EAORC BULLETIN 1,122 – 15 December 2024

CONTENTS

NOTICES

FORMATTED VERSION OF THIS BULLETIN

A pdf formatted version if 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.

NEWS

KINGUISTICS – Linguistic Inbreeding: The Downfall Of AI?

Picture this, you are a university student staring down the barrel of impossible deadlines. With each second that passes, the feeling of impending doom seeps into your very existence. In a moment of desperation AI seems to be the only saviour, a lifeline, to spark some creativity. You enter your prompt, breath-bated, just waiting for what AI has to say. Only for it to spit out some lifeless robotic sentence that was Totally. Not. Written. By a human, Exhibit A :
'This paper delves into the intricate tapestry of AI incorporating multidimensional frameworks and interconnected structure of linguistic dynamics.'
Sigh. That is about as helpful as a blank page.
https://kinguistics.wordpress.com/2024/12/03/linguistic-inbreeding-the-downfall-of-ai/

SAPIENS – It's Time to Replace "Prehistory" With "Deep History"

A team of archaeologists working in Southeast Asia is pushing toward a deeper understanding of history that amplifies Indigenous and local perspectives to challenge traditional archaeological timelines.
https://www.sapiens.org/archaeology/prehistory-deep-history-southeast-asia/

SCIENCE DAILY – Iberian Neolithic societies had a deep knowledge of archery techniques and materials

A research team has made exceptional discoveries on prehistoric archery from the early Neolithic period, 7,000 years ago. The well organic preservation of the remains of the Cave of Los Murcielagos in Albunol, Granada, made it possible for scientists to identify the oldest bowstrings in Europe, which were made from the tendons of three animal species. The use of olive and reed wood and birch bark pitch in the making of arrows reveals an unprecedented degree of precision and technical mastery, as highlighted in the study. The discoveries redefine the limits of our knowledge about the earliest agricultural societies in Europe and provide a unique view on ancestral archery materials and practices.
https://www.sciencedaily.com/releases/2024/12/241205142749.htm

SCIENCE DAILY – Neurosurgery patients show numerical concepts are processed deep in the ancient brain

New research reveals the unique human ability to conceptualize numbers may be rooted deep within the brain.
{The idea that language came before arithmetic now looks less likely.}
https://www.sciencedaily.com/releases/2024/12/241203164614.htm

SCIENCE DAILY – Dogs use two-word button combos to communicate

A new study shows that dogs trained to use soundboards to 'talk' are capable of making two-word button combinations that go beyond random behavior or simple imitation of their owners.
https://www.sciencedaily.com/releases/2024/12/241209162449.htm

SCIENCE DAILY – Earliest deep-cave ritual compound in Southwest Asia discovered

A cave in Galilee, Israel, has yielded evidence for ritualistic gathering 35,000 years ago, the earliest on the Asian continent.
https://www.sciencedaily.com/releases/2024/12/241209162441.htm

SCIENCE DAILY – Could online tech be why boys in Norway are outperforming girls in learning English?

Bucking conventionality, boys in Norway are making early gains in reading English as a second language and even outperforming girls at age 10 and 13 -- a new a study of more than one million students suggests.
{Could second-language learning be needs-driven and not genetically predetermined?}
https://www.sciencedaily.com/releases/2024/12/241208200132.htm

SCIENCE DAILY – Resolving ambiguity: How the brain uses context in decision-making and learning

Life can be tricky. We have so many decisions to make. It's a good thing we have an orbitofrontal cortex and hippocampus to help us. These areas of the brain work together to help us sort through tasks that require resolving ambiguity, that is, situations in which the meaning of stimuli changes depending on context.
https://www.sciencedaily.com/releases/2024/12/241210142045.htm

SCIENCE DAILY – Intelligence requires the whole brain

A team of neuroscientists investigates communication pathways in the brain and predicts intelligence. A new study approach uses machine learning to improve our conceptual understanding of intelligence.
https://www.sciencedaily.com/releases/2024/12/241211124837.htm

SCIENCE DAILY – A new timeline for Neanderthal interbreeding with modern humans

Neanderthal genes make up 1-2% of the genomes of non-Africans. Scientists analyzed the lengths of regions of Neanderthal DNA in 58 ancient Eurasian genomes of early modern humans and determined that the introgressed genes result from interbreeding between Homo sapiens and Neanderthals about 47,000 years ago, over a single, extended period of about 7,000 years. The findings help pin down dates for out-of-Africa migration and the dispersal of Homo sapiens.
https://www.sciencedaily.com/releases/2024/12/241212145726.htm

SCIENCE DAILY – Oldest modern human genomes sequenced

Few genomes have been sequenced from early modern humans, who first arrived in Europe when the region was already inhabited by Neanderthals. An international team has now sequenced the oldest modern human genomes to date. The genomes were recovered from seven individuals who lived between 42,000 and 49,000 years ago in Ranis, Germany and Zlaty kun, Czechia. These genomes belonged to individuals who were part of a small, closely related human group that first split off from the population that left Africa around 50,000 years ago and later settled the rest of the world. Although they separated early, the Neanderthal DNA in their genomes traces back to an admixture event common to all people outside Africa, that the researchers date to around 45,000-49,000 years ago, much later than previously thought.
https://www.sciencedaily.com/releases/2024/12/241212145718.htm

SCIENCE DAILY – Do animals get jealous like people? Researchers say it's complicated

Using data from 23 studies of what psychologists call 'inequity aversion,' researchers combed through results of more than 60,000 observations involving 18 animal species. In what they said was the 'largest empirical investigation of non-human inequity aversion to date,' the team reconstructed data analyses and used a new metric that adds depth to the concept of fairness.
https://www.sciencedaily.com/releases/2024/12/241212145708.htm

SCIENCE.ORG NEWS – 'Enigmatic' cave art was made by ice age children

Charcoal doodling appears 14,000 years ago, as adults drew more proficiently nearby.
https://www.science.org/content/article/enigmatic-cave-art-was-made-ice-age-children

THE CONVERSATION – How primate eye tracking reveals new insights into the evolution of language

How apes make sense of actions is shedding new light on the evolution of a key component of human language.
https://theconversation.com/how-primate-eye-tracking-reveals-new-insights-into-the-evolution-of-language-245110

THE CONVERSATION – People who are good at reading have different brains

Reading can change the brain.
https://theconversation.com/people-who-are-good-at-reading-have-different-brains-244786

PUBLICATIONS

Current Biology

PAPERS

QING LI et al – PITX2 expression and Neanderthal introgression in HS3ST3A1 contribute to variation in tooth dimensions in modern humans

Dental morphology varies greatly throughout evolution, including in the human lineage, but little is known about the biology of this variation. Here, we use multiomics analyses to examine the genetics of variation in tooth crown dimensions. In a human cohort with mixed continental ancestry, we detected genome-wide significant associations at 18 genome regions. One region includes EDAR, a gene known to impact dental features in East Asians. Furthermore, we find that EDAR variants increase the mesiodistal diameter of all teeth, following an anterior-posterior gradient of decreasing strength. Among the 17 novel-associated regions, we replicate 7/13 in an independent human cohort and find that 4/12 orthologous regions affect molar size in mice. Two association signals point to compelling candidate genes. One is ~61 kb from PITX2, a major determinant of tooth development. Another overlaps HS3ST3A1, a paralogous neighbor of HS3ST3B1, a tooth enamel knot factor. We document the expression of Pitx2 and Hs3st3a1 in enamel knot and dental epithelial cells of developing mouse incisors. Furthermore, associated SNPs in PITX2 and HS3ST3A1 overlap enhancers active in these cells, suggesting a role for these SNPs in gene regulation during dental development. In addition, we document that Pitx2 and Hs3st3a1/Hs3st3b1 knockout mice show alterations in dental morphology. Finally, we find that associated SNPs in HS3ST3A1 are in a DNA tract introgressed from Neanderthals, consistent with an involvement of HS3ST3A1 in tooth size variation during human evolution.
https://www.cell.com/current-biology/fulltext/S0960-9822(24)01568-9

Evolutionary Human Sciences

PAPERS

JOSHUA C. MACDONALD et al with MARCUS W. FELDMAN – Cultural transmission, networks, and clusters among Austronesian-speaking peoples

With its linguistic and cultural diversity, Austronesia is important in the study of evolutionary forces that generate and maintain cultural variation. By analysing publicly available datasets, we have identified four classes of cultural features in Austronesia and distinct clusters within each class. We hypothesized that there are differing modes of transmission and patterns of variation in these cultural classes and that geography alone would be insufficient to explain some of these patterns of variation. We detected relative differences in the verticality of transmission and distinct patterns of cultural variation in each cultural class. There is support for pulses and pauses in the Austronesian expansion, a west-to-east increase in isolation with explicable exceptions, and correspondence between linguistic and cultural outliers. Our results demonstrate how cultural transmission and patterns of variation can be analysed using methods inspired by population genetics.
https://www.cambridge.org/core/journals/evolutionary-human-sciences/article/cultural-transmission-networks-and-clusters-among-austronesianspeaking-peoples/4BDE1981FDA95FDD4C54A7BDA90E62EA

Frontiers in Ecology and Evolution

PAPERS

RUTH SONNWEBER et al with TOBIAS DESCHNER & BARBARA FRUTH – Average phenotype but not plasticity in two metabolic hormones covary in wild female bonobos (Pan paniscus)

Each individual is equipped with a distinct genetic disposition and ontogenetic history and experiences environmental conditions in a unique way. As a result, individuals vary in terms of phenotypic differences regarding their responses to internal and external conditions. By modulating hormone secretion, an individual can react to changing conditions, thus maintaining homeostasis. Cortisol and triiodothyronine (T3) are involved in mediating energy homeostasis. The secretion of metabolic hormones enables individuals to respond flexibly to internal and external conditions. However, this flexibility may be constrained by tradeoffs between average hormone levels and the degree of hormonal plasticity and the impact of the HPA axis on T3 secretion and effects. Like many other species, bonobos (Pan paniscus) are confronted with rapid ecological and climatic perturbations, resulting in challenges to energetic homeostasis. Due to their limited genetic diversity, K-strategist and stenoecious species characteristics, they are predicted to have only limited potential for adaptation. Therefore, it is important to quantify individual cortisol and T3 reaction norms and examine their relationship with each other to understand the level of flexibility of metabolic hormone phenotypes. Using a multivariate random slope model, we found that diurnal urinary excretion patterns of cortisol and T3 in wild female bonobos have (i) no relationship between average phenotype and plasticity within the reaction norms of both hormones. (ii) We also found a negative correlation between the intercepts of the two metabolic hormones, but (iii) no relationship between their slopes. (iv) Standard deviations of cortisol and T3 intercepts and slopes between females indicate little variation among females. Our data show that plasticity within and between the two metabolic hormones is not related to overall low or high hormone levels, but there is a linear negative relationship between cortisol and T3 average phenotypes. Thus, individuals with high average cortisol levels, investing in restoring energy depots, have low average T3 levels, reducing energy expenditure, and vice versa. From this we conclude that the plasticity of diurnal hormone excretion is not affected by average metabolic hormone phenotypes. Evaluations of

cortisol and T3 plasticity along ecological gradients can enhance our understanding of the adaptive potential of a given species to environmental changes.
https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2023.1300003/full

Frontiers in Integrative Neuroscience

PAPERS

KATHERINE EULAU & KATHY HIRSH-PASEK – From behavioral synchrony to language and beyond

Decades of research on joint attention, coordinated joint engagement, and social contingency identify caregiver-child interaction in infancy as a foundation for language. These patterns of early behavioral synchrony contribute to the structure and connectivity of the brain in the temporoparietal regions typically associated with language skills. Thus, children attune to their communication partner and subsequently build cognitive skills directly relating to comprehension and production of language, literacy skills, and beyond. This has yielded marked interest in measuring this contingent, synchronous social behavior neurally. Neurological measures of early social interactions between caregiver and child have become a hotbed for research. In this paper, we review that research and suggest that these early neural couplings between adults and children lay the foundation for a broader cognitive system that includes attention, problem solving, and executive function skills. This review describes the role of behavioral synchrony in language development, asks what the relationship is between neural synchrony and language growth, and how neural synchrony may play a role in the development of a broader cognitive system founded in a socially-gated brain. We address the known neural correlates of these processes with an emphasis on work that examines the tight temporal contingency between communicative partners during these rich social interactions, with a focus on EEG and fNIRS and brief survey of MRI and MEG.
https://www.frontiersin.org/journals/integrative-neuroscience/articles/10.3389/fnint.2024.1488977/full

Frontiers in Psychology

PAPERS

SILVIA POLVER et al – Developmental origins of natural sound perception

Infants are exposed to a myriad of sounds early in life, including caregivers' speech, songs, human-made and natural (non-anthropogenic) environmental sounds. While decades of research have established that infants have sophisticated perceptual abilities to process speech, less is known about how they perceive natural environmental sounds. This review synthesizes current findings about the perception of natural environmental sounds in the first years of life, emphasizing their role in auditory development and describing how these studies contribute to the emerging field of human auditory ecology. Some of the existing studies explore infants' responses to animal vocalizations and water sounds. Infants demonstrate an initial broad sensitivity to primate vocalizations, which narrows to human speech through experience. They also show early recognition of water sounds, with preferences for natural over artificial water sounds already at birth, indicating an evolutionary ancient sensitivity. However, this ability undergoes refinement with age and experience. The few studies available suggest that infants' auditory processing of natural sounds is complex and influenced by both genetic predispositions and exposure. Building on these existing results, this review highlights the need for ecologically valid experimental paradigms that better represent the natural auditory environments humans evolved in. Understanding how children process natural soundscapes not only deepens our understanding of auditory development but also offers practical insights for advancing environmental awareness, improving auditory interventions for children with hearing loss, and promoting wellbeing through exposure to natural sounds.
https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1474961/full

Human Nature

PAPERS

HUGO MEIJER – The Origins of War: A Global Archaeological Review

How old is war? Is it a deep-seated propensity in the human species or is it a recent cultural invention? This article investigates the archaeological evidence for prehistoric war across world regions by probing two competing hypotheses. The “deep roots” thesis asserts that war is an evolved adaptation that humans inherited from their common ancestor with chimpanzees, from which they split around seven million years ago, and that persisted throughout prehistory, encompassing both nomadic and sedentary hunter-gatherer societies. In contrast, the “shallow roots” viewpoint posits that peaceful intergroup relations are ancestral in humans, suggesting that war emerged only recently with the development of sedentary, hierarchical, and densely populated societies, prompted by the agricultural revolution ~ 12,000–10,000 years ago. To ascertain which position is best supported by the available empirical evidence, this article reviews the prehistoric archaeological record for both interpersonal and intergroup conflict across world regions, following an approximate chronological sequence from the emergence of humans in Africa to their dispersal out of Africa in the Near East, Europe, Australia, Northeast Asia, and the Americas. This worldwide analysis of the archaeological record lends partial support to both positions, but neither the “deep roots” nor the “shallow roots” argument is fully vindicated. Intergroup relations among prehistoric hunter-gatherers were marked neither by relentless war nor by unceasingly peaceful interactions. What emerges from the archaeological record is that, while lethal violence has deep roots in the Homo lineage, prehistoric group

interactions—ranging from peaceful cooperation to conflict—exhibited considerable plasticity and variability, both over time and across world regions, which constitutes the true evolutionary puzzle.
https://link.springer.com/article/10.1007/s12110-024-09477-3

ROGER MYERSON – Focal Coordination and Language in Human Evolution
We study game-theoretic models of human evolution to analyze fundamentals of human nature. Rival-claimants games represent common situations in which animals can avoid conflict over valuable resources by mutually recognizing asymmetric claiming rights. Unlike social-dilemma games, rival-claimants games have multiple equilibria which create a rational role for communication, and so they may be good models for the role of language in human evolution. Many social animals avoid conflict by dominance rankings, but intelligence and language allow mutual recognition of more complex norms for determining political rank or economic ownership. Sophisticated forms of economic ownership could become more advantageous when bipedalism allowed adaptation of hands for manufacturing useful objects. Cultural norms for claiming rights could develop and persist across generations in communities where the young have an innate interest in learning from their elders about when one can appropriately claim desirable objects. Then competition across communities would favor cultures where claiming rights are earned by prosocial behavior, such as contributions to public goods. With the development of larger societies in which many local communities share a common culture, individuals would prefer to interact with strangers who identifiably share this culture, because shared cultural principles reduce risks of conflict in rival-claimants games.
https://link.springer.com/article/10.1007/s12110-024-09476-4

Nature

ARTICLES

FREDA KREIER – Neanderthal clues in oldest human genomes
All people, other than those whose ancestry comes solely from sub-Saharan Africa, have some Neanderthal DNA. Now two studies suggest that it entered our genomes virtually overnight, much more recently than was thought. One study finds that modern humans and Neanderthals interbred in a roughly 7,000-year period starting around 50,500 years ago; the other finds that the mixing took place between 45,000 and 49,000 years ago. The results and other insights come in part from the oldest human genomes ever sequenced: a male Homo sapiens found near Ranis, Germany, and a female Homo sapiens whose remains were discovered in a cave at a site called Zlatý kůň in the Czech Republic.
https://www.nature.com/articles/d41586-024-04065-y

ANDERS BERGSTRÖM, JAMES A. FELLOWS YATES & CHRISTINA WARINNER – Ancient DNA data hold insights into past organisms and ecosystems — handle them with more care
DNA recovered from ancient remains is transforming our understanding of organisms and ecosystems from tens, thousands and even millions of years ago – but the growing volume of data must be better preserved.
https://www.nature.com/articles/d41586-024-03993-z

PAPERS

AREV P. SÜMER et mul with KAY PRÜFER & JOHANNES KRAUSE – Earliest modern human genomes constrain timing of Neanderthal admixture
Modern humans arrived in Europe more than 45,000 years ago, overlapping at least 5,000 years with Neanderthals. Limited genomic data from these early modern humans have shown that at least two genetically distinct groups inhabited Europe, represented by Zlatý kůň, Czechia and Bacho Kiro, Bulgaria. Here we deepen our understanding of early modern humans by analyzing one high-coverage genome and five low-coverage genomes from ~45,000 year-old remains from Ilsenhöhle in Ranis, Germany, and a further high-coverage genome from Zlatý kůň. We show that distant familial relationships link the Ranis and Zlatý kůň individuals and that they were part of the same small, isolated population that represents the deepest known split from the Out-of-Africa lineage. Ranis genomes harbor Neanderthal segments that originate from a single admixture event shared with all non-Africans that we date to ~45,000-49,000 years ago. This implies that ancestors of all non-Africans sequenced to-date resided in a common population at this time, and further suggests that modern human remains older than 50,000 years from outside Africa represent different non-African populations.
https://www.nature.com/articles/s41586-024-08420-x

REVIEWS

NATHANIEL COMFORT – Richard Dawkins's book of the dead is haunted by ghosts of past works
The Oxford ethologist offers glimpses of evolutionary history — but plays it too safe.
Review of 'The Genetic Book of the Dead: A Darwinian Reverie' by Richard Dawkins, Yale University Press (2024).
https://www.nature.com/articles/d41586-024-03991-1

Nature Computational Science

PAPERS

TIANCHENG HU et al – Generative language models exhibit social identity biases

Social identity biases, particularly the tendency to favor one's own group (ingroup solidarity) and derogate other groups (outgroup hostility), are deeply rooted in human psychology and social behavior. However, it is unknown if such biases are also present in artificial intelligence systems. Here we show that large language models (LLMs) exhibit patterns of social identity bias, similarly to humans. By administering sentence completion prompts to 77 different LLMs (for instance, 'We are…'), we demonstrate that nearly all base models and some instruction-tuned and preference-tuned models display clear ingroup favoritism and outgroup derogation. These biases manifest both in controlled experimental settings and in naturalistic human–LLM conversations. However, we find that careful curation of training data and specialized fine-tuning can substantially reduce bias levels. These findings have important implications for developing more equitable artificial intelligence systems and highlight the urgent need to understand how human–LLM interactions might reinforce existing social biases.

https://www.nature.com/articles/s43588-024-00741-1

Nature Ecology & Evolution

PAPERS

RÉMI TOURNEBIZE & LOUNÈS CHIKHI – Ignoring population structure in hominin evolutionary models can lead to the inference of spurious admixture events

Genomic and ancient DNA data have revolutionized palaeoanthropology and our vision of human evolution, with indisputable landmarks like the sequencing of Neanderthal and Denisovan genomes. Yet, using genetic data to identify, date and quantify evolutionary events—such as ancient bottlenecks or admixture—is not straightforward, as inferences may depend on model assumptions. In the last two decades, the idea that Neanderthals and members of the Homo sapiens lineage interbred has gained momentum. From the status of unlikely theory, it has reached consensus among human evolutionary biologists. This theory is mainly supported by statistical approaches that depend on demographic models minimizing or ignoring population structure, despite its widespread occurrence and the fact that, when ignored, population structure can lead to the inference of spurious demographic events. We simulated genomic data under a structured and admixture-free model of human evolution, and found that all the tested admixture approaches identified long Neanderthal fragments in our simulated genomes and an admixture event that never took place. We also observed that several published admixture models failed to predict important empirical diversity or admixture statistics, and that we could identify several scenarios from our structured model that better predicted these statistics jointly. Using a simulated time series of ancient DNA, the structured scenarios could also predict the trajectory of the empirical D statistics. Our results suggest that models accounting for population structure are fundamental to improve our understanding of human evolution, and that admixture between Neanderthals and H. sapiens needs to be re-evaluated in the light of structured models. Beyond the Neanderthal case, we argue that ancient hybridization events, which are increasingly documented in many species, including with other hominins, may also benefit from such re-evaluation.

https://www.nature.com/articles/s41559-024-02591-6

OBITUARIES

FRANCESCO D'ERRICO, LYN WADLEY & CHRIS HENSHILWOOD – Paola Villa (1939–2024)

Paola Villa's contributions to prehistoric archaeology were vast and covered a remarkable range, from the Lower Palaeolithic to the Neolithic. Her work spanned methodological advances — such as pioneering research on breakage patterns of human and animal bones, and multiple contributions on site formation processes and bone taphonomy — to in-depth analyses of major Lower and Middle Palaeolithic sites in Italy and Spain, and Middle Stone Age sites in southern Africa. She made groundbreaking discoveries, such as firmly identifying cannibalism in the Neolithic (P. Villa et al. Science 233, 431–437; 1986) and demonstrating the use of controlled heating and pressure-flaking techniques to shape 73,000-year-old bifacial points at Blombos Cave in South Africa (V. Mourre et al. Science 330, 659–662; 2010). She showed that the latter innovation occurred 50,000 years earlier than previously documented, which redefined the timeline of these key technological achievements. Her extensive work provided insights into topics as varied as the first colonization of and earliest deliberate use of fire in Europe; Neanderthal hunting weapons, cognition and demise; as well as the use of bone and ivory tools in the Lower and Middle Palaeolithic of Europe. Known for her tenacity, encyclopaedic knowledge and collaborative spirit, Paola combined rigour with innovation and transformed every project she undertook.

https://www.nature.com/articles/s41559-024-02616-0

Nature Scientific Reports

PAPERS

AMALIA P. M. BASTOS et al – Soundboard-trained dogs produce non-accidental, non-random and non-imitative two-button combinations

Early studies attempting interspecies communication with great apes trained to use sign language and Augmented Interspecies Communication (AIC) devices were limited by methodological and technological constraints, as well as restrictive sample sizes. Evidence for animals' intentional production of symbols was met with considerable criticisms which could not be easily deflected with existing data. More recently, thousands of pet dogs have been trained with AIC devices comprising soundboards of buttons that can be pressed to produce prerecorded human words or phrases. However, the nature of pets' button presses remains an open question: are presses deliberate, and potentially meaningful? Using a large dataset of button presses by family dogs and their owners, we investigate whether dogs' button presses are (i) non-accidental, (ii) non-random, and (iii) not mere repetitions of their owners' presses. Our analyses reveal that, at the population level, soundboard use by dogs cannot be explained by random pressing, and that certain two-button concept combinations appear more often than expected by chance at the population level. We also find that dogs' presses are not perfectly predicted by their owners', suggesting that dogs' presses are not merely repetitions of human presses, therefore suggesting that dog soundboard use is deliberate.
https://www.nature.com/articles/s41598-024-79517-6

Neuron

PAPERS

QIUHONG XIN et al – Deconstructing the neural circuit underlying social hierarchy in mice

Social competition determines hierarchical social status, which profoundly influences animals' behavior and health. The dorsomedial prefrontal cortex (dmPFC) plays a fundamental role in regulating social competitions, but it was unclear how the dmPFC orchestrates win- and lose-related behaviors through its downstream neural circuits. Here, through whole-brain c-Fos mapping, fiber photometry, and optogenetics- or chemogenetics-based manipulations, we identified anatomically segregated win- and lose-related neural pathways downstream of the dmPFC in mice. Specifically, layer 5 neurons projecting to the dorsal raphe nucleus (DRN) and periaqueductal gray (PAG) promote social competition, whereas layer 2/3 neurons projecting to the anterior basolateral amygdala (aBLA) suppress competition. These two neuronal populations show opposite changes in activity during effortful pushes in competition. In vivo and in vitro electrophysiology recordings revealed inhibition from the lose-related pathway to the win-related pathway. Such antagonistic interplay may represent a central principle in how the mPFC orchestrates complex behaviors through top-down control.
https://www.cell.com/neuron/abstract/S0896-6273(24)00807-9

New Scientist

NEWS

Mesopotamians felt happiness in their liver and anger in their thighs

An analysis of ancient cuneiform texts suggests people thought of emotions in a different way almost 3000 years ago, showing how culture influences our most intimate experiences.
https://www.newscientist.com/article/2458952-mesopotamians-felt-happiness-in-their-liver-and-anger-in-their-thighs/

ARTICLES

MICHAEL MARSHALL – Game-changing archaeology from the past 5 years – and what's to come

Leading archaeologists share the biggest recent advances in our understanding of human evolution, and their hopes for the exciting finds the next five years may have in store.
https://www.newscientist.com/article/2459645-game-changing-archaeology-from-the-past-5-years-and-whats-to-come/

MICHAEL LE PAGE – Toddler bones show mammoths were the main food of the first Americans

The bones of a child who died nearly 13,000 years ago suggest that the people who moved from Asia into North America at this time ate a lot of mammoth.
https://www.newscientist.com/article/2458844-toddler-bones-show-mammoths-were-the-main-food-of-the-first-americans/

THOMAS LEWTON – She's obsessed with chicken! The tests revealing my dog's inner life

Dog owners often wonder what's really going on between their pets' fluffy ears. Now, savvy experiments and new technology are finally giving us a clearer glimpse.
https://www.newscientist.com/article/mg26435213-300-shes-obsessed-with-chicken-the-tests-revealing-my-dogs-inner-life/

Philosophy Now

ARTICLES

RAYMOND TALLIS – "I refute it thus"
Raymond Tallis kicks immaterialism into touch.
https://philosophynow.org/issues/165/I_refute_it_thus

IGNACIO GONZALEZ-MARTINEZ – Metaphors & Creativity
Ignacio Gonzalez-Martinez has a flash of inspiration about the role metaphors play in creative thought.
https://philosophynow.org/issues/165/Metaphors_and_Creativity

Physics of Life Reviews

PAPERS

BALTHASAR BICKEL, ANNE-LISE GIRAUD, KLAUS ZUBERBÜHLER & CAREL P. VAN SCHAIK – Language follows a distinct mode of extra-genomic evolution
As one of the most specific, yet most diverse of human behaviors, language is shaped by both genomic and extra-genomic evolution. Sharing methods and models between these modes of evolution has significantly advanced our understanding of language and inspired generalized theories of its evolution. Progress is hampered, however, by the fact that the extra-genomic evolution of languages, i.e. linguistic evolution, maps only partially to other forms of evolution. Contrasting it with the biological evolution of eukaryotes and the cultural evolution of technology as the best understood models, we show that linguistic evolution is special by yielding a stationary dynamic rather than stable solutions, and that this dynamic allows the use of language change for social differentiation while maintaining its global adaptiveness. Linguistic evolution furthermore differs from technological evolution by requiring vertical transmission, allowing the reconstruction of phylogenies; and it differs from eukaryotic biological evolution by foregoing a genotype vs phenotype distinction, allowing deliberate and biased change. Recognising these differences will improve our empirical tools and open new avenues for analyzing how linguistic, cultural, and biological evolution interacted with each other when language emerged in the hominin lineage. Importantly, our framework will help to cope with unprecedented scientific and ethical challenges that presently arise from how rapid cultural evolution impacts language, most urgently from interventional clinical tools for language disorders, potential epigenetic effects of technology on language, artificial intelligence and linguistic communicators, and global losses of linguistic diversity and identity. Beyond language, the distinctions made here allow identifying variation in other forms of biological and cultural evolution, developing new perspectives for empirical research.
https://www.sciencedirect.com/science/article/pii/S1571064524000939

COMMENTARIES

SALIKOKO S. MUFWENE – Languages are cultural artifacts and align with cultural evolution: Comment on "Language follows a distinct mode of extra-genomic evolution" by Balthasar Bickel, Anne-Lise Giraud, Klaus Zuberbühler, Carel P. van Schaik (this issue)
As much as I like Balthasar Bickel et al's thought-provoking lead article, I cannot help voicing my disagreement about the three-way distinction they make between biology, language, and culture, as well as about a few details of their discussion. As I explained in Mufwene (2019), language is one of the multiple domains of culture, which include religion, music, dance, cuisine, arts, sports, and large complex social structures, among many others. The authors seem to have a narrow conception of technology, by contrast with Arthur (2009), according to whom technology it is whatever can be used as a tool to solve a problem or accomplish something else (including providing pleasure). The term applies not only to material cultures, on which Bickel et al. focus, but also non-material and hybrid ones, such as languages. Thus, all the above sample domains that play important roles in our lives are not only parts of human cultures but also technologies to achieve a purpose. For instance, cuisine is technology to make food (more) palatable, in addition to getting rid of toxins that some food items may contain in their raw state. Religion consists of beliefs about the universe in which we live, up to the point of prescribing rituals that putatively keep us in harmony with nature or how to restore the latter when it is broken.
https://www.sciencedirect.com/science/article/pii/S1571064524001714

PLoS One

PAPERS

FLOOR MEEWIS et al – A comparative study of causal perception in Guinea baboons (Papio papio) and human adults
In humans, simple 2D visual displays of launching events ("Michottean launches") can evoke the impression of causality. Direct launching events are regarded as causal, but similar events with a temporal and/or spatial gap between the movements of the two objects, as non-causal. This ability to distinguish between causal and non-causal events is perceptual in nature and develops early and preverbally in infancy. In the present study we investigated the evolutionary origins of this phenomenon and tested whether Guinea baboons (Papio papio) perceive causality in launching events. We used a novel paradigm which was designed to distinguish between the use of causality and the use of spatiotemporal properties. Our results indicate that Guinea baboons successfully discriminate between different Michottean events, but we did not find a

learning advantage for a categorisation based on causality as was the case for human adults. Our results imply that, contrary to humans, baboons focused on the spatial and temporal gaps to achieve accurate categorisation, but not on causality per se. Understanding how animals perceive causality is important to figure out whether non-human animals comprehend events similarly to humans. Our study hints at a different manner of processing physical causality for Guinea baboons and human adults.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0311294

YUANMIN ZHANG et al – Emotion inference in conversations based on commonsense enhancement and graph structures

In the task of emotion inference, a common issue is the lack of common sense knowledge, particularly in the context of dialogue, where traditional research has failed to effectively extract structural features, resulting in lower accuracy in emotion inference. To address this, this paper proposes a dialogue emotion inference model based on Common Sense Enhancement and Graph Model (CEICG). This model integrates external common sense with graph model techniques by dynamically constructing nodes and defining diverse edge relations to simulate the evolution of dialogue, thereby effectively capturing the structural and semantic features of the conversation. The model employs two methods to incorporate external common sense into the graph model, overcoming the limitations of previous models in understanding complex dialogue structures and the absence of external knowledge. This strategy of integrating external common sense significantly enhances the model's emotion inference capabilities, improving the understanding of emotions in dialogue. Experimental results demonstrate that the CEICG model outperforms six existing baseline models in emotion inference tasks across three datasets.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0315039

KATHARINA FUCHS et al – Life and death in Trypillia times: Interdisciplinary analyses of the unique human remains from the settlement of Kosenivka, Ukraine (3700–3600 BCE)

We present an interdisciplinary analysis of finds from the Trypillia settlement of Kosenivka, Ukraine (ca. 3700–3600 BCE, Trypillia C1–2), that links information on human, faunal, and botanical remains with archaeological data to provide exceptionally detailed insights into life and death at a giant Trypillia settlement. We obtained osteological, palaeopathological, morphological and histotaphonomic data from human bone fragments; performed carbon and nitrogen stable isotopic analysis of human and animal bone to calculate food webs; modelled newly generated radiocarbon dates to refine the site's chronology; and contextualised the finds within the phenomenon of a general lack of human remains in Early and Middle Trypillia times through a literature review. Regarding the sphere of life, the biological profile of seven identified individuals reconstructed from the highly fragmented and partially burnt bones represents a demographic cross-section of the population. We documented disease symptoms common in the Chalcolithic and two cases of perimortem cranial trauma. Furthermore, food web calculations demonstrate the large contribution of cereals to the protein component of the human diet, which is supported by dental observations. We suggest that livestock were a major manure producer for crop cultivation, while meat contributed less than 10% to the human diet. Regarding the sphere of death, multidisciplinary data suggest a deadly fire event as one probable scenario for the formation of the Kosenivka find assemblage. This could be a rare example that sheds light on household size in prehistoric times. Furthermore, it adds to the extremely small number of human bone finds in Early and Middle Trypillia sites (A–C1), preceding the shift to extramural burials in its late phase (C2) in some regions. Altogether, our results indicate the huge explanatory potential that has yet to be unlocked in the rare and often poorly preserved bioarchaeological archives of the Cucuteni–Trypillia phenomenon.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0289769

CORRECTIONS

FELIX RIEDE et al – Correction: A quantitative analysis of Final Palaeolithic/earliest Mesolithic cultural taxonomy and evolution in Europe

There are errors in the Author Contributions. The correct contributions are:
CONCEPTUALIZATION: Felix Riede, David N. Matzig, Shumon T. Hussain.
DATA CURATION: David N. Matzig, Shumon T. Hussain.
FORMAL ANALYSIS: David N. Matzig, Shumon T. Hussain.
FUNDING ACQUISITION: Felix Riede.
INVESTIGATION: Felix Riede, Miguel Biard, Philippe Crombé, Javier Fernández-Lopéz de Pablo, Federica Fontana, Daniel Groß, Thomas Hess, Mathieu Langlais, Ludovic Mevel, William Mills, Martin Moník, Nicolas Naudinot, Caroline Posch, Tomas Rimkus, Damian Stefański, Hans Vandendriessche, Shumon T. Hussain.
METHODOLOGY: Felix Riede, David N. Matzig, Shumon T. Hussain.
PROJECT ADMINISTRATION: Felix Riede, David N. Matzig, Shumon T. Hussain.
RESOURCES: Felix Riede.
SOFTWARE: David N. Matzig, Shumon T. Hussain.
SUPERVISION: Felix Riede, Shumon T. Hussain.

VALIDATION: Felix Riede, Miguel Biard, Philippe Crombé, Javier Fernández-Lopéz de Pablo, Federica Fontana, Daniel Groß, Thomas Hess, Mathieu Langlais, Ludovic Mevel, William Mills, Martin Moník, Nicolas Naudinot, Caroline Posch, Tomas Rimkus, Damian Stefański, Hans Vandendriessche, Shumon T. Hussain.
VISUALIZATION: Felix Riede, David N. Matzig, Shumon T. Hussain.
WRITING–ORIGINAL DRAFT: Felix Riede, David N. Matzig, Shumon T. Hussain.
WRITING–REVIEW & EDITING: Felix Riede, David N. Matzig, Miguel Biard, Philippe Crombé, Javier Fernández-Lopéz de Pablo, Federica Fontana, Daniel Groß, Thomas Hess, Mathieu Langlais, Ludovic Mevel, William Mills, Martin Moník, Nicolas Naudinot, Caroline Posch, Tomas Rimkus, Damian Stefański, Hans Vandendriessche, Shumon T. Hussain.
Original paper in EAORC 1,083, https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0299512
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0315964

Proceedings of the Royal Society B

PAPERS

JINGSHU SONG et al – Stimulus-dependent emergence of understanding the 'same–different' concept in budgerigars
The ability to understand relational concepts, such as 'same' and 'different', is a critical feature of human cognition. To what extent non-human animals can acquire such concepts and which factors influence their learning are still unclear. We examined the acquisition and the breadth of understanding the 'same–different' concept in budgerigars (Melopsittacus undulatus). Budgerigars trained to discriminate stimulus pairs in which two identical figures were either the same or different size (Experiment 1) successfully generalized the discrimination to novel stimuli belonging to various categories (size, colour, shape, geometric type and number of dots). The results of Experiment 1 thus demonstrate that budgerigars can perceive and generalize the same–different concept across dimensions after training with a limited set of stimuli differing along a single dimension. In contrast, while most budgerigars trained to discriminate two pairs of discs that were either the same or different in colour (Experiment 2) could generalize the discrimination to novel stimuli within the training category (colour), only few generalized the discrimination to another category suggesting a generalization based on perceptual similarity. The results thus show that whether budgerigars generalize a relationship by conceptual or perceptual similarity depends on the nature of the training stimuli.
https://royalsocietypublishing.org/doi/10.1098/rspb.2024.1862

JACK L. ANDREWS, KARINA GRUNEWALD & SUSANNE SCHWEIZER – A human working memory advantage for social network information
As a social species, humans live in complexly bounded social groups. In order to navigate these networks, humans rely on a set of social–cognitive processes, including social working memory. Here, we designed a novel network memory task to study working memory for social versus non-social network information across 241 participants (18–65 years) in a tightly controlled, preregistered study. We show that humans demonstrate a working memory advantage for social, relative to non-social, network information. We also observed a self-relevant positivity bias, but an 'other' negativity bias. These findings are interpreted in the context of an evolutionary need to belong to one's social group, to identify risks to one's social safety and to appropriately track one's social status within a complex network of social relationships.
https://royalsocietypublishing.org/doi/10.1098/rspb.2024.1930

RUCHA KULKARNI et al – Humans exploit the trade-off between lateral stability and manoeuvrability during walking
People use the mechanical interplay between stability and manoeuvrability to successfully walk. During single-limb support, body states (position and velocity) that increase in lateral stability will inherently resist lateral manoeuvres, decrease medial stability and facilitate medial manoeuvres. Although not well understood, people can make behavioural decisions exploiting this relationship in anticipation of perturbations or direction changes. To characterize the behavioural component of the stability–manoeuvrability relationship, 24 participants performed many repetitions of a discrete stepping task involving mid-trial reactive manoeuvres (medial or lateral direction) in a Baseline (no external perturbations) and Perturbed (random mediolateral perturbations applied to their pelvis) environment. We hypothesized people would make systematic changes in lateral stability dependent on both environment (increasing lateral stability in the Perturbed environment) and anticipated manoeuvre direction (reducing lateral stability to facilitate lateral manoeuvres). Participants increased lateral stability in the Perturbed environment, coinciding with an increase in manoeuvre reaction time for laterally but not medially directed manoeuvres. Moreover, we observed lower lateral stability in both environments when people anticipated making a lateral manoeuvre when compared to medial manoeuvres. These results support the hypothesis that people behaviourally exploit the mechanical relationship between lateral stability and manoeuvrability depending on walk task goals and external environment.
https://royalsocietypublishing.org/doi/10.1098/rspb.2024.2040

Royal Society Open Science

PAPERS

STUART KYLE WATSON et al – Inter-call intervals, but not call durations, adhere to Menzerath's Law in the submissive vocal bouts of meerkats

Diverse information encoding systems, including human language, the vocal and gestural systems of non-human animals and the structure of DNA and proteins, have been found to conform to 'Menzerath's Law'—a negative relationship between the number of units composing a sequence, and the size of those units. Here, we test for the presence of Menzerath's Law in the vocal bouts produced in a submissive context by meerkats (Suricata suricatta). Using a suite of Bayesian mixed effects models, we examined 1676 vocal bouts produced by 89 wild meerkats, ranging from 1 to 590 calls in length, to determine whether the number of calls composing each bout had a negative relationship with the duration of those calls or their inter-call intervals. In contradiction to Menzerath's Law, we found that the duration of vocalizations had a positive relationship with the number of calls in a bout. However, the duration of intervals between calls did have a negative relationship with bout size. Moreover, both calls and intervals had longer durations the closer they were positioned to the end of the bout. These findings highlight the multi-faceted ways in which efficiency trade-offs can occur in the vocal repertoires of non-human animals, shaping variability in the production of signal forms.
https://royalsocietypublishing.org/doi/10.1098/rsos.241351

KAZUHIRO TAMURA & SATORU MORITA – Analysing public goods games using reinforcement learning: effect of increasing group size on cooperation

Electricity competition, restrictions on carbon dioxide (CO2) emissions and arm races between nations are examples of social dilemmas within human society. In the presence of social dilemmas, rational choice in game theory leads to the avoidance of cooperative behaviour owing to its cost. However, in experiments using public goods games that simulate social dilemmas, humans have often exhibited cooperative behaviour that deviates from individual rationality. Despite extensive research, the alignment between human cooperative behaviour and game theory predictions remains inconsistent. This study proposes an alternative approach to solve this problem. We used Q-learning, a form of artificial intelligence that mimics decision-making processes of humans who do not possess the rationality assumed in game theory. This study explores the potential for cooperation by varying the number of participants in public goods games using deep Q-learning. The simulations demonstrate that agents with Q-learning can acquire cooperative behaviour similar to that of humans. Moreover, we found that cooperation is more likely to occur as the group size increases. These results support and reinforce existing experiments involving humans. In addition, they have potential applications for creating cooperation without sanctions.
https://royalsocietypublishing.org/doi/10.1098/rsos.241195

Science

ARTICLES

ANDREW CURRY – Mystery woman's DNA reveals close family ties between Europe's earliest people

Pair of studies shines light on how modern humans and Neanderthals settled the continent together
https://www.science.org/content/article/mystery-woman-s-dna-reveals-close-family-ties-between-europe-s-earliest-people

PAPERS

LEONARDO N. M. IASI et al – Neanderthal ancestry through time: Insights from genomes of ancient and present-day humans

Gene flow from Neanderthals has shaped genetic and phenotypic variation in modern humans. Most non-Africans living today derive ~1 to 2% of their ancestry from Neanderthals. Across the genome, some genomic regions harbor a high frequency of Neanderthal variants and are identified as "candidates of adaptive introgression," whereas others are devoid of any Neanderthal ancestry and are referred to as "deserts." However, the timing and evolutionary processes, for example, genetic drift or natural selection, that have shaped the landscape of Neanderthal ancestry remain elusive. Most of the previous studies have focused on genomes of present-day individuals, where separating the effects of past demography and selection is challenging. Ancient DNA analyses have transformed research into human evolutionary history by enabling the direct observation of genetic variation patterns that existed in the past.
In this study, we analyzed genomic data from 59 ancient individuals sampled between 45,000 and 2200 years before present and 275 diverse present-day individuals to study the evolutionary history of Neanderthal ancestry throughout time. We examined the frequency, length, and distribution of Neanderthal ancestry segments over time to answer the following questions: (i) How is Neanderthal ancestry shared among individuals, by geography and time? (ii) When did Neanderthal gene flow occur and for how long did it last? and (iii) What is the functional legacy of Neanderthal ancestry in modern humans?
We generated a catalog of Neanderthal ancestry in ancient and present-day modern humans and found that the majority of the Neanderthal ancestry segments are shared across populations and that the sharing of Neanderthal ancestry segments mirrors the population structure among non-Africans. The comparison with sequenced Neanderthals, for example, Vindija, Altai, and Chagyrskaya, suggests that the gene flow occurred from a single or multiple closely related Neanderthal groups. By

contrast, the earliest modern humans—Oase, Ust'-Ishim, Zlatý kůň, and Bacho Kiro—possess substantial unique Neanderthal ancestry and a distinct matching profile to the sequenced Neanderthals, indicating that some Neanderthal ancestry in these early individuals is not shared with modern humans after 40,000 years.

By studying the distribution and lengths of the Neanderthal ancestry segments in ancient individuals, we found evidence for a single extended period of Neanderthal gene flow that occurred ~47,000 years ago and lasted for ~7000 years. This is consistent with archaeological evidence for the potential overlap of early modern humans and Neanderthals in Europe.

Finally, we examined the frequency of Neanderthal ancestry across the genome and over time. We uncovered new candidates of adaptive introgression, including regions that were immediately adaptive for modern humans and some that became adaptive more recently from introgressed standing variation. Most Neanderthal deserts—on the autosomes and the X chromosome—were formed rapidly after the gene flow and were also evident in the earliest modern human genomes. Notably, the X chromosome exhibits a nonuniform and nonrandom distribution of Neanderthal ancestry, with large Neanderthal ancestry deserts overlapping previously identified signals of sweeps in non-Africans.

Our study provides insights into the complex history of Neanderthal gene flow into modern humans. We found strong support for a single extended period of Neanderthal gene flow into the common ancestors of all non-Africans that occurred between 50,500 and 43,500 years ago. These dates provide a lower bound for the timing of the out-of-Africa migration and settlement of regions outside Africa. The majority of natural selection—positive and negative—on Neanderthal ancestry happened very quickly after the gene flow and left clear signals in the genetic diversity of the earliest modern humans outside Africa.

{Someone seems to have missed the memo about what an "abstract" is.}

https://www.science.org/doi/10.1126/science.adq3010

Trends in Cognitive Sciences

PAPERS

JULIA LÖSCHNER & STEFFEN R. HAGE – Sound amongst the din: primate strategies against noise

Ambient noise disrupts vocal communication amongst animals. Recent studies show that some species, such as marmosets, can rapidly adjust the patterns of ongoing calls according to noisy environments. This substantial vocal flexibility reveals that non-human primates have more advanced cognitive control over when and what to vocalize than previously thought.

https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(24)00314-0

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