

EAORC BULLETIN 1,097 – 23 June 2024

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NOTICES

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.

ACADEMIA.EDU – The Domestication of Humans

Anthropologie XLVI/1, 1-17 (2008)

ROBERT G. BEDNARIK – The Domestication of Humans

In the last few years it has become evident that the European Upper Paleolithic "replacement" model was initially based on false evidence and that most of its propositions can be or have been refuted. This paper reviews the key evidence of the model, the skeletal, archaeological and genetic factors inherent in it, and how they have failed to support the model. It is shown that the change from robust to gracile *Homo sapiens* occurs gradually in all four continents then occupied by humans and that there are many intermediate fossils. In Europe, it is shown; there are currently no known specimens of reasonably "modern" remains until the Gravettian, while all Early Upper Paleolithic traditions, including the Aurignacian, seem to be attributable to Robusts, such as Neanderthaloid people. The rapid gracilization of all humans of the Final Pleistocene is attributed here to suspension of natural evolutionary developments by culturally mediated breeding patterns favouring skeletal gracility.

https://www.academia.edu/9158987/The_Domestication_of_Humans

NEWS

JOHN TEMPLETON FOUNDATION – How Deep Curiosity Can Change the World

Q&A with author Scott Shigeoka.

<https://www.templeton.org/news/how-deep-curiosity-can-change-the-world>

JOHN TEMPLETON FOUNDATION – What Stars and Saints Reveal About Awe

During this year’s Perseid meteor shower I took my 10-year-old son camping to get a good view of the dozens of shooting stars that were expected. We set up camp on what turned out to be an unseasonably cool August evening. We settled in around 10pm and saw the first few stars dart across the sky. My son was mesmerized. A few moments later, something odd appeared on the northern horizon. It was a long trail of 12-15 bright lights moving in a perfect line across the sky. “Look at that!” I blurted out. It was unlike any of the other streaking meteors we had seen that night. Rather than relish the mystery of the thing, I checked my smartphone. It turned out that we were looking at Elon Musk’s Starlink satellites.

<https://www.templeton.org/news/what-stars-and-saints-reveal-about-awe>

JOHN TEMPLETON FOUNDATION – The Overconfidence Game

David Dunning and Justin Kruger are among the few contemporary psychologists whose last names have escaped into the popular consciousness in adjectival form. Their 1999 article “Unskilled and Unaware of It: How Difficulties in Recognizing One’s Own Incompetence Lead to Inflated Self-Assessments” codified what is now known as the Dunning–Kruger effect, a handy shorthand for the rationale (or lack of such) behind all kinds of hubristic human foolishness. Journalists now write about Dunning–Kruger economics, Dunning–Kruger geopolitics, a Dunning–Kruger presidency. When someone, somewhere, does something especially stupid, David Dunning is often the person the reporter calls for a comment. But are unskilled people disproportionately prone to be unaware of what they don’t know?

<https://www.templeton.org/news/the-overconfidence-game>

NATURE BRIEFING – How things appear in your ‘mind’s eye’

Vivid memories that flash into the mind’s eye might be made in the primary visual cortex, the same area of the brain that processes raw visual input from the eyes. A study in monkeys suggests that neurons there display a different activity pattern when images are conjured up from memory compared with real-time vision. Some researchers say that other areas, such as the prefrontal cortex, are more likely to be the seat of the ‘mind’s eye’. “There’s a possibility that the actual memory encoding is happening elsewhere, and that what you’re seeing in the primary visual cortex is the downstream consequences,” says neuroscientist Floris de Lange.

<https://www.nature.com/articles/d41586-024-01757-3>

SCIENCEADVISER – Ancient ants’ antennae may have equipped them for chemical communication

If you watch ants at work, you might notice their antennae sweeping through the air and over each other’s bodies to detect pheromones—chemicals the insects use to raise alarms, lay trails, and guide their complex social lives. But while scientists think ants have been social since they first evolved, whether early ants used pheromones the way modern ants do has remained uncertain. Now, using laser microscopy to observe the antennae of early-Cretaceous ants preserved in amber, researchers have identified tiny, hairlike structures called sensilla—similar to the ones today’s ants use to pick up pheromones.

“The imaging technique seems really sharp,” says evolutionary biologist Phil Barden, who was not involved in the study. “I’ve never seen images of structures this small in amber before.”

That doesn’t necessarily mean Cretaceous ants used their sensilla for pheromone detection like modern ones do, some experts caution: Even today, ants may also use them to detect odorants in prey, plants, and soil. But others say the finding offers the best evidence yet that early ants at least had the necessary hardware to chemically communicate. If they did, it could provide clues about whether that ability helped spur the massive evolutionary success some ant lineages have attained today.

<https://www.science.org/content/article/early-ants-antennae-may-have-let-them-talk-using-pheromones>

SCIENCEADVISER – Too hot for words: Heat makes politicians use simpler language

If the summer heat has got you feeling a bit more sluggish than usual, don’t worry—it’s not your fault: High temperatures can compromise brain function, tank productivity, and literally make you less smart. And politicians, tasked with making crucial legislative decisions no matter the weather, aren’t immune to this phenomenon. According to new research, it even changes the way they talk.

To find out more about the connection between heat and cognitive performance, scientists combed through millions of parliamentary speeches delivered by more than 28,000 politicians across eight countries. When the team compared the language used in those speeches to variations in daily temperature, the results were surprisingly clear-cut: On hot days, speakers used shorter, simpler words—an effect comparable to losing half a month of education, the researchers tell Grist. Older adults, who have a harder time cooling down, dumbed their language down even more in response to heat.

“Considering the critical role of politicians in democratic processes, the impact of extreme temperatures on their cognitive performance could have profound and far-reaching consequences for society as a whole,” study author Tobias Widmann warns in a statement. As climate change causes global temperature to spike, the team adds, it’s likely that more and more politicians will struggle to think straight.

[https://www.cell.com/iscience/fulltext/S2589-0042\(24\)01331-2](https://www.cell.com/iscience/fulltext/S2589-0042(24)01331-2)

SCIENCE DAILY – Direct evidence found for dairy consumption in the Pyrenees in early Neolithic

A study on the remains of the Chaves and Puyascada caves, both located in the province of Huesca, Spain, yields the first direct proof of the consumption and processing of dairy products in the Pyrenees already at the start of the Neolithic period, approximately 7,500 years ago, as well as the consumption of pig. The results lead to doubts about the belief that these products were first used much later in the Pyrenean mountain range.

<https://www.sciencedaily.com/releases/2024/06/240617173552.htm>

SCIENCE DAILY – Origins of cumulative culture in human evolution

Cumulative culture -- the accumulation of technological modifications and improvements over generations -- allowed humans to adapt to a diversity of environments and challenges. But, it is unclear when cumulative culture first developed during hominin evolution. A new study concludes that humans began to rapidly accumulate technological knowledge through social learning around 600,000 years ago.

<https://www.sciencedaily.com/releases/2024/06/240617173730.htm>

SCIENCE DAILY – Parliamentary members use simpler language on hot days

Climate change has many widespread and complicated effects on the well-being of people and the planet, and a new study has now added a surprising one to the list. After analyzing the language used in seven million parliamentary speeches around the world, it shows that high temperatures lead to a significant and immediate reduction in politicians' language complexity. <https://www.sciencedaily.com/releases/2024/06/240613140846.htm>

SCIENCE.ORG NEWS – Early ants' antennae may have let them 'talk' using pheromones

100-million-year-old fossils share the sensory hairs of insects' modern counterparts. <https://www.science.org/content/article/early-ants-antennae-may-have-let-them-talk-using-pheromones>

SCIENCE.ORG NEWS – Chimps use more plant medicines than any other animal

Study suggests sick chimpanzees go out of their way to find plants with antibacterial and anti-inflammatory properties. <https://www.science.org/content/article/chimps-use-more-plant-medicines-any-other-animal>

PUBLICATIONS**American Journal of Biological Anthropology****PAPERS****TIM SCHUURMAN & EMILIANO BRUNER – A comparative anatomical network analysis of the human and chimpanzee brains**

Spatial interactions among anatomical elements help to identify topological factors behind morphological variation and can be investigated through network analysis. Here, a whole-brain network model of the chimpanzee (Pan troglodytes, Blumenbach 1776) is presented, based on macroanatomical divisions, and compared with a previous equivalent model of the human brain. The goal was to contrast which regions are essential in the geometric balance of the brains of the two species, to compare underlying phenotypic patterns of spatial variation, and to understand how these patterns might have influenced the evolution of human brain morphology. The human and chimpanzee brains share morphologically complex inferior-medial regions and a topological organization that matches the spatial constraints exerted by the surrounding braincase. These shared topological features are interesting because they can be traced back to the Chimpanzee-Human Last Common Ancestor, 7–10 million years ago. Nevertheless, some key differences are found in the human and chimpanzee brains. In humans, the temporal lobe, particularly its deep and medial limbic aspect (the parahippocampal gyrus), is a crucial node for topological complexity. Meanwhile, in chimpanzees, the cerebellum is, in this sense, more embedded in an intricate spatial position. This information helps to interpret brain macroanatomical change in fossil hominids.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24988>

Animal Behaviour**PAPERS****MARTIN N. MULLER et al with RICHARD W. WRANGHAM – Age-related reproductive effort in male chimpanzees: terminal investment or alternative tactics?**

Because senescence impairs the ability of older males to compete successfully for mates, male reproductive strategies are expected to change with age. The terminal investment hypothesis proposes that older males, who could die soon, should take greater risks to obtain mating opportunities. Another possibility is that older males avoid such risks, adopting alternative reproductive tactics, such as increased affiliation with females, increased reliance on coalitions or sexual coercion to continue to compete with younger animals. We tested these hypotheses in wild chimpanzees, Pan troglodytes schweinfurthii, of the Kanyawara community, Kibale National Park, Uganda, where old males sire offspring at relatively high rates. Our data set included >40 000 incidents of male aggression and >5800 copulations observed between 2005 and 2017. We found that, even as their dominance status declined, old males maintained relatively high copulation rates, especially with established mothers. There was no evidence for terminal investment in response to ageing. Males became generally less aggressive as they aged. Neither did old males form affiliative bonds with females, nor use sexual coercion more frequently, as alternative reproductive tactics. Old males did, however, participate in coalitionary aggression at higher rates than young males and increased the proportion of their aggression that was coalitionary over time. Coalitions were positively associated with mating success, particularly for low- and middle-ranking males. These results support the hypothesis that ageing male chimpanzees use coalitions as an alternative reproductive tactic. The lack of evidence for terminal investment in response to ageing appears to reflect a broader mammalian pattern in which males who rely on fighting to secure mating opportunities avoid excessive risk taking as their formidability wanes.

<https://www.sciencedirect.com/science/article/abs/pii/S0003347224001064>

KE DENG et al – Hainan frilled treefrogs' calls partially conform to Menzerath–Altmann's law, but oppose Zipf's law of abbreviation

Information compression is widely regarded as a fundamental principle that applies to human language. Zipf's law of abbreviation and Menzerath–Altmann's law are two linguistic laws related to information compression and have been demonstrated in human language and other communication systems. Female choice and male-male competition in anurans (frogs and toads) depend heavily on vocal communication. However, it remains unclear whether the laws reflecting information compression apply to vocal communication in anurans. Hainan frilled treefrogs, *Kurixalus hainanus*, are suitable anuran species to test Zipf's law of abbreviation and Menzerath–Altmann's law as male *K. hainanus* can emit either monosyllabic or multisyllabic calls with three types of notes (i.e. A, B and C notes). In the present study, we mathematically examined whether the vocalizations of *K. hainanus* conform to these laws. We found that the note type duration was positively correlated with its frequency of occurrence, which was the opposite finding to that predicted by Zipf's law of abbreviation. We also found that the note duration was negatively correlated with call size (the number of notes in a call), but only A notes exhibited patterns consistent with Menzerath–Altmann's law when analysed separately. These results may be caused by the different physical characteristics or different functions and selection pressures of different note types. Further linear mixed model analysis showed that the duration of A notes was significantly negatively correlated with note position in a call, which suggests that the conformity to Menzerath–Altmann's law in A note is caused by energetic or breathing constraints on vocal production. Lastly, we observed a negative correlation between internote interval duration and call size. Our findings support the existence of information compression in vocal communication systems in anurans, among other communication principles, and contribute to increasing our understanding of universal patterns in communication systems.

<https://www.sciencedirect.com/science/article/abs/pii/S0003347224001234>

Biolinguistics**REVIEWS****ELLY VAN GELDEREN – Review of Merge and the Strong Minimalist Thesis**

This review first provides a summary of the central ideas in *Merge and the Strong Minimalist Thesis* and then presents a discussion of the more controversial points. The book offers an introduction to the Minimalist Program. The focus is on *Merge*, which plays a central role in the Faculty of Language because it is “the primary structure-building device of the syntax” (p. 2). The book clarifies the status of Theta Theory, Search, and Workspace, and provides a novel account of passives and obligatory control.

Review of N. Chomsky, T.D. Seely, R.C. Berwick, S. Fong, M.A.C. Huybregts, H. Kitahara, A. McInerney & Y. Sugimoto (2023). *Merge and the Strong Minimalist Thesis*. Cambridge University Press.

<https://bioling.psychopen.eu/index.php/bioling/article/view/14525>

Cell**PAPERS****PRISCA LIBERALI & ALEXANDER F. SCHIER – The evolution of developmental biology through conceptual and technological revolutions**

Developmental biology—the study of the processes by which cells, tissues, and organisms develop and change over time—has entered a new golden age. After the molecular genetics revolution in the 80s and 90s and the diversification of the field in the early 21st century, we have entered a phase when powerful technologies provide new approaches and open unexplored avenues. Progress in the field has been accelerated by advances in genomics, imaging, engineering, and computational biology and by emerging model systems ranging from tardigrades to organoids. We summarize how revolutionary technologies have led to remarkable progress in understanding animal development. We describe how classic questions in gene regulation, pattern formation, morphogenesis, organogenesis, and stem cell biology are being revisited. We discuss the connections of development with evolution, self-organization, metabolism, time, and ecology. We speculate how developmental biology might evolve in an era of synthetic biology, artificial intelligence, and human engineering.

[https://www.cell.com/cell/fulltext/S0092-8674\(24\)00632-9](https://www.cell.com/cell/fulltext/S0092-8674(24)00632-9)

Cell Reports**PAPERS****YANG-YANG FENG, ETHAN S. BROMBERG-MARTIN & ILYA E. MONOSOV – Dorsal raphe neurons integrate the values of reward amount, delay, and uncertainty in multi-attribute decision-making**

The dorsal raphe nucleus (DRN) is implicated in psychiatric disorders that feature impaired sensitivity to reward amount, impulsivity when facing reward delays, and risk-seeking when confronting reward uncertainty. However, it has been unclear whether and how DRN neurons signal reward amount, reward delay, and reward uncertainty during multi-attribute value-based decision-making, where subjects consider these attributes to make a choice. We recorded DRN neurons as monkeys chose between offers whose attributes, namely expected reward amount, reward delay, and reward uncertainty, varied independently. Many DRN neurons signaled offer attributes, and this population tended to integrate the attributes in a

manner that reflected monkeys' preferences for amount, delay, and uncertainty. After decision-making, in response to post-decision feedback, these same neurons signaled signed reward prediction errors, suggesting a broader role in tracking value across task epochs and behavioral contexts. Our data illustrate how the DRN participates in value computations, guiding theories about the role of the DRN in decision-making and psychiatric disease.

[https://www.cell.com/cell-reports/fulltext/S2211-1247\(24\)00669-7](https://www.cell.com/cell-reports/fulltext/S2211-1247(24)00669-7)

Current Biology

ARTICLES

UNNAMED AUTHOR WHO DECLARES NO COMPETING INTERESTS – Interview with Chris Stringer

Chris Stringer graduated from University College London (UCL) in 1969, did his PhD at Bristol University from 1970 to 1973 and has worked at the Natural History Museum in London since 1973. He is now a Research Leader in Human Origins at the Museum, a Fellow of the Royal Society and also a Visiting Professor at both Royal Holloway, University of London and UCL. His early research was on the relationship between Neanderthals and early Homo sapiens in Europe, but through his work on the 'Recent African Origin' theory of modern human origins he now collaborates with archaeologists, dating specialists and geneticists in an attempt to reconstruct the evolution of our species globally. He has excavated at sites in Britain and abroad, and he is currently co-directing the Pathways to Ancient Britain project, funded by the Calleva Foundation. He has published over 300 scientific papers, and his recent books include *The Origin of Our Species* (2011 in the UK; published in the US in 2012 as *Lone Survivors: How We Came to Be the Only Humans on Earth*), *Britain: One Million Years of the Human Story* (2014, with Rob Dinnis) and *Our Human Story* (2018, with Louise Humphrey).

[https://www.cell.com/current-biology/fulltext/S0960-9822\(24\)00663-8](https://www.cell.com/current-biology/fulltext/S0960-9822(24)00663-8)

PAPERS

RYAN A. WIRT et al – Temporal information in the anterior cingulate cortex relates to accumulated experiences

Anterior cingulate cortex (ACC) activity is important for operations that require the ability to integrate multiple experiences over time, such as rule learning, cognitive flexibility, working memory, and long-term memory recall. To shed light on this, we analyzed neuronal activity while rats repeated the same behaviors during hour-long sessions to investigate how activity changed over time. We recorded neuronal ensembles as rats performed a decision-free operant task with varying reward likelihoods at three different response ports ($n = 5$). Neuronal state space analysis revealed that each repetition of a behavior was distinct, with more recent behaviors more similar than those further apart in time. ACC activity was dominated by a slow, gradual change in low-dimensional representations of neural state space aligning with the pace of behavior. Temporal progression, or drift, was apparent on the top principal component for every session and was driven by the accumulation of experiences and not an internal clock. Notably, these signals were consistent across subjects, allowing us to accurately predict trial numbers based on a model trained on data from a different animal. We observed that non-continuous ramping firing rates over extended durations (tens of minutes) drove the low-dimensional ensemble representations. 40% of ACC neurons' firing ramped over a range of trial lengths and combinations of shorter duration ramping neurons created ensembles that tracked longer durations. These findings provide valuable insights into how the ACC, at an ensemble level, conveys temporal information by reflecting the accumulation of experiences over extended periods.

[https://www.cell.com/current-biology/abstract/S0960-9822\(24\)00688-2](https://www.cell.com/current-biology/abstract/S0960-9822(24)00688-2)

FÉLIX BIGAND et al – The geometry of interpersonal synchrony in human dance

Collective synchronized behavior has powerful social-communicative functions observed across several animal taxa. Operationally, synchronized behavior can be explained by individuals responding to shared external cues (e.g., light, sound, or food) as well as by inter-individual adaptation. We contrasted these accounts in the context of a universal human practice—collective dance—by recording full-body kinematics from dyads of laypersons freely dancing to music in a “silent disco” setting. We orthogonally manipulated musical input (whether participants were dancing to the same, synchronous music) and visual contact (whether participants could see their dancing partner). Using a data-driven method, we decomposed full-body kinematics of 70 participants into 15 principal movement patterns, reminiscent of common dance moves, explaining over 95% of kinematic variance. We find that both music and partners drive synchrony, but through distinct dance moves. This leads to distinct kinds of synchrony that occur in parallel by virtue of a geometric organization: anteroposterior movements such as head bobs synchronize through music, while hand gestures and full-body lateral movements synchronize through visual contact. One specific dance move—vertical bounce—emerged as a supramodal pacesetter of coordination, synchronizing through both music and visual contact, and at the pace of the musical beat. These findings reveal that synchrony in human dance is independently supported by shared musical input and inter-individual adaptation. The independence between these drivers of synchrony hinges on a geometric organization, enabling dancers to synchronize to music and partners simultaneously by allocating distinct synchronies to distinct spatial axes and body parts.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(24\)00698-5](https://www.cell.com/current-biology/fulltext/S0960-9822(24)00698-5)

Evolutionary Anthropology

PAPERS

BRIAN VILMOARE & WILLIAM KIMBEL – On the scientific credibility of paleoanthropology

Smith and Smith and Wood proposed that the human fossil record offers special challenges for causal hypotheses because “unique” adaptations resist the comparative method. We challenge their notions of “uniqueness” and offer a refutation of the idea that there is something epistemologically special about human prehistoric data. Although paleontological data may be sparse, there is nothing inherent about this information that prevents its use in the inductive or deductive process, nor in the generation and testing of scientific hypotheses. The imprecision of the fossil record is well-understood, and such imprecision is often factored into hypotheses and methods. While we acknowledge some oversteps within the discipline, we also note that the history of paleoanthropology is clearly one of progress, with ideas tested and resolution added as data (fossils) are uncovered and new technologies applied, much like in sciences as diverse as astronomy, molecular genetics, and geology.

<https://onlinelibrary.wiley.com/doi/full/10.1002/evan.22037>

CLARA L. MARIENCHECK – The immunity gap in primates

Vertebrates exhibit sexual dimorphism in response to infectious diseases and in morbidity and mortality rates to various pathogens. Females are generally more immunocompetent than males, despite their increased reproductive burden and the immunosuppressive effects of gestation. In addition, females generally have lower incidences of cancer compared to males; however, they have higher rates of autoimmune disorders. These sex differences may be a result of life history differences, sexual selection, genetics, and/or the physiological effects of hormones. As highly social mammals with complex life histories, primates offer a unique opportunity to investigate the evolution of enhanced female immunocompetence. This review aims to examine the evidence of this immunity gap, understand current hypotheses for its evolution, and explore the potential role of X chromosome specific genes and heterozygosity within this framework.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/evan.22038>

Frontiers in Communication

PAPERS

YINGYING CAI & HENDRIK DE SMET – Are categories' cores more isomorphic than their peripheries?

Isomorphism holds that, ideally, a single meaning is expressed by a single form. However, despite long-standing support, the theoretical viability of the isomorphic principle has been called into question. There is widespread recognition that the coexistence of (near-) synonymous expressions—variation—is actually very common in language. In this study, we explore a possible path toward reconciling the theoretical notion of isomorphism with the observable fact of variation. To this end, we adopt an analogy to tool use inspired by Zipf (1949). Tools largely monopolize their core functional domains (e.g., for cutting, knives are overwhelmingly preferred over screwdrivers) but compete over more peripheral functions (for puncturing, knives and screwdrivers have more equal chances of selection). In the same way, we hypothesize forms can code a prototypically organized network of senses, whereby they largely monopolize the core but are more likely to come into competition with other forms in the periphery. To test this hypothesis, a case study is conducted on variation in the use of two prepositions: at and with. For each, a semantic core and periphery are established. Using a corpus consisting of parallel translations of the same source text, it is then tested whether translators are more likely to converge on the same preposition to express one of that preposition's core senses than to express one of its peripheral senses. This is the pattern one would expect if isomorphic pressure is stronger for semantic cores than for peripheries. The results are promising but inconclusive. They confirm that the sense most prone to competition is arguably the most peripheral but also reveal a surprisingly high level of competition for the spatial core use of at.

<https://www.frontiersin.org/articles/10.3389/fcomm.2024.1310234/full>

Frontiers in Psychology

PAPERS

YUNJUN HU et al – Downward social comparison positively promotes altruism: the multi-mediating roles of belief in a just world and general life satisfaction

This study examined the underlying mechanism of the relationship between downward social comparison (DSC) and altruism through two conceptually important but rarely studied factors: belief in a just world (BJW) and general life satisfaction (GLS). The study utilized a two-time-point design, spaced 2 months apart, with a sample of 1,764 college students from China. The study measured DSC, altruism, BJW, and GLS.

The findings revealed a significant positive predictive effect of DSC on college students' altruism and belief in a just world (BJW). Notably, GLS emerged as a multi-mediating factor in this relationship. The study also revealed that both subscales of BJW, namely personal belief in a just world (PBJW) and general belief in a just world (GBJW), played distinct roles in the mediation model. PBJW exhibited a stronger mediating effect, suggesting that DSC can foster individual altruism and BJW. Particularly, BJW was identified as enhancing GLS, subsequently promoting altruistic behavior.

This study contributes to the existing literature on social comparison by shedding light on the relationship between DSC, altruism, and the mediating role of belief in a just world and GLS. The findings underscore the potential for promoting altruistic behavior among college students through interventions targeting beliefs in a just world, especially at the personal level, and enhancing GLS.

<https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1386860/full>

DEBORAH SCHNEIDER et al – Perinatal influences on academic achievement and the developing brain: a scoping systematic review

In this PRISMA-compliant systematic review, we identify and synthesize the findings of research in which neuroimaging and assessments of achievement have been used to examine the relationships among aspects of developmental programming, neurodevelopment, and achievement in reading and mathematics.

Forty-seven studies met inclusion criteria. The majority examined the impact of prematurity (n = 32) and prenatal alcohol exposure (n = 13). Several prematurity studies reported a positive correlation between white-matter integrity of callosal fibers and executive functioning and/or achievement, and white matter properties were consistently associated with cognitive and academic performance in preterm and full-term children. Volumetric studies reported positive associations between academic and cognitive abilities and white and gray matter volume in regions such as the insula, putamen, and prefrontal lobes. Functional MRI studies demonstrated increased right-hemispheric language processing among preterm children. Altered activation of the frontoparietal network related to numerical abilities was also reported. Prenatal alcohol exposure studies reported alterations in white matter microstructure linked to deficits in cognitive functioning and academic achievement, including mathematics, reading, and vocabulary skills. Volumetric studies reported reductions in cerebral, cerebellar, and subcortical gray matter volumes associated with decreased scores on measures of executive functioning, attention, working memory, and academic performance. Functional MRI studies demonstrated broad, diffuse activation, reduced activation in canonical regions, and increased activation in non-canonical regions during numeric tasks.

A preponderance of studies linked prematurity and prenatal alcohol exposure to altered neurodevelopmental processes and suboptimal academic achievement. Limitations and recommendations for future research are discussed.

<https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1352241/full>

ERNIL HANSEN – Touching the unconscious in the unconscious – hypnotic communication with unconscious patients

If hypnosis means contact to the unconscious to modulate psychological and physiological functions by means of suggestions, and if this is facilitated by attenuation of the critical mind, then the question arises as to whether suggestions also have an effect when waking consciousness is otherwise eliminated, namely by coma or anesthesia. A prerequisite would be perception, which actually is evidenced by reports of patients after traumatic brain injury, artificial coma, resuscitation or general anesthesia. Moreover, posttraumatic stress disorder (PTSD) frequently observed after these medical situations is hardly explainable without some sort of awareness under such conditions. Even advanced neurophysiological diagnostic cannot yet rule out consciousness or sensory processing. Especially reference to perception during unconsciousness is given by the results of a recent multicenter study on the effects of hypnotic communication with patients under controlled adequate deep general anesthesia. The observed reductions in incidence and severity of postoperative pain, opioid use, nausea and vomiting cannot be explained by the reaction of a few but only by a considerable proportion of patients. This leads to a strong plea for a more careful treatment of unconscious patients in the emergency room, operating theater or intensive care unit, for the abandonment of the restriction of therapeutic communication to awake patients, and for new aspects of communication and hypnosis research. Obviously, loss of consciousness does not protect against psychological injury, and continuation of communication is needed. But how and what to talk to unconscious patients? Generally addressing the unconscious mind with suggestions that generally exert their effects unconsciously, hypnotic communication appears to be the adequate language. Especially addressing meaningful topics, as derived from the basic psychological needs and known stressors, appears essential. With respect to negative effects by negative or missing communication or to the proposed protective and supporting effects of therapeutic communication with patients clinically rated as unconscious, the role of consciousness is secondary. For the effects of perceived signals and suggestions it does not matter whether consciousness is absent, or partial, or unrecognized present.

<https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1389449/full>

ISABEL MARTÍN-MONZÓN et al – Intraoperative mapping of the right hemisphere: a systematic review of protocols that evaluate cognitive and social cognitive functions

The right hemisphere of the brain is often referred to as the non-dominant hemisphere. Though this is meant to highlight the specialized role of the left hemisphere in language, the use of this term runs the risk of oversimplifying or minimizing the essential functions of the right hemisphere. There is accumulating evidence from functional MRI, clinical lesion studies, and intraoperative mapping data that implicate the right hemisphere in a diverse array of cognitive functions, including visuospatial functions, attentional processes, and social cognitive functions. Neuropsychological deficits following right hemisphere resections are well-documented, but there is a general paucity of literature focusing on how to best map these functions during awake brain surgery to minimize such deficits. To address this gap in the literature, a systematic review was conducted to examine the cognitive and emotional processes associated with the right hemisphere and the

neuropsychological tasks frequently used for mapping the right hemisphere during awake brain tumor surgery. It was found that the most employed tests to assess language and speech functions in patients with lesions in the right cerebral hemisphere were the naming task and the Pyramids and Palm Trees Test (PPTT). Spatial cognition was typically evaluated using the line bisection task, while social cognition was assessed through the Reading the Mind in the Eyes (RME) test. Dual-tasking and the movement of the upper and lower limbs were the most frequently used methods to evaluate motor/sensory functions. Executive functions were typically assessed using the N-back test and Stroop test. To the best of our knowledge, this is the first comprehensive review to help provide guidance on the cognitive functions most at risk and methods to map such functions during right awake brain surgery.

<https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1415523/full>

Heliyon

PAPERS

YING ZENG et al – Bottlenose dolphins (*Tursiops truncatus*) display gaze alternation and referential communication in an impossible task

Gaze cues play a vital role in conveying critical information about objects and locations necessary for survival, such as food sources, predators, and the attentional states of conspecific and heterospecific individuals. During referential intentional communication, the continuous alternation of gaze between a communicative partner and a specific object or point of interest attracts the partner's attention towards the target. This behaviour is considered by many as essential for understanding intentions and is thought to involve mental planning. Here, we investigated the behavioural responses of seven bottlenose dolphins (*Tursiops truncatus*) that were given an impossible task in the presence of two experimenters (a 'commanding experimenter' and a 'non-commanding experimenter'), whose attentional state towards the dolphins varied. We found that the dolphins spontaneously displayed gaze alternation, specifically triadic referential pointing, only when the human commanding experimenter was facing them. However, they ceased to alternate their gaze between the impossible object and the commanding experimenter when the experimenter had their back turned. Notably, the dolphins' behaviour differed from general pointing and gaze, as their triadic sequence occurred within a narrow time window. These findings suggest that the dolphins were sensitive to human attentional cues and utilized their own gaze cue (pointing) as a salient signal to attract the attention of the commanding experimenter towards a specific location.

[https://www.cell.com/heliyon/fulltext/S2405-8440\(24\)09223-5](https://www.cell.com/heliyon/fulltext/S2405-8440(24)09223-5)

iScience

PAPERS

TAMÁS LÁNG et al – Medial preoptic circuits governing instinctive social behaviors

The medial preoptic area (MPOA) has long been implicated in maternal and male sexual behavior. Modern neuroscience methods have begun to reveal the cellular networks responsible, while also implicating the MPOA in other social behaviors, affiliative social touch, and aggression. The social interactions rely on input from conspecifics whose most important modalities in rodents are olfaction and somatosensation. These inputs bypass the cerebral cortex to reach the MPOA to influence the social function. Hormonal inputs also directly act on MPOA neurons. In turn, the MPOA controls social responses via various projections for reward and motor output. The MPOA thus emerges as one of the major brain centres for instinctive social behavior. While key elements of MPOA circuits have been identified, a synthesis of these new data is now provided for further studies to reveal the mechanisms by which the area controls social interactions.

[https://www.cell.com/iscience/fulltext/S2589-0042\(24\)01521-9](https://www.cell.com/iscience/fulltext/S2589-0042(24)01521-9)

LUCIA DE FRANCESCO et al – Cooperation and Competition have same benefits but different costs

Cooperation and competition shape everyday human interactions and impact individuals' chances of success in different domains. Using a virtual Stroop test, classically employed to assess general cognitive interference, we examined the impact of social context (Cooperation and Competition) and other's ability (Higher and Lower performers) on performance, perceived stress, and autonomic activity. In Experiment 1 we found that both cooperation with a lower performer and competition with a higher performer led to similar enhancement in performance. However, only competition with a more skilled opponent induced an increase in perceived stress and physiological activity. Experiment 2 further demonstrated that these effects persisted even with prolonged exposure to these contexts. In summary, cooperation can be just as effective as competition in improving individuals' performance. However, cooperation does not carry the same level of stress and physiological burden as the competitive context, representing a healthier and more optimal way to boost individual performance.

[https://www.cell.com/iscience/fulltext/S2589-0042\(24\)01517-7](https://www.cell.com/iscience/fulltext/S2589-0042(24)01517-7)

IRENE GARCÍA-RUIZ & MICHAEL TABORSKY – Nepotism mediates enforced cooperation in asymmetric negotiations

In cooperative societies, group members typically exchange different commodities among each other, which involves an incessant negotiation process. How is the conflict of fitness interests resolved in this continual bargaining process between unequal partners, so that maintaining the cooperative interaction is the best option for all parties involved? Theory predicts

that relatedness between group members may alleviate the conflict of fitness interests, thereby promoting the evolution of cooperation. To evaluate the relative importance of relatedness and direct fitness effects in the negotiation process, we experimentally manipulated both the relatedness and mutual behavioural responses of dominant breeders and subordinate helpers in the cooperatively breeding cichlid fish *Neolamprologus pulcher*. Results show that coercion by breeders is crucial for the performance of alloparental egg care by helpers, but that kinship significantly decreases the need for coercion as predicted by theory. This illustrates the relative importance of kinship and enforcement in the bargaining process.

[https://www.cell.com/iscience/fulltext/S2589-0042\(24\)01559-1](https://www.cell.com/iscience/fulltext/S2589-0042(24)01559-1)

Nature

PAPERS

EVELINA FEDORENKO, STEVEN T. PIANTADOSI & EDWARD A. F. GIBSON – Language is primarily a tool for communication rather than thought

Language is a defining characteristic of our species, but the function, or functions, that it serves has been debated for centuries. Here we bring recent evidence from neuroscience and allied disciplines to argue that in modern humans, language is a tool for communication, contrary to a prominent view that we use language for thinking. We begin by introducing the brain network that supports linguistic ability in humans. We then review evidence for a double dissociation between language and thought, and discuss several properties of language that suggest that it is optimized for communication. We conclude that although the emergence of language has unquestionably transformed human culture, language does not appear to be a prerequisite for complex thought, including symbolic thought. Instead, language is a powerful tool for the transmission of cultural knowledge; it plausibly co-evolved with our thinking and reasoning capacities, and only reflects, rather than gives rise to, the signature sophistication of human cognition.

<https://www.nature.com/articles/s41586-024-07522-w>

FELINE W. LINDHOUT et al – A molecular and cellular perspective on human brain evolution and tempo

The evolution of the modern human brain was accompanied by distinct molecular and cellular specializations, which underpin our diverse cognitive abilities but also increase our susceptibility to neurological diseases. These features, some specific to humans and others shared with related species, manifest during different stages of brain development. In this multi-stage process, neural stem cells proliferate to produce a large and diverse progenitor pool, giving rise to excitatory or inhibitory neurons that integrate into circuits during further maturation. This process unfolds over varying time scales across species and has progressively become slower in the human lineage, with differences in tempo correlating with differences in brain size, cell number and diversity, and connectivity. Here we introduce the terms ‘bradychrony’ and ‘tachychrony’ to describe slowed and accelerated developmental tempos, respectively. We review how recent technical advances across disciplines, including advanced engineering of in vitro models, functional comparative genetics and high-throughput single-cell profiling, are leading to a deeper understanding of how specializations of the human brain arise during bradychronic neurodevelopment. Emerging insights point to a central role for genetics, gene-regulatory networks, cellular innovations and developmental tempo, which together contribute to the establishment of human specializations during various stages of neurodevelopment and at different points in evolution.

<https://www.nature.com/articles/s41586-024-07521-x>

Nature Communications Biology

PAPERS

GIULIO DEGANO et al – Speech prosody enhances the neural processing of syntax

Human language relies on the correct processing of syntactic information, as it is essential for successful communication between speakers. As an abstract level of language, syntax has often been studied separately from the physical form of the speech signal, thus often masking the interactions that can promote better syntactic processing in the human brain. However, behavioral and neural evidence from adults suggests the idea that prosody and syntax interact, and studies in infants support the notion that prosody assists language learning. Here we analyze a MEG dataset to investigate how acoustic cues, specifically prosody, interact with syntactic representations in the brains of native English speakers. More specifically, to examine whether prosody enhances the cortical encoding of syntactic representations, we decode syntactic phrase boundaries directly from brain activity, and evaluate possible modulations of this decoding by the prosodic boundaries. Our findings demonstrate that the presence of prosodic boundaries improves the neural representation of phrase boundaries, indicating the facilitative role of prosodic cues in processing abstract linguistic features. This work has implications for interactive models of how the brain processes different linguistic features. Future research is needed to establish the neural underpinnings of prosody-syntax interactions in languages with different typological characteristics.

<https://www.nature.com/articles/s42003-024-06444-7>

Nature Reviews Psychology

PAPERS

TINA MALTI & RUTH SPEIDEL – Development of prosociality and the effects of adversity

Understanding how children become kind and caring prosocial adults matters for the survival and thriving of humanity. However, adversity can impact children’s prosocial potential in multifaceted ways. In this Review, we provide critical insights into how humans become prosocial from a developmental-relational perspective. We begin by discussing central factors underlying the development of prosociality in children. Next, we summarize research on the effects of adversity on prosocial development, including the effects of exposure to traumatic life events and everyday hurts and stressors, as well as protective factors that help children to find, remain on, or return to a prosocial path. Then we discuss interventions to nurture prosociality from an early age in every individual, emphasizing the role of practices of care to create positive change at community levels. Finally, we make recommendations for future research.

<https://www.nature.com/articles/s44159-024-00328-7>

Neuron

OBITUARIES

ROBERT C. LIU & ANNE Z. MURPHY – Larry J. Young (1967–2024)

Larry Young, the self-described “guy who spends his days thinking about love and bonding in terms of biochemical reactions in localized circuits of the brain” (The Chemistry Between Us1), passed away, too early, in March 2024. He was a brilliant scientist who used prairie voles (*Microtus ochrogaster*) and other rodents to pioneer a deeper understanding of the mechanisms by which the neuropeptides oxytocin and vasopressin act in the mammalian brain to mediate affiliative behaviors. He was also so much more—to his family, his field, his trainees and colleagues, and the larger world with whom he so skillfully communicated his complex studies that have illuminated how the social brain works.

[https://www.cell.com/neuron/fulltext/S0896-6273\(24\)00369-6](https://www.cell.com/neuron/fulltext/S0896-6273(24)00369-6)

New Scientist

NEWS

Easter Island's legendary societal collapse didn't actually happen

Historians have claimed the people of Easter Island overexploited natural resources, causing a population crash, but new evidence suggests they lived sustainably for centuries.

<https://www.newscientist.com/article/2436416-easter-islands-legendary-societal-collapse-didnt-actually-happen/>

ARTICLES

HARVEY WHITEHOUSE – Why humanity’s survival may depend on us becoming a tribe of billions

Tribalism can be toxic, yet we need more of it if we are to meet today’s global challenges, argues one anthropologist. His research reveals how to create a “teratribe”.

{I think they mean “gigatribe”. At maximum rate (74 years to get from 2.5bn in 1950 to 8bn in 2024) it will take over 300 years for humanity to reach a teratribe. And, taking Earth as being at maximum capacity, it would take over 1,000 Earthlike planets to support that population.}

<https://www.newscientist.com/article/mg26234960-100-why-humanitys-survival-may-depend-on-us-becoming-a-tribe-of-billions/>

PLoS One

PAPERS

RACHELLE K. GOULD et al – Nature is resource, playground, and gift: What artificial intelligence reveals about human–Nature relationships

This paper demonstrates how artificial-intelligence language analysis can inform understanding of human–nature relationships and other social phenomena. We demonstrate three techniques by investigating relationships within the popular word2vec word embedding, which is trained on a sample from over 50,000 worldwide news sources. Our first technique investigates what theory-generated analogies are most similar to nature:people. The resource:user analogy is most similar, followed by the playground:child and gift:receiver analogies. Our second technique explores whether nature-related words are affiliated with words that denote race, class, or gender. Nature words tend slightly toward associations with femininity and wealth. Our third technique demonstrates how the relationship between nature and wellbeing compares to other concepts’ relationships to wellbeing—e.g., spirituality–wellbeing, social relations–wellbeing. Nature is more semantically connected to wellbeing than money, social relations, and multiple other wellbeing correlates. Findings are consistent with previous social science and humanities research on human-nature relationships, but do not duplicate them exactly; our results thus offer insight into dominant trends and prevalence of associations. Our analysis also offers a model for using word embeddings to investigate a wide variety of topics.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0297294>

KARYN A. ANDERSON et al – Same-sex sexual behaviour among mammals is widely observed, yet seldomly reported: Evidence from an online expert survey

Same-sex sexual behaviour (SSSB) occurs in most animal clades, but published reports are largely concentrated in a few taxa. Thus, there remains a paucity of published reports for most mammalian species. We conducted a cross-sectional expert survey to better understand the underlying reasons for the lack of publications on this topic. Most respondents researched Primates (83.6%, N = 61), while the rest studied Carnivora (6.9%, N = 5), Rodentia (4.1%, N = 3), Artiodactyla (2.7%, N = 2), and Proboscidea (2.7%, N = 2). Most respondents (76.7%, N = 56) had observed SSSB in their study species, but only 48.2% (N = 27) collected data on SSSB, and few (18.5%, N = 5) had published papers on SSSB. Of the unique species identified as engaging in SSSB in the survey, 38.6% (N = 17) have no existing reports of SSSB to the knowledge of the authors. In both the survey questions and freeform responses, most respondents indicated that their lack of data collection or publication on SSSB was because the behaviours were rare, or because it was not a research priority of their lab. No respondents reported discomfort or sociopolitical concerns at their university or field site as a reason for why they did not collect data or publish on SSSB. Multiple logistic regressions were performed to assess whether taxa studied, education level, or identification within the LGBTQ+ community predicted observing, collecting data on, or publishing on SSSB, but none of these variables were significant predictors. These results provide preliminary evidence that SSSB occurs more frequently than what is available in the published record and suggest that this may be due to a publishing bias against anecdotal evidence.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0304885>

PNAS**ARTICLES****M. MITCHELL WALDROP – Can ChatGPT help researchers understand how the human brain handles language?**

Large language models are surprisingly good at mimicking our speech and writing. Now they're serving as an electronic lab rat for language, offering insights into the mysteries of one of humankind's most important abilities.

<https://www.pnas.org/doi/full/10.1073/pnas.2410196121>

PAPERS**TAYLOR A. HERSH, ANDREA RAVIGNANI & HAL WHITEHEAD – Cetaceans are the next frontier for vocal rhythm research**

While rhythm can facilitate and enhance many aspects of behavior, its evolutionary trajectory in vocal communication systems remains enigmatic. We can trace evolutionary processes by investigating rhythmic abilities in different species, but research to date has largely focused on songbirds and primates. We present evidence that cetaceans—whales, dolphins, and porpoises—are a missing piece of the puzzle for understanding why rhythm evolved in vocal communication systems. Cetaceans not only produce rhythmic vocalizations but also exhibit behaviors known or thought to play a role in the evolution of different features of rhythm. These behaviors include vocal learning abilities, advanced breathing control, sexually selected vocal displays, prolonged mother–infant bonds, and behavioral synchronization. The untapped comparative potential of cetaceans is further enhanced by high interspecific diversity, which generates natural ranges of vocal and social complexity for investigating various evolutionary hypotheses. We show that rhythm (particularly isochronous rhythm, when sounds are equally spaced in time) is prevalent in cetacean vocalizations but is used in different contexts by baleen and toothed whales. We also highlight key questions and research areas that will enhance understanding of vocal rhythms across taxa. By coupling an infraorder-level taxonomic assessment of vocal rhythm production with comparisons to other species, we illustrate how broadly comparative research can contribute to a more nuanced understanding of the prevalence, evolution, and possible functions of rhythm in animal communication.

<https://www.pnas.org/doi/full/10.1073/pnas.2313093121>

Proceedings of the Royal Society B**PAPERS****YURI KAWAGUCHI & D BRIDGET M. WALLER – Lorenz's classic 'baby schema': a useful biological concept?**

Konrad Lorenz introduced the concept of a 'baby schema', suggesting that infants have specific physical features, such as a relatively large head, large eyes and protruding cheeks, which function as an innate releaser to promote caretaking motivation from perceivers. Over the years, a large body of research has been conducted on the baby schema. However, there are two critical problems underpinning the current literature. First, the term 'baby schema' lacks consistency among researchers. Some researchers use the term baby schema to refer to infant stimuli (often faces) in comparison with adults (categorical usage), while others use the term to refer to the extent that features contribute to cuteness perception (spectrum usage). Second, cross-species continuity of the 'baby schema' has been assumed despite few empirical demonstrations. The evolutionary and comparative relevance of the concept is, therefore, debatable, and we cannot exclude the possibility that extreme sensitivity to the baby schema is a uniquely human trait. This article critically reviews the state of the existing literature and evaluates the significance of the baby schema from an evolutionary perspective.

<https://royalsocietypublishing.org/doi/10.1098/rspb.2024.0570>

OXÁNA BÁNSZEGI et al – Response to geometrical visual illusions in non-human animals: a meta-analysis

Visual illusions have been studied in many non-human species, spanning a wide range of biological and methodological variables. While early reviews have proved useful in providing an overview of the field, they have not been accompanied by quantitative analysis to systematically evaluate the contribution of biological and methodological moderators on the proportion of illusory choice. In the current meta-analytical study, we confirm that geometrical visual illusion perception is a general phenomenon among non-human animals. Additionally, we found that studies testing birds report stronger illusion perception compared to other classes, as do those on animals with lateral-positioned eyes compared to animals with forward-facing eyes. In terms of methodological choices, we found a positive correlation between the number of trials during training or testing and the effect sizes, while studies with larger samples report smaller effect sizes. Despite studies that trained animals with artificial stimuli showing larger effect sizes compared with those using spontaneous testing with naturalistic stimuli, like food, we found more recent studies prefer spontaneous choice over training. We discuss the challenges and bottlenecks in this area of study, which, if addressed, could lead to more successful advances in the future. <https://royalsocietypublishing.org/doi/10.1098/rspb.2024.0414>

NIKOLETA E. GLYNATSI, ALEX MCAVOY & CHRISTIAN HILBE – Evolution of reciprocity with limited payoff memory

Direct reciprocity is a mechanism for the evolution of cooperation in repeated social interactions. According to the literature, individuals naturally learn to adopt conditionally cooperative strategies if they have multiple encounters with their partner. Corresponding models have greatly facilitated our understanding of cooperation, yet they often make strong assumptions on how individuals remember and process payoff information. For example, when strategies are updated through social learning, it is commonly assumed that individuals compare their average payoffs. This would require them to compute (or remember) their payoffs against everyone else in the population. To understand how more realistic constraints influence direct reciprocity, we consider the evolution of conditional behaviours when individuals learn based on more recent experiences. Even in the most extreme case that they only take into account their very last interaction, we find that cooperation can still evolve. However, such individuals adopt less generous strategies, and they cooperate less often than in the classical setup with average payoffs. Interestingly, once individuals remember the payoffs of two or three recent interactions, cooperation rates quickly approach the classical limit. These findings contribute to a literature that explores which kind of cognitive capabilities are required for reciprocal cooperation. While our results suggest that some rudimentary form of payoff memory is necessary, it suffices to remember a few interactions. <https://royalsocietypublishing.org/doi/10.1098/rspb.2023.2493>

Royal Society Open Science**PAPERS****TIM JOHNSON – Empirically testing a relationship between cooperation and the prime numbers**

Theoretical models suggest a relationship between cooperation and the prime numbers. In environments where agents play multiple one-shot prisoner's dilemma games per generation, cooperators evolve to fixation more frequently when cooperating on a cyclical schedule with a prime-number period length. This finding parrots classic predator-prey models showing selection for prime-number prey life cycles. Here, I report an empirical test of the former models using previously published data concerning humans playing one-shot public goods games across multiple time points—i.e. an analogue to multiple one-shot prisoner's dilemma games. I find very modest evidence of cyclicity at prime-numbered time intervals, though results indicate rough agreement between theoretical predictions and observed rates of full cooperation across time points. Analyses of individual decisions find increased contributions to the public good at prime-number time points and separate placebo tests indicate a 4-in-1000 chance of spuriously estimating this effect. However, when exploratory analyses exclude low-value prime-numbered time points, the magnitude of the estimated effect decreases and the hypothesis of no effect cannot be rejected, implying that low-value, prime-number time points drive estimates, contrary to theoretical model predictions. These findings cast doubt on the hypothesis of increased cooperation at prime-number time points—at least among humans playing public goods games. <https://royalsocietypublishing.org/doi/10.1098/rsos.231425>

Science**PAPERS****C. TESTARD et al – Ecological disturbance alters the adaptive benefits of social ties**

Extreme weather events radically alter ecosystems. When ecological damage persists, selective pressures on individuals can change, leading to phenotypic adjustments. For group-living animals, social relationships may be a mechanism enabling adaptation to ecosystem disturbance. Yet whether such events alter selection on sociality and whether group-living animals can, as a result, adaptively change their social relationships remain untested. We leveraged 10 years of data collected on rhesus macaques before and after a category 4 hurricane caused persistent deforestation, exacerbating monkeys' exposure to intense heat. In response, macaques demonstrated persistently increased tolerance and decreased aggression toward

other monkeys, facilitating access to scarce shade critical for thermoregulation. Social tolerance predicted individual survival after the hurricane, but not before it, revealing a shift in the adaptive function of sociality.

<https://www.science.org/doi/10.1126/science.adk0606>

OBITUARIES

RAFAEL YUSTE & MICHAEL LEVIN – Daniel C. Dennett (1942-2024)

Daniel Clement Dennett, who merged philosophical thinking with scientific evidence from many fields, died on 19 April at age 82. In the central question of the nature of the mind, Dennett took a neuroscience-anchored position, arguing that consciousness and all higher cognitive abilities could be understood as a direct consequence of the physiology of the brain. He expanded his ideas in best-selling books about religion and evolution and became one of the strongest voices publicly defending atheism and Darwinism.

<https://www.science.org/doi/10.1126/science.adg5873>

Trends in Cognitive Sciences

PAPERS

DANIEL N. SCOTT et al – Thalamocortical architectures for flexible cognition and efficient learning

The brain exhibits a remarkable ability to learn and execute context-appropriate behaviors. How it achieves such flexibility, without sacrificing learning efficiency, is an important open question. Neuroscience, psychology, and engineering suggest that reusing and repurposing computations are part of the answer. Here, we review evidence that thalamocortical architectures may have evolved to facilitate these objectives of flexibility and efficiency by coordinating distributed computations. Recent work suggests that distributed prefrontal cortical networks compute with flexible codes, and that the mediodorsal thalamus provides regularization to promote efficient reuse. Thalamocortical interactions resemble hierarchical Bayesian computations, and their network implementation can be related to existing gating, synchronization, and hub theories of thalamic function. By reviewing recent findings and providing a novel synthesis, we highlight key research horizons integrating computation, cognition, and systems neuroscience.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(24\)00119-0](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(24)00119-0)

Trends in Ecology and Evolution

PAPERS

CÉDRIC SUEUR & MICHAEL A. HUFFMAN – Co-cultures: exploring interspecies culture among humans and other animals

The concept of ‘co-culture’ is introduced as a novel framework for understanding the mutual cultural evolution between animal species, including, but not only, humans. It explores the dynamics of interspecies interactions, particularly in how different species influence each other’s behavioural and cognitive adaptations. Various instances of interspecies cultural exchange are highlighted, such as the acquisition of medicinal plants from animals resulting in a shared medicinal culture, adaptive behaviours of urban wildlife, and cooperative behaviours between animal species. Co-culture challenges the notion of species-specific culture, underscoring the complexity and interconnectedness of human and animal societies, and between animal societies. Further research into co-culture is advocating and emphasising its implications for conservation, urban planning, and a deeper understanding of animal cognition and behaviour.

[https://www.cell.com/trends/ecology-evolution/abstract/S0169-5347\(24\)00122-8](https://www.cell.com/trends/ecology-evolution/abstract/S0169-5347(24)00122-8)

Trends in Neurosciences

PAPERS

RALDA NEHME, OLLI PIETILÄINEN & LINDY E. BARRETT – Genomic, molecular, and cellular divergence of the human brain

While many core biological processes are conserved across species, the human brain has evolved with unique capacities. Current understanding of the neurobiological mechanisms that endow human traits as well as associated vulnerabilities remains limited. However, emerging data have illuminated species divergence in DNA elements and genome organization, in molecular, morphological, and functional features of conserved neural cell types, as well as temporal differences in brain development. Here, we summarize recent data on unique features of the human brain and their complex implications for the study and treatment of brain diseases. We also consider key outstanding questions in the field and discuss the technologies and foundational knowledge that will be required to accelerate understanding of human neurobiology.

[https://www.cell.com/trends/neurosciences/fulltext/S0166-2236\(24\)00089-4](https://www.cell.com/trends/neurosciences/fulltext/S0166-2236(24)00089-4)

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