EAORC BULLETIN 1,197 – 24 May 2026

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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.

PUBLICATION ALERT – Uniformitarianism in Language Speciation

Uniformitarianism in Language Speciation: From Creolistics to Genetic Linguistics. Edited by Salikoko S. Mufwene & Enoch O. Aboh. Cambridge University Press, 10 December 2025

Uniformitarianism is the widely held assumption that, in the case of languages, structural and other changes in the past must have been triggered and constrained by the same ecological factors as changes in the present. This volume, led by two of the most eminent scholars in language contact, brings together an international team of authors to shed new light on Uniformitarianism in historical linguistics. Applying the Uniformitarian Principle to creoles and pidgins, as well as other languages, the chapters show that, contrary to the received doctrine, the former group of languages did not emerge in an exceptional way. Covering a typologically and geographically broad range of languages, and focusing on different contact ecologies in Africa, Latin America, and the Caribbean, the book also dispels common misconceptions about what Uniformitarianism is. It shows how similar processes in different ecosystems result in different linguistic patterns, which don't require exceptional linguistic explanations in terms of creolization, pidginization, simplification, or incomplete acquisition.

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12 - Recombination, Feature Pool, and Population Structure: Three Factors Bearing on "Grammaticalization" (ENOCH O. ABOH)

https://www.cambridge.org/core/books/uniformitarianism-in-language-speciation/CD3ED96E631DD9661FDFDBD3B3EA76D0

ACADEMIA.EDU – Art or Scribbles? In the Eye of the Beholder

Australian Archaeology (2026).

CHRISTOPHER HENSHILWOOD – Art or Scribbles? In the Eye of the Beholder: The Evolutionary Emergence of Visual Communication

Review of 'Art or Scribbles? In the Eye of the Beholder: The Evolutionary Emergence of Visual Communication' by Iain Davidson, Interdisciplinary Evolution Research 11, Cham, Springer Nature, 2025.

https://www.academia.edu/167534055/Art_or_Scribbles_In_the_Eye_of_the_Beholder_The_Evolutionary_Emergence_of_Visual_Communication

NEWS

JOHN TEMPLETON FOUNDATION – Your Ancestors Aren't Who You Think They Are

Over the last 15 years, data on ancient DNA has upended the old story of human history. In this full-length interview, produced in partnership with BigThink, geneticist David Reich explains how new findings have challenged the family tree model of ancestry and revealed a past shaped by migration, interbreeding, disappearance, and constant change.

From Neanderthals and Denisovans to the myths of purity that still shape modern identity, Reich shows how the last decade of research has rewritten what we thought we knew about human origins. The result is a much stranger, more dynamic picture of the human story, one that forces us to rethink ancestry, evolution, and the deep history of who we are.

https://www.youtube.com/watch?v=a0uKLW07Jlg

NATURE BRIEFING – Brain activity isn't stable, it 'drifts'

A long-held dogma of neuroscience states that certain brain cells respond in the same way to the same thing. But that theory's dominance is being called into question. Researchers have reported evidence for neurons in mice changing how they respond to stimuli over time, a phenomenon dubbed 'representational drift'. But why drift occurs, and what purpose it might serve, is still unclear. And debates swirl around other big questions, such as: how is the brain able to generate stable behaviours if the activity of its neurons keeps changing?
https://www.nature.com/articles/d41586-026-01554-0

NATURE BRIEFING – arXiv clamps down on AI citations

The preprint repository arXiv has announced a one-year posting ban for researchers whose submissions are found to contain references hallucinated by artificial intelligence. Even after this penalty period, affected researchers can't post to arXiv unless their manuscript has already been accepted at a "reputable peer-reviewed venue", according to computer scientist Thomas Dietterich, chair of arXiv's computer science section. Some researchers have praised the server for taking a stand; others suggest it doesn't go far enough to tackle 'AI slop' in preprints.
https://www.nature.com/articles/d41586-026-01595-5

NATURE BRIEFING – Tough peer review can lead to citation boost

Papers that are put through the wringer during the peer review process go on to have a higher impact in science than those that sail through it. Researchers used artificial intelligence to analyse the peer-review correspondence associated with a selection of papers published in Nature Communications. They found that papers that elicited stronger criticism from reviewers and required more-extensive revisions received more citations than did papers that drew lighter comments. A higher 'quality' of reviewer comments — those that were more specific and well-reasoned — was also associated with a boost in citations to the published product.
https://www.nature.com/articles/d41586-026-01615-4

NEWS FROM SCIENCE – Study strengthens idea that humans evolved from knuckle-walking ancestors

Analysis charts evolution of the joint that made our species so nimble.
https://www.science.org/content/article/new-study-strengthens-idea-humans-evolved-knuckle-walking-ancestors

SCIENCEADVISER – Darling dingo

Nearly a thousand years ago, Aboriginal people in Australia cared for and deliberately buried a dingo. Skeletal analysis suggests the animal was tamed, and people continued to tend the burial site by "feeding" it with mussel shells for multiple generations.
https://www.tandfonline.com/doi/full/10.1080/03122417.2026.2650909

SCIENCEADVISER – Teach a Neanderthal to fish

New research suggests that Neanderthals were snacking on shellfish, even using sophisticated seasonal harvesting strategies, thousands of years before their human descendants.
https://www.pnas.org/doi/10.1073/pnas.2531880123

SCIENCEADVISER – Did humans evolve from knuckle-walking ancestors? It's all in the wrist

Humans are the only primates that walk upright all the time, an adaptation that has freed up our hands to more nimbly build tools, lug around food, and carry out other dexterous tasks. Hidden in the eight small bones of the wrist is an anatomical hint to where that gift of grab originated.

Now, the most comprehensive analysis of primate wrist bones to date—published in Proceedings of the Royal Society B—concludes that our wrists more closely resemble those of gorillas and chimpanzees than any other primate group, a similarity the authors link to a possible knuckle-walking past.

Scientists have long looked to wrist anatomy for clues to our evolutionary past, comparing our wrists to those of other living primates such as chimps and gorillas (which knuckle-walk) or capuchins and macaques (which flat-palm walk). Studying fossil hominins' wrists for signs of these adaptations has proven tricky, as the wrist is a complex puzzle of eight or nine interlocking bones. So, researchers digitally reconstructed and quantified the exteriors of 2037 wrist bones across multiple living and extinct species, including monkeys and apes.

For nearly every bone examined, human wrist bones resembled the equivalents in knuckle-walking African apes far more than those of any other primate group. Human wrists also feature traits that help stabilize other primates' wrists during knuckle walking—a sign of evolution's opportunism. Features that once steadied the wrist in our distant ancestors laid the foundation for adaptations that yielded our dexterous wrists. "We became the human lineage," said study co-author Laura Hunter. "But understanding where we started from is what tells you how we got here."
https://www.science.org/content/article/new-study-strengthens-idea-humans-evolved-knuckle-walking-ancestors

SCIENCEADVISER – Vocal fry isn't a girly thing

In the early 2010s, headlines spoke of an epidemic: Vocal fry, that gravelly buzz that occurs when people speak in their lowest vocal register, was creeping into the speech patterns of young female speakers of American English. Pop singers like Britney Spears are known to employ this characteristically creaky effect, which is caused by the slow, irregular fluttering of the vocal cords that commonly happens at the end of an uttered sentence. It is typically associated with young women, and many people find it irritating. One PloS One study found, for example, that women who speak with vocal fry are viewed as "less competent, less educated, less trustworthy, less attractive, and less hirable." These negative perceptions were stronger for female voices compared to male ones.

But according to research summarized at last week's meeting of the Acoustical Society of America, stereotypes about vocal fry are just that—stereotypes.

Linguistics researcher Jeanne Brown collected speech samples from 49 Canadians and analyzed them for the acoustic markers of vocal fry, including low pitch, irregular voicing, and increased closure of the vocal cords. That research, published last year in the Journal of Phonetics, found that men's voices are actually creakier than women's. What's more, voice creakiness appears to increase with age—further challenging the assumption that vocal fry is some kind of fad or trend among young women.

In a second experiment, Brown asked 40 Canadian English listeners to rate the perceived creakiness of different voice recordings, which had been altered so that the level of fry varied and the perceived gender of the speaker was ambiguous. The recordings were also paired with pictures of male and female faces. Participants in that study, published in the current issue of Laboratory Phonology, correctly identified creaky voices, but the primary marker for their perception of vocal fry was low pitch, not gender.

"The conflict between that finding and everyday perception, where women are routinely flagged as creakier, suggests the bias is real but socially constructed, rather than grounded in how women actually sound," Brown said in a statement. So, even though people can accurately identify vocal fry based on pitch in controlled settings, negative social and cultural biases may cause them to more selectively hear it in the voices of young women in everyday situations. After all, a signature vocal growl is also common among male singers, podcast hosts, and social media influencers, although these individuals are rarely criticized for it or viewed as annoying. "Maybe it's about the whole interpretation of what this person stands for, what this person represents, the social group this person is trying to show that they're a part of," Brown told New Scientist . "It could be that people are making judgments about that in addition to the way that their voice sounds."

https://www.newscientist.com/article/2526201-vocal-fry-is-more-common-in-men-actually-find-scientists/

SCIENCEADVISER – Peek-a-moo! I remember you

If Veronika's prodigious use of a deck brush didn't convince you that there's a lot going on in the minds of cows, perhaps some French bovines will: In a new study, the animals were able to tell people apart by their faces and voices, much like dogs can.

To put the animals to the test, the researchers played silent videos of a familiar and unfamiliar face saying a sentence to nearly three dozen dairy cows. The beasts stared longer at the people they'd never seen, showing they could tell them apart. They also gazed longer at videos when the depicted person's audio was played, rather than someone else talking; a similar tendency has been demonstrated in dogs.

"Our findings suggest that cows … do not perceive all humans as a single, undifferentiated category, but are instead capable of distinguishing and recognizing individuals they have previously met," the team explained in the paper. "These findings profoundly change the way we look at farm animals," study leader Léa Lansade told Refractor. "And we know that the better we understand an animal, the better we tend to treat it."

"Based on these results, future research should explore whether cows can adjust their behavior depending on the person they are interacting with—a capacity that may reflect their agency in human-animal relationship," the researchers concluded.

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0329529

SCIENCEADVISER – Baby honeybees give their nurses the munchies

When a human baby gets hungry, it wails for milk. When honeybee larvae get a hankering for their favorite food, they employ a much more subtle strategy.

Although pollen is a valuable source of protein for bees, larvae don't consume it directly, instead relying on young workers to metabolize the pollen in special glands. These nurse bees then secrete a milky-white, nutrient-rich substance known as royal jelly, which the baby bees eat. The hungrier the brood, the more jelly the nurses produce. But how do the larvae communicate their hunger? As scientists report in a new study, hungry baby bees give off a pheromone called E-β-ocimene, which is the same volatile compound that flowers release to attract pollinators. This pheromone alters the nurse bees' internal molecular signaling, making them crave protein-rich pollen instead of nectar. When the nurses indulge, their glands swell up and start making more of the major proteins for royal jelly.

This molecular mechanism, the researchers report, may have appeared early on in bee evolution and potentially enabled their unique social behaviors to emerge. "Our study suggests that larval-worker communication evolved through the

cooption of ancestral regulatory pathways," the team explained. "This created a physiological link between larvae and nurses comparable to interactions among organs within a 'superorganism.'"
https://www.science.org/doi/10.1126/sciadv.aec3855

SCIENCENEWS – New study strengthens idea that humans evolved from knuckle-walking ancestors

Analysis charts evolution of the joint that made our species so nimble.
https://www.science.org/content/article/new-study-strengthens-idea-humans-evolved-knuckle-walking-ancestors

SCIENCENEWS – Our understanding of Charles Darwin continues to evolve

Darwin: A Biography lifts the curtain on the private life of one of science's most controversial pioneers
Review of 'Darwin: A Biography' by Janet Browne, Princeton University Press, 2026.
https://www.sciencenews.org/article/charles-darwin-new-biography-evolution

THE CONVERSATION – Ancient tooth proteins suggest H. erectus genetic legacy in people today

Studies of Chinese Homo erectus suggest that it was no evolutionary dead end, but contributed genes to modern people in the region.
https://theconversation.com/ancient-tooth-proteins-suggest-homo-erectus-may-have-left-a-genetic-legacy-in-people-today-282785

PUBLICATIONS

eLife

PAPERS

MARIUS OSSWALD et al – Task-Dependent Motor Unit Recruitment and Rate Coding Reveal Redistribution of Neural Drive in the Human Hand

Reviewed Preprint

Although Henneman's size principle dictates an orderly small-to-large activation, evidence suggests a certain level of flexibility in the recruitment of spinal motor neurons depending on task demands. Here, we investigate motor unit (MU) recruitment flexibility in the human first dorsal interosseous (FDI) muscle while controlling for overall muscle activation across two functionally distinct tasks using high-density intramuscular EMG (HD-iEMG) electrode arrays. Six participants performed isometric index finger abduction where the FDI serves as the prime mover, and flexion with the FDI functioning as a synergist. Recruitment thresholds (RTs) and recruitment orders (ROs) were highly consistent within the same task, but differed significantly between abduction and flexion. Across participants, 45.3% of MUs showed changes in recruitment above the coefficient of repeatability across tasks compared to only 5.0% within tasks. Changes in RT were accompanied by corresponding adaptations in discharge rate (DR), preserving the inverse RT-DR relationship. MU size did not have an effect on recruitment variability. Intramuscular coherence analysis revealed no differences in the delta (1–5 Hz) or alpha (5–13 Hz) band, but beta band (13–30 Hz) coherence was significantly lower during flexion than abduction, indicating reduced high-frequency inputs when FDI serves as a synergist muscle. Together, these results indicate different distributions of net excitatory input to FDI MUs across different functional tasks, that may include stronger involvement of spinal circuits during flexion as opposed to abduction, as indicated by the reduced intramuscular beta coherence. Moreover, the present findings also demonstrate that common synaptic input and not intrinsic motor neuron properties determines the inverse relation between MU RT and DR.
https://elifesciences.org/reviewed-preprints/110609

YA ZHENG & RUMENG TANG – Effort produces after-effects costly for others but valued for self

Engaging in prosocial behavior requires effort, yet people are often averse to exerting effort for others' benefit. However, it remains unclear how effort exertion affects subsequent reward evaluation during prosocial acts. Here, we combined high-temporal-resolution electroencephalography with a paradigm that independently manipulated physical effort and monetary reward for self and others to elucidate the neural mechanisms underlying the reward after-effect of prosocial effort expenditure. We found dissociable reward after-effects for self-benefiting and other-benefiting effort. For self-benefiting rewards, the reward positivity (RewP) increased with effort demand, suggesting an effort-enhancement effect. In contrast, for other-benefiting rewards, the RewP decreased as effort increased, demonstrating an effort-discounting effect. Critically, this dissociation was contingent upon high reward magnitude and modulated by individual differences in effort discounting, yet remained distinct from performance evaluation. Our findings reveal distinct neural computations for self- and other-benefiting efforts, offering new insights into how prior effort expenditure shapes reward evaluation during prosocial behavior.
https://elifesciences.org/articles/103566

RICHARD JOHNSTON & MATTHEW A. SMITH – Brain-wide arousal signals are segregated from movement planning in the superior colliculus

Reviewed Preprint

The superior colliculus (SC) is traditionally considered a brain region that functions as an interface between processing visual inputs and generating eye movement outputs. Although its role as a primary reflex center is thought to be conserved across vertebrate species, evidence suggests that the SC has evolved to support higher-order cognitive functions including spatial attention. When it comes to oculomotor areas such as the SC, it is critical that high precision fixation and eye movements are maintained even in the presence of signals related to ongoing changes in cognition and brain state, both of which have the potential to interfere with eye position encoding and movement generation. In this study, we recorded spiking responses of neuronal populations in the SC while monkeys performed a memory-guided saccade task and found that the activity of some of the neurons fluctuated over tens of minutes. By leveraging the statistical power afforded by high-dimensional neuronal recordings, we were able to identify a low-dimensional pattern of activity that was correlated with pupil size and simultaneously recorded data in the prefrontal cortex (PFC), consistent with slow changes in the monkeys' arousal levels while they were performing the task. Importantly, we found that the spiking responses of deep-layer SC neurons were less correlated with this brain-wide arousal signal, and that neural activity associated with changes in pupil size and saccade tuning did not overlap in population activity space with movement initiation signals. Taken together, these findings provide a framework for understanding how signals related to cognition and arousal can be embedded in the population activity of oculomotor structures without compromising the fidelity of the motor output.

https://elifesciences.org/reviewed-preprints/99278

Frontiers in Psychology

PAPERS

YANG ZHANG & ZIJUN HUANG – The influence of self-relevance under time pressure on moral decision-making

Moral decision-making is a core cognitive process that influences human social behavior. Understanding its underlying psychological mechanisms is crucial for comprehending individuals' prosocial tendencies and social adaptation. This study employs a situational priming paradigm to systematically investigate the impact of self-relevance on moral decision-making under time pressure. A pilot study assessed time pressure and established decision time thresholds for moderate and high levels of time pressure. Building on this, Experiment 1 examined the impact of time pressure (none, moderate, high) on moral decision-making, revealing that participants' helping behavior significantly increased under moderate and high time pressure compared to no time pressure. Experiment 2 introduced self-relevance to explore the joint effects of time pressure (none, moderate, high) and self-relevance (low, moderate, high) on moral decision-making. The results indicated that: (1) the main effect of self-relevance was significant, with helping behavior notably higher under high self-relevance than under low and moderate conditions; (2) within each self-relevance condition, helping behavior under moderate and high time pressure was significantly greater than under no time pressure; (3) under high self-relevance, participants maintained a similarly high level of helping behavior across all time pressure conditions (none, moderate, high). These findings suggest that time pressure facilitates altruistic moral decision-making in helping dilemmas. Moreover, individuals in high self-relevance condition tend to exhibit a greater proportion of helping behavior and are relatively less influenced by variations in time pressure. This study offers a novel perspective on how time pressure influences moral behavior within close relationships.

https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2026.1778803/full

HGG Advances

PAPERS

YOUNESS TOUISSI & ERIC J. VALLENDER – Positive selection on brain cis-regulatory elements in the human lineage drives gene expression divergence and susceptibility to neuropsychiatric disorders

Human brain evolution is hypothesized to be driven primarily by regulatory rather than protein-coding changes. Identifying evolutionary changes in regulatory elements, however, has been constrained by numbers and relationships of taxa and by methodology targeting conserved sequences. These approaches are independent of any experimental assessment of function and overlook potential neofunctionalization in less constrained regions. Here, we leveraged 243 primate genomes to apply a human branch-specific positive selection test to over 350,000 experimentally confirmed human brain-active cis-regulatory elements, identifying 8,522 elements under positive selection on the human lineage. Genes regulated by human-positively selected elements showed differential expression between humans and macaques during fetal and adult stages, compared to non-selected elements. Elements under positive selection that remained active across fetal and adult stages showed the strongest enrichment for genetic variants associated with neuropsychiatric conditions, including schizophrenia and bipolar disorder.

https://www.cell.com/hgg-advances/fulltext/S2666-2477(26)00069-2

iScience

PAPERS

DONG LU et al – From technology to interaction: How ritual interaction drives participation intention in immersive digital environments

Despite rapid advances in immersive technologies (AR, VR, and MR), many digital experiences struggle to sustain user participation. Prior research emphasizes technological realism while overlooking how structured interactions shape meaning-making and motivation. Drawing on interaction ritual chains (IRC) theory, this study introduces ritual interaction (RI)—comprising contextual elements, ritual symbols, scripted processes, and shared emotion—to examine its impact on participation intention. Using PLS-SEM, results show that RI influences participation through a sequential psychological process: it enhances immersion, which strengthens presence, ultimately driving participation intention. Immersion plays a more proximal role than presence. Moderation analysis indicates that experience type strengthens the effect of RI on immersion in culture-based, but not nature-based, environments. By shifting focus from technological affordances to interactional structure, this study highlights how structured interaction can motivate participation and informs the design of immersive systems while contributing to human-computer interaction and mediated social behavior research.
https://www.cell.com/iscience/fulltext/S2589-0042(26)01466-5

YUN LUO et al – Applications of human-machine collaborative decision-making: A review of research with recent developments

This study comprehensively reviews human-machine collaborative decision-making (HMCD) methods and applications across management science, the military, healthcare, and manufacturing. We propose a dual-layer analytical framework. The first layer decomposes HMCD into four sequential stages, namely attribute determination, weight assignment, information aggregation, and decision-making. The second layer identifies four cross-cutting collaboration mechanisms, namely role configuration, interaction and deliberation, trust and explanation, and authority and responsibility migration. A feedback loop connects decision outcomes to earlier stages, capturing iterative adaptation between agents. Using this framework as an analytical lens, we synthesize methods and applications, examine stage-specific collaboration patterns across domains, and trace how failures propagate through mechanism dependencies. This review provides a structured map of HMCD research and guidance for collaborative system design.
https://www.cell.com/iscience/fulltext/S2589-0042(26)01431-8

ANDREA GRADASSI, WOUTER VAN DEN BOS & LUCAS MOLLEMAN – Own and others' confidence in social information use

The behavior of friends, colleagues, television hosts, and social media feeds affects what we buy, how we dress, and who we vote for. The confidence with which those opinions are expressed shapes how much weight individuals give them. Yet little is known about how one's own confidence and others' confidence jointly determine social information use. We present results of two incentivized decision-making tasks (N = 203 and N = 213, samples from the U.S.A.) where participants could adjust their initial judgments upon observing judgments of peers and their confidence. Adjustments were most sensitive to the confidence of others when participants' own confidence was low. Confidence also affected heuristic strategies: confident others prompted participants to compromise and copy social information more often, rather than to stick with their initial estimates. We discuss how following confident others when uncertain can improve decision-making, but also leaves people vulnerable to sources of misinformation.
https://www.cell.com/iscience/fulltext/S2589-0042(26)01343-X

Nature

NEWS

The brain's code seems to be in constant flux. Neuroscientists are baffled

Neurons fire much more erratically than researchers thought. What does that mean for how the brain works?
https://www.nature.com/articles/d41586-026-01554-0

ARTICLES

LUCAS Y. TIAN & KEDAR GARZÓN GUPTA – Monkeys that 'draw' reveal a neuronal population that encodes combinable actions

When faced with unfamiliar problems, humans and other animals must plan and execute action sequences that they might not have used before. In macaque monkeys, this ability is supported by a population of neurons in the brain's frontal cortex that encode recombinable action units or 'action symbols'.
https://www.nature.com/articles/d41586-026-00928-8

PAPERS

LUCAS Y. TIAN et al – Neural representation of action symbols in primate frontal cortex

A hallmark of intelligence is proficiency in solving new problems, including those that substantially differ from previously seen problems. Problem solving in turn depends on the goal-directed generation of novel ideas and behaviours, which has been proposed to involve internal representations of discrete units (or symbols) that can be recombined into numerous possible composite representations. Although this view has been influential in cognitive-level explanations of behaviour, definitive evidence for a neuronal substrate of symbols has remained elusive. Here we identify a neural population that encodes action symbols—recombinable representations of discrete units of motor behaviour—in a specific area of the frontal cortex. In macaque monkeys performing a drawing-like task, we found behavioural evidence that action elements (strokes) exhibit three crucial features that indicate an underlying symbolic representation: (1) invariance over low-level motor parameters; (2) categorical structure, which reflects discrete action types; and (3) recombination into novel sequences. Based on simultaneous neural recordings across eight regions of the motor, premotor and prefrontal cortex, we identified population activity specifically in the ventral premotor cortex that encodes planned actions in a manner that also reflects invariance, categorical structure and recombination. These findings reveal a neural representation of action symbols localized to the ventral premotor cortex and a putative neural substrate for symbolic operations.
https://www.nature.com/articles/s41586-026-10297-x

Nature Biomedical Engineering

PAPERS

PIERRE VASSILIADIS et al – Temporal interference stimulation for deep brain neuromodulation in humans

Deep brain stimulation needs high focality in deep parts of the brain; hence, it has largely relied on invasive surgical approaches in clinical populations. Transcranial temporal interference stimulation (tTIS) has emerged as a method for focal non-invasive electrical deep brain stimulation. First developed and validated through computational modelling and rodent work, tTIS is now being translated to humans for targeting deep brain regions such as the hippocampus or striatum. Here we present current evidence for tTIS-based neuromodulation, describe the underlying mechanisms and discuss future developments of this technology. We highlight key opportunities and challenges for fundamental neuroscience, as well as for the design of interventions in neuropsychiatric disorders. We suggest that a multidisciplinary research effort is now required to further validate the use of tTIS in multiple applications, understand its underlying principles and optimize the technology in the view of wider scientific and clinical deployment.
https://www.nature.com/articles/s41551-026-01665-z

Nature Communications

PAPERS

ZHUANGYI JIANG et al – Single-neuron network topology governs neural computation and learning in primate cortex

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.

Neural networks underlie complex brain information processing, yet the role of their single-neuron topology in governing computation and behavior remains unclear, particularly regarding how it shapes individual neuron function and activity evolution during learning. Using two-photon calcium imaging, we tracked functional connectivity in thousands of posterior parietal cortex neurons as monkeys learned sensorimotor associations across days. We identified small-world networks with densely connected hub neurons that dominated encoding key task variables, driving local dynamics and neural encoding evolution during the monkeys' task performance and learning. Dynamic transitions in hub/non-hub status captured how inter-neuronal interactions shaped neuronal encoding evolution during association formation. Modular structures supported specialized neuron ensembles, enabling segregated representations and interactions within local networks. Importantly, small-world network properties predicted behavioral performance, with global information processing efficiency increasing as learning progressed. These findings reveal how single-neuron-resolution brain networks, through small-world organization, orchestrate both global and modular neural computations within local network to mediate behavior and shape learning.
https://www.nature.com/articles/s41467-026-72510-9

Nature Human Behaviour

PAPERS

KENTARO MIYAMOTO et al – Brain activity, disruption and connectivity comparisons identify origins of human metacognition in other primates

Planning requires anticipating the environmental contingencies that we will encounter and also our own future behaviour in those scenarios. The evolutionary origins of such prospective decision simulations have, however, been difficult to investigate. Moreover, in humans, these metacognitive processes are associated with a distinctively human brain region in the anterior lateral prefrontal cortex. Here we demonstrate these capacities in macaques and their neural bases in two

complementary patterns of brain activity in different ventrolateral prefrontal areas: areas 45a and 47/12o. We also examine the impact of ultrasonic disruption of each area. We compare behavioural, brain activity and disruption patterns in humans and macaques. Finally, comparative connectional analysis revealed similarities between the conjunction of the two circuits associated with areas 45a and 47/12o in macaques and the human anterior lateral prefrontal area. In combination, the results suggest behavioural and anatomical origins of metacognitive processes that have become especially sophisticated in humans.
https://www.nature.com/articles/s41562-026-02473-w

Nature Reviews Genetics

ARTICLES

MIA T. LEVINE – The long reach of the Red Queen
Selfish genetic elements antagonize subunits of essential multi-protein complexes. Research now suggests that intermolecular compensatory evolution among these subunits preserves the integrity and function of these vital but vulnerable complexes.
https://www.nature.com/articles/s41576-026-00976-w

New Scientist

ARTICLES

ROWAN HOOPER – The Selfish Gene at 50: Why Dawkins's evolution classic still holds up
When Richard Dawkins's first blockbuster book was published half a century ago, few genes had ever been sequenced or studied in detail. Yet the book's gene-centred view of evolution still has much to teach us in today's genetic age.
https://www.newscientist.com/article/2525646-the-selfish-gene-at-50-why-dawkinss-evolution-classic-still-holds-up/

CHRISTA LESTÉ-LASSERRE – Neanderthals treated a dental cavity by drilling into the tooth
A Neanderthal tooth shows clear signs of human intervention to treat bacterial decay, showing that the earliest dentistry began at least 59,000 years ago.
https://www.newscientist.com/article/2526440-neanderthals-treated-a-dental-cavity-by-drilling-into-the-tooth/

MICHAEL MARSHALL – Ancient teeth hint at links between Denisovans and Homo erectus
Six teeth roughly 400,000 years old have yielded some of the first ancient proteins thought to belong to Homo erectus, providing molecular clues to their relationships with other hominins.
https://www.newscientist.com/article/2526391-ancient-teeth-hint-at-links-between-denisovans-and-homo-erectus/

MICHAEL MARSHALL – The story of the first human tool: the humble container
An analysis of ancient human artefacts finds that the container, a simple but critical tool, may have originated 500,000 years ago. Columnist Michael Marshall explores how slings, ostrich eggs and wooden trays helped our ancestors survive.
https://www.newscientist.com/article/2526004-the-story-of-the-first-human-tool-the-humble-container/

Patterns

PAPERS

NAND CHANDRAVADIA & NABIL IMAM – Neural rhythms as priors of speech computations
People speak at particular rhythms, producing syllables, words, and phrases at characteristic rates, and these rhythms help make speech comprehensible despite variability across speakers, accents, and languages. Auditory neural networks in the brain generate rhythms at these same rates, suggesting that brain circuits may be innately tuned to the temporal structure of speech. In an artificial neural network incorporating brain-like rhythms, we find that speech is readily recognized across different speakers and languages if the configured rhythms match the temporal modulations of speech. Without these rhythms, the network is unable to learn meaningful representations and consequently performs at chance levels. This stark difference in recognition performance indicates that wave-like rhythms in the auditory system serve as inductive biases that are exploited for learning speech signals. More broadly, embedding wave dynamics into artificial neural networks offers a new design principle for building machines that learn more efficiently.
https://www.cell.com/patterns/fulltext/S2666-3899(26)00072-3

PeerJ

PAPERS

GEORGE M.W. HODGSON et al – Sex and spatial proximity affect ungulate behavioral synchrony
Collective group decisions are important for the survival and reproduction of social mammals, with inter-individual interactions affecting group-level emergent behavior. Activity synchronization is an important aspect of collective behavior, with differences in nutritional requirements leading to foraging asynchrony. Individual variation between animals (such as

sex or social relationships) are predicted to affect ungulate synchronization and spatial proximity, with between-sex differences consequently expected to influence the evolution of sexual segregation in ungulates. Although investigated independently, the relative roles of sex, sociality and proximity in synchronization are rarely investigated concurrently, especially in regards to affiliative relationships. Using a mixed-sex group of feral cattle (Bos taurus), we evaluated the supporting evidence for several predictions arising from the current understanding of synchronization in ungulates. We investigated how sex and social relationships (dominance and affiliation) affected foraging, behavioral synchrony and proximity. We found that same-sex dyads were more likely to be synchronized than mixed-sex dyads, while differences in dominance and affiliation only affected dyadic synchrony when observations with high foraging activity were excluded. Focal animals were more synchronized with closest neighbors than with another randomly selected conspecific. Inter-individual differences can explain variation in activity, with synchronization being biased towards certain individuals by favoring animals in close spatial proximity and those of the same-sex.
https://peerj.com/articles/21331/

PLoS One

PAPERS

ALEXANDER MILDENER et al – Evidence for mirror self-recognition in beluga whales (Delphinapterus leucas)

Tests of mirror self-recognition (MSR) have provided behavioral evidence of a high level of self-awareness in humans, chimpanzees, bonobos, orangutans, gorillas, bottlenose dolphins, Asian elephants, magpies, and to some extent in the cleaner wrasse. We conducted the standard mirror test with a social group of four beluga whales (Delphinapterus leucas), one subadult and three adult females, housed together at the New York Aquarium of the Wildlife Conservation Society. We exposed the whales to a two-way plexiglass mirror and a transparent control surface during baseline and post-mirror sessions and recorded and analyzed their behavioral responses in the three conditions. Two of the four whales, the subadult and her mother, exhibited a rich suite of self-directed behaviors at the mirror and subsequent mark and control sham-mark tests were conducted with both whales. The adult female showed mark-directed behavior at the mirror and passed one of the initial mark tests in a series of tests given. The self-directed behaviors exhibited by both whales and mark directed behavior by the adult female provides evidence for the capacity of MSR in the beluga whale.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0348287

OCÉANE AMICHAUD et al – Cows visually discriminate and cross-modally recognise familiar and unfamiliar human faces in videos

Social recognition has been studied and demonstrated in many species. In domesticated species, the long evolutionary history shared with humans has led to investigations into their cognitive abilities towards humans, particularly regarding discrimination and recognition of humans. The present study investigated whether cows are capable of visual discrimination and cross-modal recognition of familiar and unfamiliar humans. Thirty-two cows were exposed to two tests: a visual preference test, during which two silent videos were shown simultaneously – each displaying either a familiar or an unfamiliar human face – and a cross-modal test, during which the videos were accompanied by either a congruent or incongruent voice. During the visual preference test, cows looked significantly longer at the video showing the unfamiliar person ($p = 0.028$). In the cross-modal test, they looked significantly longer at the video that was congruent with the voice being played ($p = 0.014$). These two results show that cows are able to discriminate between familiar and unfamiliar individuals and form cross-modal representations of these people. Based on these results, future research should explore whether cows can adjust their behaviour depending on the person they are interacting with – a capacity that may reflect their agency in human-animal relationships.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0329529

Proceedings of the Royal Society B

PAPERS

MAYTE MARTINEZ et al with SARAH FRANCES BROSNAN – Chimpanzees' responses to inequity in a group context are influenced by food quality and their relationships with the group members present

Chimpanzees, like humans, react negatively to receiving lower-value rewards than their peers for the same task, though results vary across individuals and studies. This variation may, in part, stem from research focusing on dyads, which, while providing better experimental control, reduce the complexity of natural social environments. Here, we studied chimpanzees' ($n = 27$) reactions to inequity using a token-exchange task that allowed unrestricted participation by all group members. As in previous studies, subjects reacted negatively to disadvantageous inequity when receiving low-value food. However, medium- and high-value rewards were rarely rejected, possibly explaining some of the variation across earlier studies. Notably, responses to inequity were stronger when closely bonded individuals were present, which may relate to inequity's proposed function to maintain equitable relationships. Our findings highlight the importance of naturalistic conditions for understanding primate social decision-making, which is essential to understand the evolution of responses to unfairness.
https://royalsocietypublishing.org/rspb/article/293/2071/20260397/481770/Chimpanzees-responses-to-inequity-in-a-group

SOFIA M. HALEY et al – More smarts, more song: male chickadees with better spatial learning and memory abilities sing more throughout the day

Cognitive abilities may allow flexible responses to variable environments, proving critical to individual survival in many species. When cognitive abilities are associated with survival, we may also expect cognition to be under sexual selection, as mate choice based on cognitive traits can lead to increased fitness. However, evidence for whether and how individuals assess the cognitive abilities of conspecifics is variable and sparse. We investigated whether individual variation in heritable spatial cognitive abilities of food-caching mountain chickadees (Poecile gambeli), which rely on spatial memory for overwinter survival, is associated with differences in song production, a known secondary sexual trait. Males that performed better on a spatial learning task produced higher daily song output than males that performed worse, both throughout the day and at dawn. While males that performed worse on the spatial learning task sang less throughout the day, they allocated more of their total songs to the first hour of the day. Performance on a single reversal learning task was not associated with song output. These results suggest that differences in daily song output may serve as a reliable signal for spatial cognitive abilities in mountain chickadees.
https://royalsocietypublishing.org/rspb/article/293/2071/20260376/481772/More-smarts-more-song-male-chickadees-with-better

REBECCA F.B. PADGET, ANDREW N. RADFORD & ANDREW D. HIGGINSON – Reward inequity can promote both public goods production and free riding

When animals in groups cooperate, individuals sometimes produce a 'public' good that benefits many or all group members and receive a private reward (that is not shared with others). The rate at which rewards are given and how rewards are distributed among contributors is likely to affect the occurrence of public goods production, but empirical evidence is contradictory. Here, we develop a game-theoretic model to investigate how reward rate and distribution affect the production of a public good. Our model is applicable to various scenarios in which individuals can be rewarded for public goods contributions; for example, sentinel behaviour, intergroup contest participation and collective hunting. The model predicts that inequitable distribution of rewards results in higher public goods contributions by some individuals but free riding by others because it induces competition among potential contributors. We also find that a high reward rate promotes public goods contributions but only up to a point, after which further rewards suppress contributions. This suggests that social factors such as inequity and competition might interact to affect the outcome of common public goods scenarios.
https://royalsocietypublishing.org/rspb/article/293/2071/20260455/481773/Reward-inequity-can-promote-both-public-goods

JINGYI YANG et al – Song complexity in suboscine birds: evolutionary drivers and ecological constraints

Acoustic signal complexity varies widely in animals, from single notes to highly sophisticated vocal displays. In birds, vocal complexity can evolve as an honest signal of individual quality driven by sexual selection. However, this hypothesis is rarely explored in conjunction with alternative drivers, including competition for ecological resources (social selection) and intra-group communication, both of which may favour increased signal complexity. Using Bayesian phylogenetic models, we test whether these alternative mechanisms predict the complexity of innate songs in 1288 species of suboscine passerine birds, while accounting for ecological constraints on sound production, transmission and detection. We found that overall song complexity was reduced by sexual selection (estimated from mating systems) and declined with body size and vegetation density. Conversely, note count and song length increased in territorial species, particularly those using song to defend year-round territories during the non-breeding season. These findings challenge the common assumption that sexual selection is the main driver of increased signal complexity and highlight the role of social selection via territorial competition as a factor increasing the temporal complexity of songs. Our results suggest that signal complexity depends on social, cultural and ecological contexts, reflecting a combination of multiple inter-related drivers and constraints.
https://royalsocietypublishing.org/rspb/article/293/2071/20260429/481775/Song-complexity-in-suboscine-birds-evolutionary

LAURA E. HUNTER et al – Did modern human carpal morphology evolve from knuckle walking traits?

Hominin forelimbs have evolved from primarily locomotive to manipulative appendages over approximately 6 million years. As such, hand functions in fossil hominins and the Pan–Homo last common ancestor (LCA) are intensely debated, with carpal morphology central to this debate. However, owing to their irregular and challenging shapes, few studies have comprehensively quantified carpal morphology. We analyse the overall carpal morphology of anthropoids, including fossil hominins, using spherical harmonics and use classification methods to characterize fossil hominins within the context of extant taxa. Results show that hominins share with African apes derived carpal morphology possibly related to knuckle walking. Furthermore, unique modern human carpal morphology appears to have evolved from these possible knuckle-walking features and in a piecemeal manner, causing some hominin capitates to resemble those of palmigrade monkeys. Striking variation in biomechanically relevant carpal morphology and retention of potentially ancestral features persists as late as Homo naledi, suggesting that most hominins probably neither knuckle walked nor extensively used stone tools. These results indicate that the hominin carpus evolved from an African ape-like wrist, with radial-side reorganization related to

manipulation occurring only recently. Although it remains unclear whether the LCA knuckle walked, our results suggest that this is the most likely existing hypothesis.
https://royalsocietypublishing.org/rspb/article/293/2071/20260556/481780/Did-modern-human-carpal-morphology-evolve-from

Trends in Cognitive Sciences

PAPERS

MARTIN LANG et al – Cognitive computations underlying ritual performance and persistence
From petitionary prayers to pilgrimages, rituals are found in every known culture. Yet, the reason for their persistence is a matter of active debate. Some studies portray rituals as attempts to affect uncertain outcomes, whereas others emphasize their role in facilitating social cohesion. We review the cognitive processes underlying both perspectives and draw on advances in reinforcement learning to integrate them. Specifically, ritual participation is motivated by two processes: habitual reinforcement of affective and social rewards experienced during performance (model-free learning) and reinforcement of pragmatic and cooperative benefits derived from culturally shared world models (model-based learning). This framework synthesizes previous accounts and illuminates ritual's role in sustaining intersubjectively aligned world models in past and present societies.
https://www.cell.com/trends/cognitive-sciences/abstract/S1364-6613(26)00105-1

HUILI CHEN et al – Machine understanding
What do artificial intelligence (AI) systems "understand"? This question arises not only in assessing a system's intelligence but also in evaluation practices to ensure the safe and responsible deployment of AI. Drawing on scholarship from philosophy and cognitive science, and informed by current practices in AI, we develop a framework for asking more precise questions and making more precise claims about machine understanding. We conceptualize understanding as a relation between a system (S) and a target of understanding (T), and we discuss how to specify the relation, the system, and the target, offering a landscape of options in each case. Our goal is not to defend a particular account of understanding, but to provide conceptual tools for those working to assess or advance machine understanding.
https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(26)00077-X

Trends Open

PAPERS

PENG WANG et al – State and capacity in neural models of cognition and consciousness
Artificial neural networks increasingly reproduce behavioral and neural signatures, yet their internal workings are often treated as incidental to explanation. This review proposes a two-axis framework that separates global computational state, the current operating regime of a fixed architecture, from structural capacity, the architectural and scaling constraints that bound what can be represented. Changes in state (e.g., gain, noise, thresholds, and normalization) and changes in capacity (e.g., depth, recurrence, and multimodality) can produce distinct behavioral and neural fingerprints. This review outlines experimental designs and modeling practices that disentangle these axes, sharpen mechanistic claims, and strengthen links to theories of cognition and conscious access.
https://www.cell.com/trends-open/fulltext/S3117-3470(26)00012-X

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