responses and prevent negative emotional states such as boredom or stress. The present review aims to analyze the benefits that CE provides to NHPs (including monkeys and great apes), highlighting its relevance to research, conservation, and ethical management in controlled environments.
https://www.frontiersin.org/journals/veterinary-science/articles/10.3389/fvets.2025.1724923/full

Interface Focus

PAPERS

KATE J. JEFFERY – Why is complexification time-asymmetric? Available to Purchase

Why do order and complexity arise in a Universe obeying the Second Law of Thermodynamics? This apparent paradox is resolved by recognizing that entropy, a microscopic dissipative process, and disorder, a macroscopic process, are different, although both are directional across time. This think-piece investigates the directionality of complexification. It describes complexity using the borrowed term 'phase space', characterizing structures in terms of their interactions across space and time, independently (sometimes) of the underlying physical substrate. Phase space size reflects the number of available interactions, and loosely equates to complexity. Structures can pass through 'portals'—significant interactions that change the size of their phase space. While portals can lead to larger or smaller phase spaces, it is easier to progress into a smaller space than a larger one because there are more smaller ones; a fact that becomes increasingly true as complexification develops. This asymmetry accounts for why ordered systems seem to progress more often to disorder than the reverse over local timescales. This formulation is used to examine the evolution in living things of spatial representation, memory and language, finishing with consideration of what phase space lies on the far side of the AI portal we have recently reached.
https://royalsocietypublishing.org/rsfs/article-abstract/15/5/20250017/364115/Why-is-complexification-time-asymmetric

NICHOLE LEVESLEY, DANIEL W. MCSHEA & GUNNAR BABCOCK – Evolving systems and directionality Open Access

Evolving systems in both the life and physical sciences are often thought to be directional. The processes that drive the evolution of systems are diverse, ranging from natural selection to thermodynamics. However, in many treatments of these processes, the different kinds of directionality and types of ends that evolving systems trend towards are often either poorly specified or implicitly assumed. This paper aims to provide a classification of ends and directional processes that can be used to identify and characterize directionality in evolving systems. Specifically, we propose that directional evolution can be either terminal or perpetual, with perpetual further divided into targeted or open-ended. Additionally, we caution against conflating organization, order, and complexity, as each tracks different properties of a directional system.
https://royalsocietypublishing.org/rsfs/article/15/5/20250018/364118/Evolving-systems-and-directionality

iScience

PAPERS

ALICE GALOTTI et al – Social engagement modulates wild monkeys' vocal expressions and the behavioural response to that of others

Animal vocal communication relies on the dynamic interaction between emitter and receiver, with signals shaped within a social and embodied context. To fully understand how such interactive processes operate, we used yawn vocalizations of geladas (Theropithecus gelada), a species showing exceptional yawning variability. We first examined yawn calls produced in three contexts: high-intensity social, low-intensity social, and non-social context and found clear acoustic differences among them, revealing context-dependent modulation in a typically stereotyped behaviour. We conducted field playback experiments exposing wild geladas to unfamiliar male yawn vocalizations emitted in the three contexts. During playbacks, monkeys gazed more at the loudspeaker when yawns originated from a social rather than a non-social context, indicating that animals perceive the stimuli's differing nature. Although yawn responses did not vary across contexts, contagion was higher when geladas were grooming during test, suggesting that positive social engagement enhances, rather than reduces, susceptibility to contagion.
https://www.cell.com/iscience/fulltext/S2589-0042(25)02669-0

Journal of the Royal Society Interface

PAPERS

LING-WEI KONG et al – A brief natural history of misinformation Open Access

The idea that organisms benefit by acquiring information through social connections is a cornerstone of our understanding of social evolution and collective behaviour. Yet, while learning about the world through social ties can confer many benefits, these connections can also serve as conduits for misinformation. Studies of misinformation in human social systems are rapidly proliferating, yet our understanding of the biological origins of misinformation remains surprisingly limited. In this review, we survey examples of socially transmitted misinformation across biological systems. Our central findings are (i) that the transmission and use of misinformation is widespread in biological systems spanning levels of organization, and (ii) that the production and transmission of misinformation is probably an inevitable property that inherits from fundamental constraints on biological communication systems, rather than a pathology that lies apart from the normal functioning of such systems. In this light, we argue that there is a need for a more integrated theoretical and empirical science of misinformation in biology. We end by highlighting four emerging questions about misinformation and its role in driving ecological and evolutionary dynamics that this new field of inquiry should address.
https://royalsocietypublishing.org/rsif/article/22/233/20250161/364004/A-brief-natural-history-of-misinformation

Linguistic Anthropology

PAPERS

OLE PÜTZ – Co-textual dopes: How LLMs produce contextually appropriate text in chat interactions with humans without access to context

This paper asks how LLM-based systems can produce text that is taken as contextually appropriate by humans without having seen text in its broader context. To understand how this is possible, context and co-text have to be distinguished. Co-text is input to LLMs during training and at inference as well as the primary resource of sense-making for humans in interaction, collaboratively produced by both human and machine during chat. Systems can also passively participate in contextualization, insofar as cues are found in the co-text and the user guides the system as to what is the appropriate context for them.
https://anthrosource.onlinelibrary.wiley.com/doi/full/10.1111/jola.70036

Nature

ARTICLES

ILINA BHAYA-GROSSMAN – The brain's speech centre responds to universal and specific features of language

This is a summary of: Bhaya-Grossman, I. et al. Shared and language-specific phonological processing in the human temporal lobe. Nature https://doi.org/10.1038/s41586-025-09748-8 (2025). {EAORC BULLETIN 1,171}

More than 7,000 languages are spoken around the world, but the human brain becomes highly specialized to process speech in an individual's own language. Recordings from human brains reveal the shared and language-specific neural mechanisms that arise in the superior temporal gyrus to achieve this feat.
https://www.nature.com/articles/d41586-025-03827-6

SÉGOLÈNE VANDEVELDE – Oldest known evidence of the controlled ignition of fire

A 400,000-year-old site excavated in England reveals signs of deliberate fires made using the mineral iron pyrite to produce sparks.
https://www.nature.com/articles/d41586-025-03735-9

NICK PETRIĆ HOWE & ANNE MARIE CONLON – Neanderthals mastered fire — 400,000 years ago [PODCAST]
Archaeological evidence makes a compelling case for Neanderthal-created fires 400,000 years ago in Suffolk, UK — plus, how chatbots can sway the opinions of voters.
https://www.nature.com/articles/d41586-025-04059-4

PAPERS

ROB DAVIS et al with CHRIS STRINGER & NICK ASHTON – Earliest evidence of making fire
Fire-making is a uniquely human innovation that stands apart from other complex behaviours such as tool production, symbolic culture and social communication. Controlled fire use provided adaptive opportunities that had profound effects on human evolution. Benefits included warmth, protection from predators, cooking and creation of illuminated spaces that became focal points for social interaction. Fire use developed over a million years, progressing from harvesting natural fire to maintaining and ultimately making fire. However, determining when and how fire use evolved is challenging because natural and anthropogenic burning are hard to distinguish. Although geochemical methods have improved interpretations of heated deposits, unequivocal evidence of deliberate fire-making has remained elusive. Here we present evidence of fire-making on a 400,000-year-old buried landsurface at Barnham (UK), where heated sediments and fire-cracked flint handaxes were found alongside two fragments of iron pyrite—a mineral used in later periods to strike sparks with flint. Geological studies show that pyrite is locally rare, suggesting it was brought deliberately to the site for fire-making. The emergence of this technological capability provided important social and adaptive benefits, including the ability to cook food on demand—particularly meat—thereby enhancing digestibility and energy availability, which may have been crucial for hominin brain evolution.
https://www.nature.com/articles/s41586-025-09855-6

Nature Communications

PAPERS

SHIR GENZER et al – Directional bias in interpersonal emotion perception
[We are providing an unedited version of this manuscript to give early access to its findings. Before final publication, the manuscript will undergo further editing. Please note there may be errors present which affect the content, and all legal disclaimers apply.]
Accurately understanding others' emotional states is fundamental to effective social functioning. While extensive research exists on how humans recognize different emotions, little is known about how people assess emotional intensity. Through a preliminary survey and seven multi-site studies (n = 2866), we demonstrate that despite believing they gauge emotions accurately, systematic discrepancies emerge: individuals tend to rate others' emotions as more intense than those individuals rate themselves, particularly for negative emotions. This bias persists across text-based interactions, recorded videos, and live conversations, with both strangers and romantic partners. Interestingly, while people report preferring accurate judgments of their own emotional intensity, the discrepancy may serve adaptive functions, predicting higher empathic responses with strangers and greater relationship satisfaction in romantic relationships. These findings advance understanding of discrepancies in interpersonal emotional perception, highlighting their potential adaptive roles and providing insight into how they shape our social world and relationship outcomes.
https://www.nature.com/articles/s41467-025-66879-2

Nature Communications Earth & Environment

PAPERS

MICHAEL K. GAGAN et al – Onset of summer aridification and the decline of Homo floresiensis at Liang Bua 61,000 years ago
The cause of the disappearance of the primitive hominin Homo floresiensis from the Indonesian island of Flores about 50,000 years ago is a key question in palaeoanthropology. While the potential roles of climate change and human agency continue to be debated, the history of freshwater availability essential for survival at the type locality, Liang Bua, remains poorly understood. Although speleothem δ18O is widely used to reconstruct monsoon rainfall, variations in summer and winter rainfall, with distinct δ18O values, can complicate interpretations of mean annual rainfall. Here, we combine speleothem Mg/Ca, a proxy for local rainfall, with δ18O to determine annual, summer and winter rainfall amounts concurrent with H. floresiensis and Stegodon, one of its primary prey. Geochemical modelling of the Mg-18O system reveals a sustained decline in mean annual rainfall from ~1560 to 990 mm between 76,000 and 61,000 years ago. Critically, summer rainfall decreased to a record low of ~450 mm at 61,000–55,000 years ago, alongside a marked decline in both the abundance and relative proportion of Stegodon remains in the fossil record. These findings increase the likelihood that progressive landscape aridification, and intensified human-faunal competition for dwindling resources, culminated in abandonment of Liang Bua.
https://www.nature.com/articles/s43247-025-02961-3

Nature Communications Medicine

PAPERS

MARIA R. LIMA et al – Evaluating spoken language as a biomarker for automated screening of cognitive impairment

[We are providing an unedited version of this manuscript to give early access to its findings. Before final publication, the manuscript will undergo further editing. Please note there may be errors present which affect the content, and all legal disclaimers apply.]

Timely and accurate assessment of cognitive impairment remains a major unmet need. Speech biomarkers offer a scalable, non-invasive, cost-effective solution for automated screening. However, the clinical utility of machine learning (ML) remains limited by interpretability and generalisability to real-world speech datasets.

We evaluate explainable ML for screening of Alzheimer's disease and related dementias (ADRD) and severity prediction using benchmark DementiaBank speech (N = 291, 64% female, 69.8 ± 8.6 years). We validate generalisability on pilot data collected in-residence (N = 22, 59% female, 76.2 ± 8.0 years). To enhance clinical utility, we stratify risk for actionable triage and assess linguistic feature importance.

We show that a Random Forest trained on linguistic features for ADRD detection achieves a mean sensitivity of 69.4% (95% confidence interval (CI) = 66.4–72.5) and specificity of 83.3% (78.0–88.7). On pilot data, this model yields a mean sensitivity of 70.0% (58.0–82.0) and specificity of 52.5% (39.3–65.7). For prediction of Mini-Mental State Examination (MMSE) scores, a Random Forest Regressor achieves a mean absolute MMSE error of 3.7 (3.7–3.8), with comparable performance of 3.3 (3.1–3.5) on pilot data. Risk stratification improves specificity by 13% on the test set, offering a pathway for clinical triage.

Linguistic features associated with ADRD include increased use of pronouns and adverbs, greater disfluency, reduced analytical thinking, lower lexical diversity, and fewer words that reflect a psychological state of completion.

Our predictive modelling shows promise for integration with conversational technology at home to monitor cognitive health and triage higher-risk individuals, enabling early screening and intervention.

https://www.nature.com/articles/s43856-025-01263-1

Nature Scientific Data

PAPERS

ERI KASHIMA, FRANCESCA DI GARBO, OONA RAATIKAINEN et mul – A curated global dataset of social contact between diverse language communities

[We are providing an unedited version of this manuscript to give early access to its findings. Before final publication, the manuscript will undergo further editing. Please note there may be errors present which affect the content, and all legal disclaimers apply.]

The GramAdapt Social Contact Dataset is a curated dataset of 34 language pairs with qualitative and quantifiable data on social interaction and aspects of societal multilingualism. The language pairs were sampled globally to represent the world's linguistic diversity. The dataset can be used to interrogate the social dimensions of language contact independently or in conjunction with appropriate linguistic data. The data were collected by distributing a questionnaire to experts who have experience with either one or both of the language communities of a pair. The data represent subjective expert assessments based on choices from predetermined answers which can be quantified. Authors 1, 2 and 3 manually checked the response to identify possible misjudgments or misunderstandings. This results in a dataset containing 13,493 data points. This dataset is a first of its kind in the field of linguistics, built upon wide findings from sociolinguistics, historical linguistics, psycholinguistics, and linguistic anthropology.

https://www.nature.com/articles/s41597-025-06192-1

Nature Scientific Reports

PAPERS

NIRA ALPERSON-AFIL & RIVKA RABINOVICH – Decoding Natufian mortuary practices through the taphonomy of an experimental burial

The intentional burial of the dead emerged around 120,000 years ago, but it was with the Levantine Natufian culture (ca. 15 ka BP) that we see stone-constructed graves in designated burial sites. The Natufian investment of effort and resources prompts an inquiry into the motivations for such elaborate burials. This paper addresses this by presenting an experimental burial of a wild boar in a Natufian-like grave. The experiment provides data on post-depositional processes characteristic of such graves and offers insights into the potential incentives for their construction. The experiment demonstrated that while a constructed grave offers protection, the decomposition, gravity, and larval activity induce various modifications to both the grave and its content, including changes in shape and size and stone and bone displacement. We conclude that Natufian mortuary practices reflect a deep understanding of postmortem changes, which drove them to construct graves primarily for the protection of their dead. The demanding challenges and time constraints of postmortem bodily modifications emphasized the need for a robust social network. Only through collective effort and shared ritual engagement could Natufians manage the complex treatment of their dead and their grave construction. These dynamic mortuary practices actively contributed to the formation and development of their social structures and networks.

https://www.nature.com/articles/s41598-025-27181-9

New Scientist

NEWS

Ancient human artefacts found near caves in Arabian desert
Today, the deserts of the Arabian peninsula are inhospitable – but 100,000 years ago, the area was full of animals and ancient humans.
https://www.newscientist.com/article/2506818-ancient-human-artefacts-found-near-caves-in-arabian-desert/

Mark Zuckerberg's face put on top of robotic dog for art installation
The Meta founder was one of six real-life figures to have a waxwork of his head placed on top of a robotic dog at Art Basel in Miami, Florida, by the artist Beeple.
{It looks weird and unnatural, but fortunately the robot-dog body takes it out of the uncanny valley.}
https://www.newscientist.com/article/mg26835732-400-mark-zuckerbergs-face-put-on-top-of-robotic-dog-for-art-installation/

ARTICLES

MICHAEL MARSHALL – Did ancient humans start farming so they could drink more beer?
New evidence suggests that alcohol was a surprisingly big motivator in our monumental transition from hunting and gathering to farming – but was beer really more important to us than bread?
https://www.newscientist.com/article/2501758-did-ancient-humans-start-farming-so-they-could-drink-more-beer/

MICHAEL MARSHALL – 2025 was chock full of exciting discoveries in human evolution
From an incredible series of revelations about the ancient humans called Denisovans to surprising discoveries about tool making, this year has given us a clearer picture of how and why humans evolved to be so different from other primates.
https://www.newscientist.com/article/2507618-2025-was-chock-full-of-exciting-discoveries-in-human-evolution/

Physics of Life Reviews

COMMENTARIES

HÉCTOR M. MANRIQUE & ANA MAGDALENA HURTADO – Informational inbreeding: a useful concept to add to extant evolutionary theories: Comment on "Homo informatio" by Michael J. Walker
[Original paper: MICHAEL J. WALKER – "Homo informatio", EAORC BULLETIN 1,172, https://www.sciencedirect.com/science/article/pii/S1571064525001502]
https://www.sciencedirect.com/science/article/abs/pii/S1571064525001824

PLoS Biology

PAPERS

HEUNGJIN RYU et al – Male bonobo mating strategies target female fertile windows despite noisy ovulatory signals during sexual swelling
In most mammals, female sexual receptivity (estrus) closely coincides with ovulation, providing males with precise fertility signals. However, in some anthropoid primates living in multi-male societies, females display extended receptivity along with exaggerated sexual swellings that probabilistically indicate ovulation. This raises the question about how males successfully time mating, particularly when ovulation is difficult to predict from such signals. To address this question in bonobos, we combined daily variation in swelling size, hormonal profiles, and male mating behaviors. By estimating day-specific ovulation probabilities relative to the onset and subsidence (detumescence) of maximal swelling, we also examined how male efforts correlate with female fertility. Our results revealed that while ovulation probability was widely distributed and difficult to predict when aligned with the onset of the swelling phase, male behavior was closely aligned with the conception probability. Males concentrated mating efforts late in the phase and stopped after detumescence. High-ranking males intervened in copulations involving females with higher conception probabilities, specifically those with maximal swelling and older infants. When multiple females exhibited maximal swelling, males preferentially followed females whose maximal swelling started earlier and who had older infants. Male–male aggression increased when there were more females with maximal swelling. However, this tendency was reversed when male party size exceeded the average. Importantly, our results revealed that the low predictability of ovulation is best explained by inter- and intra-individual variation in the length of maximal swelling phase, rather than ovulation occurring randomly within that phase in bonobos. Males effectively manage such a noisy signal by prioritizing late-phase ovulatory cues and integrating reproductive history, thereby extracting usable timing information. This behavioral mechanism helps explain the persistence of conspicuous yet noisy ovulatory signals in bonobos. Since males are capable of inferring ovulation timing even under noisy conditions, selection may not favor highly precise female signals. Instead, it shifts more of the time and energy costs onto males, allowing conspicuous female traits to be maintained.
https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3003503

PLoS One

PAPERS

ANTONIA M. WERNER-RICCETTI et al – The inner critical voice among university students and patients with depression – A linguistic analysis of self-criticism

Self-criticism is considered an important vulnerability factor for the development and maintenance of psychopathological symptoms. Mostly assessed as trait via self-report, information about its linguistic features is rare. The following study explored individual differences of self-criticism of 184 university students (84.2% female) and 45 inpatients in treatment for a depressive disorder (62.2% female). Participants verbalized self-critical thoughts after a standardized induction of negative emotions, talking out loud to themselves as their "inner critic". Participants' self-criticism was analyzed by conducting a linguistic analysis with a quantitative word count tool (Linguistic Inquiry and Word Count – LIWC). Self-criticism was also measured with an established self-report instrument, alongside measures of self-compassion and depressive symptoms for validation. Non-parametric Spearman rank correlations between the linguistic features of the "inner critic", self-reported self-criticism, self-compassion, and depressive symptoms have been conducted. Furthermore, group differences between university students and patients have been explored. In both subsamples, small significant relations between the language categories and self-reported self-criticism, self-compassion, and depressive symptoms became evident, ranging from $|\rho| = .13$ to $|\rho| = .39$. There were slightly different patterns in students and patients, indicating qualitative differences in clinically relevant self-criticism and non-pathogenic self-reflection. University students used significantly fewer pronouns than patients with depression when acting as their "inner critic" ($t = -5.14$, $p < .001$) and less negative emotion words ($t = -4.19$, $p < .001$), particularly words indicating sadness ($t = -3.18$, $p = .003$). Employing different assessment methods of self-criticism and comparing clinical and non-clinical samples adds valuable information for a better understanding of the cognitive-affective processes underlying self-criticism. The results can inform clinical practice and public mental health strategies aimed at promoting mental health and preventing or treating mental disorders.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0337220

YEN-PING CHANG, YU-SHAN CHIANG & CHUN-KUN WANG – Under renovation: Large-scale societal events induce shifts between moral ideologies

Existing research has revealed various cross-sectional inter-personal/group (e.g., regional) differences in moral traits; it has, however, paid less attention to cross-temporal intra-personal/group moral differences – simply, changes over time. Addressing the intellectual gap, the present research proposes that morality is redefined – renovated – in times when a society undergoes widespread social upheavals, in a manner that the incoming new ideology would better serve the society. Using longitudinal social media (Reddit) text data (N = 459,077,063) from Reddit over the 63 months since the last global great recession starting in late 2007, we report a partial, economy-focused demonstration of the hypothesis, wherein people associated their overall conception of morality more with support for authority and hierarchy and less with fairness and equality when the economic stress was increasing. In comparison, the public reversed the association to lean back on fairness and away from authority when the market was on the rise. Together, the findings offer insights into the communal nature of morality and call for caution that personal moral disposition may be malleable and fluctuating with the collective surroundings, thus cannot be adequately measured without first considering what the disposition means for the cultural-social unity at the moment.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0336520

MARIE-JOSÉE ANGUE ZOGO et al – Pahon Cave, Gabon: New insights into the Later Stone Age in the African rainforest

Although the Later Stone Age as a distinctive techno-cultural phase has disappeared, forager groups in the African rainforest persist today. However, their origins remain poorly understood. The absence of stone tool production raises questions about the pace and processes of its decline and its relationship to the emergence or adoption of metallic tools. Archaeological sequences from the Middle and Late Holocene are particularly valuable for documenting the coexistence of diverse subsistence strategies and technologies within the Central African rainforest. In this context, the Pahon Cave sequence, in Gabon, spanning a period from 7,571 cal. BP to 2,523 cal. BP, provides an opportunity to study the evolution of stone tool production in the rainforest of the Ogooué Basin. This chronological range coincides with significant broader techno-cultural and environmental changes in Central Africa. This article provides a detailed description of the lithic industry for each layer, along with the identification of faunal remains, giving insight into the exploitation of rainforest resources and hunting practices. At Pahon Cave, our findings suggest that stone tool technology remained stable over time, at least until around 2,523 cal. BP. Furthermore, the technological characteristics of the lithic industry indicate no clear cultural affiliations. These features contribute highlighting a techno-cultural diversity during the Middle and Late Holocene Later Stone Age in Atlantic Central Africa.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0336405

NIGINI OLIVEIRA et al with ANDREW N. MELTZOFF – Culturally-attuned AI: Implicit learning of altruistic cultural values through inverse reinforcement learning

Constructing a universal moral code for artificial intelligence (AI) is challenging because human cultures have different values, norms, and social practices. We therefore argue that AI systems should adapt to culture based on observation: Just as a child

raised in a particular culture learns the specific values, norms, and behaviors of that culture, we propose that an AI system operating in a particular human community could similarly learn them as well. How AI systems might accomplish this from observing and interacting with humans has remained an open question. Here, we propose using inverse reinforcement learning (IRL) as a method for AI agents to acquire culturally relevant values implicitly from humans. We test our approach using an experimental paradigm in which AI agents use IRL to learn different reward functions, which govern the agents' actions, by learning from variations in the altruistic behavior of human subjects from two cultural groups in an online game requiring real-time decision making. We show that an AI agent learning from a particular human cultural group can acquire the altruistic characteristics reflective of that group's average behavior, and can generalize to new scenarios requiring altruistic judgments. Our results provide a proof-of-concept demonstration that AI agents can be endowed with the ability to learn culturally-typical behaviors and values directly from observing human behavior.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0337914

DARREN CURNOE et al – A Late Pleistocene archaic human tooth from Gua Dagang (Trader's Cave), Niah national park, Sarawak (Malaysia)

The rarity of Late Pleistocene hominin remains from Insular Southeast Asia (ISEA) has hampered our ability to understand a crucial episode of human evolutionary history, namely, the global dispersal of Homo sapiens from Africa. Moreover, recent discoveries indicate a surprising level of taxic diversity during this time with at least two species—H. floresiensis and H. luzonensis—endemic to the region when H. sapiens first arrived. A third hominin dubbed the 'Denisovans' is shown from DNA evidence to have interbred with the ancestors of contemporary Indigenous populations across ISEA, New Guinea and Australia. Yet, the Denisovans have not been identified from the fossil record of the area despite recent breakthroughs in this regard on mainland East Asia. New excavations by our team at the Trader's Cave in the Niah National Park ('Niah Caves'), northern Borneo, have yielded an isolated hominin upper central permanent incisor dated with Optically Stimulated Luminescence dating of sediments to about 52 − 55 thousand years ago. Specimen SMD-TC-AA210 has a massive crown absolutely and relative to its root size, the crown is wide (mesiodistally) and relatively short (labiolingually). Morphologically, it exhibits a very strong degree of labial convexity, pronounced shovelling, and the bulging basal eminence exhibits several upward finger-like projections. Labial enamel wrinking on the enamel-dentine junction is expressed as two large ridges exhibiting numerous spine-like projections, and the lingual extensions on the enamel surface of the basal eminence are expressed as six extensions. This combination of crown size and morphological traits is not normally found in H. sapiens and instead characterises archaic members of Homo such as H. erectus, H. neanderthalensis and Middle Pleistocene hominins sharing a clade with H. heidelbergensis. The Trader's Cave tooth suggests that an archaic hominin population inhabited northern Borneo just prior to or coincident with the arrival of H. sapiens as documented at the nearby West Mouth of the Niah Great Cave.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0338786

CORRECTIONS

THE PLOS ONE STAFF – Correction: Potential evidence of reengagement attempts following interruptions of a triadic social game in bonobos and chimpanzees

{See EAORC Bulletin 1,137}

This article was republished on November 24, 2025, to correct Tables 2 and 3 because their legends were inverted. Please download this article again to view the correct version. The originally published, uncorrected article and the republished, corrected article are provided here for reference.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0338981

PNAS

PAPERS

COSTANTINO BUZI et al – The first preserved nasal cavity in the human fossil record: The Neanderthal from Altamura

The nose of Neanderthals and its possible adaptation to harsh climatic conditions is a longstanding matter of debate in paleoanthropology. Here, we present and describe the complete inner nasal structures of the early Neanderthal skeleton from Altamura, southern Italy. It represents evidence hitherto unavailable, both for this species and the human fossil record in general, and sheds light on the possible influence of respiratory adaptations on the characteristic Neanderthal facial morphology. Part of the debate has revolved around inner nasal traits proposed as unique adaptations (autapomorphies) of the species Homo neanderthalensis in relation to cold climate, specifically: a vertically oriented medial projection and a medial swelling on the nasal cavity wall alongside the lack of an ossified roof over the lacrimal groove. The lack of complete anatomy in the Neanderthal fossil record further livened the discussion regarding their occurrence. With the description and analysis of this unique finding, we can rule out the existence of such features. In addition, our observations corroborate the hypothesis that the characteristic midfacial morphology of H. neanderthalensis (i.e., the midfacial prognathism) is the result of a combination of factors and not a direct result of respiratory adaptations in the upper airways. Finally, our data provide an enhanced perspective for modeling Neanderthal respiratory performances.
https://www.pnas.org/doi/10.1073/pnas.2426309122

REESE A. K. RICHARDSON et al – The entities enabling scientific fraud at scale are large, resilient, and growing rapidly
Science is characterized by collaboration and cooperation, but also by uncertainty, competition, and inequality. While there has always been some concern that these pressures may compel some to defect from the scientific research ethos—i.e., fail to make genuine contributions to the production of knowledge or to the training of an expert workforce—the focus has largely been on the actions of lone individuals. Recently, however, reports of coordinated scientific fraud activities have increased. Some suggest that the ease of communication provided by the internet and open-access publishing have created the conditions for the emergence of entities—paper mills (i.e., sellers of mass-produced low quality and fabricated research), brokers (i.e., conduits between producers and publishers of fraudulent research), predatory journals, who do not conduct any quality controls on submissions—that facilitate systematic scientific fraud. Here, we demonstrate through case studies that i) individuals have cooperated to publish papers that were eventually retracted in a number of journals, ii) brokers have enabled publication in targeted journals at scale, and iii), within a field of science, not all subfields are equally targeted for scientific fraud. Our results reveal some of the strategies that enable the entities promoting scientific fraud to evade interventions. Our final analysis suggests that this ability to evade interventions is enabling the number of fraudulent publications to grow at a rate far outpacing that of legitimate science.
https://www.pnas.org/doi/pdf/10.1073/pnas.2420092122

COMMENTARIES

RÉMI NEVEU & ANDRÉ NEVEU – Reviewers are better equipped to detect fraud than editors
Using observational studies, Richardson et al. argue for a causal role of a cooperation of editors and authors in the increase of fraudulent science based on:
- anomalous patterns of articles retracted or commented on PubPeer,
- articles published faster (acknowledged as a weaker result).

Alternative considerations may also explain these results.
https://www.pnas.org/doi/full/10.1073/pnas.2522791122

REESE A. K. RICHARDSON et al – Reply to Neveu and Neveu: Inference in an information-restricted environment
We thank Neveu and Neveu for their commentary on our study. We agree that it would be worthwhile to examine the role of reviewers in the proliferation of fraud in scientific publishing. Indeed, paper mills have been previously implicated in compromising review processes and fabricating reviewer identities. However, we dispute other assertions made in their commentary.
https://www.pnas.org/doi/full/10.1073/pnas.2524788122

Trends in Ecology and Evolution

PAPERS

SAMANTHA E. ROTHBERG, ELLA G. HENRY & MICHAEL A. GIL – Pervasive loose sociality can drive demographic Allee effects
Sociality can, in theory, lead to positive relationships between population density and per capita growth rates (demographic Allee effects), but evidence of such relationships remains rare. Here, we consider the demographic consequences of sociality, highlight a historic bias favoring studies of species that socialize in relatively fixed groups, and present evidence that 'loose sociality', whereby individuals do not form fixed groups, could be a more likely driver of Allee effects. We show that loose sociality can drive Allee effects if local density increases with population density, that this condition could be widespread in the animal kingdom, and that there are measurable traits that can determine a species' susceptibility to such socially-driven population collapse.
https://www.cell.com/trends/ecology-evolution/abstract/S0169-5347(25)00323-4

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