EAORC BULLETIN 1,108 – 8 September 2024

CONTENTS

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 – Beads and Cognitive Evolution

Time and Mind: The Journal of Archaeology, Consciousness and Culture 1:3, 285-318 (2008).

ROBERT G. BEDNARIK – Beads and Cognitive Evolution

The study of human evolution has largely focused on skeletal developments and on the stone tools of successive technological traditions. The cultural and cognitive evolution of hominins has been comparatively neglected. Here it is proposed that beads and pendants provide some of the most reliable evidence for our nonphysical (cognitive) evolution. The available corpus of such finds from the Middle and Late Pleistocene periods is presented and reviewed. It is shown to demonstrate not only the use of complex symbolisms several hundred millennia ago, but also the application of concepts of perfection and self-awareness. This finding agrees with other indicators of hominin cognition, but it clashes with the dominant notion that "modern" human faculties appeared with a hypothetical replacement of Europeans by Africans just 40,000 years ago. This notion is reviewed and shown to be based on fake datings and misidentifications of numerous human fossils, on questionable genetic contentions, and on inadequate consideration of the available empirical evidence.
https://www.academia.edu/9480941/Beads_and_Cognitive_Evolution

NEWS

NATURE BRIEFING – Video: How ancient people got to Mallorca

Mallorca is believed to be among the last Mediterranean islands to be settled by humans — but an ancient stone bridge in a flooded cave calls that timeline into question. By dating mineral deposits in the cave, scientists suggest that people reached the island at least 5,600 years ago — some 1,000 years earlier than previously thought.
https://www.nature.com/articles/d41586-024-02799-3

SCIENCEADVISER – Bird embryos listen to chatty parents—and become more chatty themselves

Like most gulls, yellow-legged gulls are loud animals. Their squawking is notorious, but no doubt they've got important things to say—especially when they're expanding their family. In fact, the more parent gulls talk when handing over egg-incubation duties, the better care their offspring receive. Now, scientists have found that the chicks benefit another way: Young gulls that overhear more chatter before they hatch are more communicative themselves, and end up healthier because of it.
https://www.science.org/doi/10.1126/sciadv.adn8542

SCIENCEADVISER – Culture, not environment, dictates which nest style a sparrow weaver builds

For decades, research into bird nests has rested on the assumption that building behavior is exclusively driven by environmental factors—species in colder climates, for instance, tend to construct bigger, more insulated nests than their warm-weather counterparts—or instinct. As behavioral ecologist Maria Tello-Ramos tells The New York Times, scientists originally believed "the little brains of birds couldn't possibly deal with such a large amount of information, so it must be innate."
For two years, Tello-Ramos and her colleagues tracked 43 groups of sparrow weavers in the South African region of the Kalahari Desert, eventually collecting measurements from nearly 450 different structures. While some groups were separated by long distances, others were neighbors, living and building within 30 feet of one another. But despite their proximity, similar genetic backgrounds, and near-identical habitats, different families consistently created very different-looking nests. As Tello-Ramos puts it, "Birds that live together build together, and they have distinctive architectural styles."
https://www.science.org/doi/10.1126/science.adn2573

SCIENCE DAILY – Researchers identify basic approaches for how people recognize words

Recognizing spoken words is a split-second competition, and a new study defines how people approach that competition and ultimately recognize words. The researchers identified three main approaches by which people of all ages -- including those who use cochlear implants to hear -- recognize spoken language.
https://www.sciencedaily.com/releases/2024/08/240829132443.htm

SCIENCE DAILY – Agriculture accelerated human genome evolution to capture energy from starchy foods

Scientists have suspected that modern humans have more genes to digest starch than our hunter-gatherer ancestors, but the amylase locus of the genome is hard to study. Researchers have now developed new methods to isolate the multiple amylase genes and compare the locus to ancient genomes. They found that amylase gene number has increased from an average of eight to more than 11 over the past 12,000 years.
https://www.sciencedaily.com/releases/2024/09/240904141503.htm

SCIENCE.ORG NEWS – Marmosets call one another by name

Enduring vocal labels for individuals may be a window into how humans evolved language.
https://www.science.org/content/article/marmosets-call-one-another-name

PUBLICATIONS

Biology Letters

PAPERS

SHANY DROR, ÁDÁM MIKLÓSI & CLAUDIA FUGAZZA – Dogs with a vocabulary of object labels retain them for at least 2 years

Long-term memory of words has a crucial role in the developing abilities of young children to acquire language. In dogs, the ability to learn object labels is present in only a small group of uniquely gifted word learner (GWL) dogs. As they are very rare, little is known about the mechanisms through which they acquire such large vocabularies. In the current study, we tested the ability of five GWL dogs to retrieve 12 labelled objects 2 years after the object-label mapping acquisition. The dogs proved to remember the labels of between three and nine objects. The results shed light on the process by which GWL dogs acquire an exceptionally large vocabulary of object names. As memory plays a crucial role in language development, these dogs provide a unique opportunity to study label retention in a non-linguistic species.
https://royalsocietypublishing.org/doi/10.1098/rsbl.2024.0208

eLife

PAPERS

XINLIN HOU et al – Neonatal sensitivity to vocal emotions: A developmental change at 37 weeks of gestational age

Emotional responsiveness in neonates, particularly their ability to discern vocal emotions, plays an evolutionarily adaptive role in human communication and adaptive behaviors. The developmental trajectory of emotional sensitivity in neonates is crucial for understanding the foundations of early social-emotional functioning. However, the precise onset of this sensitivity and its relationship with gestational age (GA) remain subjects of investigation. In a study involving 120 healthy neonates categorized into six groups based on their GA (ranging from 35 and 40 weeks), we explored their emotional responses to vocal stimuli. These stimuli encompassed disyllables with happy and neutral prosodies, alongside acoustically matched nonvocal control sounds. The assessments occurred during natural sleep states using the odd-ball paradigm and event-related potentials. The results reveal a distinct developmental change at 37 weeks GA, marking the point at which neonates exhibit heightened perceptual acuity for emotional vocal expressions. This newfound ability is substantiated by the presence of the mismatch response, akin to an initial form of adult mismatch negativity, elicited in response to positive emotional vocal prosody. Notably, this perceptual shift's specificity becomes evident when no such discrimination is observed in acoustically matched control sounds. Neonates born before 37 weeks GA do not display this level of discrimination ability. This developmental change has important implications for our understanding of early social-emotional development, highlighting the role of gestational age in shaping early perceptual abilities. Moreover, while these findings introduce the potential for a valuable screening tool for conditions like autism, characterized by atypical social-emotional functions, it is important to note that the current data are not yet robust enough to fully support this application. This study makes a substantial contribution to the broader field of developmental neuroscience and holds promise for future research on early intervention in neurodevelopmental disorders.
https://elifesciences.org/reviewed-preprints/95393

CHAO WEN et al with LARS CHITTKA – Does bumblebee preference of continuous over interrupted strings in string-pulling tasks indicate means-end comprehension?

Bumblebees (Bombus terrestris) have been shown to engage in string-pulling behavior to access rewards. The objective of this study was to elucidate whether bumblebees display means-end comprehension in a string-pulling task. We presented

bumblebees with two options: one where a string is connected to an artificial flower containing a reward and the other presenting an interrupted string. Bumblebees displayed a consistent preference for pulling connected strings over interrupted ones after training with a stepwise pulling technique. When exposed to novel string colors, bees continued to exhibit a bias towards pulling the connected string. This suggests that bumblebees engage in featural generalization of the visual display of the string connected to the flower in this task. If the view of the string connected to the flower was restricted during the training phase, the proportion of bumblebees choosing the connected strings significantly decreased. Similarly, when the bumblebees were confronted with coiled connected strings during the testing phase, they failed to identify and reject the interrupted strings. This finding underscores the significance of visual consistency in enabling the bumblebees to perform the task successfully. Our results suggest that bumblebees' ability to distinguish between continuous strings and interrupted strings relies on a combination of image matching and associative learning, rather than means-end understanding. These insights contribute to a deeper understanding of the cognitive processes employed by bumblebees when tackling complex spatial tasks.
https://elifesciences.org/reviewed-preprints/97018

JIXING LI et al – Multi-talker speech comprehension at different temporal scales in listeners with normal and impaired hearing

Comprehending speech requires deciphering a range of linguistic representations, from phonemes to narratives. Prior research suggests that in single-talker scenarios, the neural encoding of linguistic units follows a hierarchy of increasing temporal receptive windows. Shorter temporal units like phonemes and syllables are encoded by lower-level sensory brain regions, whereas longer units such as sentences and paragraphs are processed by higher-level perceptual and cognitive areas. However, the brain's representation of these linguistic units under challenging listening conditions, such as a cocktail party situation, remains unclear. In this study, we recorded electroencephalogram (EEG) responses from both normal-hearing and hearing-impaired participants as they listened to individual and dual speakers narrating different parts of a story. The inclusion of hearing-impaired listeners allowed us to examine how hierarchically organized linguistic units in competing speech streams affect comprehension abilities. We leveraged a hierarchical language model to extract linguistic information at multiple levels—phoneme, syllable, word, phrase, and sentence—and aligned these model activations with the EEG data. Our findings showed distinct neural responses to dual-speaker speech between the two groups. Specifically, compared to normal-hearing listeners, hearing-impaired listeners exhibited poorer model fits at the acoustic, phoneme, and syllable levels as well as the sentence levels, but not at the word and phrase levels. These results suggest that hearing-impaired listeners experience disruptions at both shorter and longer temporal scales, while their processing at medium temporal scales remains unaffected.
https://elifesciences.org/reviewed-preprints/100056

XIAOQIAN YAN et al – When Do Visual Category Representations Emerge in Infants' Brains?

Organizing the continuous stream of visual input into categories like places or faces is important for everyday function and social interactions. However, it is unknown when neural representations of these and other visual categories emerge. Here we used steady state evoked potential electroencephalography to measure cortical responses in infants at 3-4 months, 4-6 months, 6-8 months, and 12-15 months, when they viewed controlled, gray-level images of faces, limbs, corridors, characters, and cars. We found that distinct responses to these categories emerge at different ages. Reliable brain responses to faces emerge first, at 4-6 months, followed by limbs and places around 6-8 months. Between 6-15 months response patterns become more distinct, such that a classifier can decode what an infant is looking at from their brain responses. These findings, have important implications for assessing typical and atypical cortical development as they not only suggest that category representations are learned, but also that representations of categories that may have innate substrates emerge at different times during infancy.
https://elifesciences.org/reviewed-preprints/100260

Frontiers in Environmental Archaeology

PAPERS

ALAN P. SULLIVAN III et al – Archaeological evidence of anthropogenic burning for food production in forested uplands of the Grand Canyon province, northern Arizona

Despite convincing archaeological arguments about the global effects of human pyrogeography and their evolutionary significance, many of the implicated data sources are unavailable in research contexts that lack significant accumulations of charcoal or stands of fire-scarred trees. In view of the strong likelihood that hominins routinely ignited small, low-intensity landscape fires for millennia, we explore the role of cultural burning for food-production in an area of the American Southwest where anthropogenic fire has not been considered. To illustrate the virtues of a multidisciplinary approach, informed by Formation Theory and time perspectivism, we focus on the returns from macrobotanical and palynological analyses of samples recovered from a variety of archaeological and geoarchaeological contexts in the Upper Basin, a landform located south of the Grand Canyon in northern Arizona. Previous archaeobotanical studies of samples recovered from archaeological sites (ca. AD 500–1500) in the basin's pinyon-juniper woodlands are dominated by amaranth, chenopodium, and other economic ruderals. These findings support the "fire foodway" model that posits prehistoric

Indigenous populations of the Upper Basin depended on these fire-following wild plants, rather than maize, by harvesting their abundant seeds and leaves from production locations that were created by low-intensity understory fires. In this paper, we present the results of new studies of archaeobotanical remains recovered from cut-back terraces and sedimentary contexts that (i) expand the evidence base for the fire-foodway model, (ii) provide a basis for proposing several types of prehistoric cultural burning practices, and (iii) introduce the outlines of the ruderal seed-bed hypothesis. Combined, these findings provide a new archaeological perspective on upland subsistence practices in the northern American Southwest. Our study also highlights biases of modern vegetation surveys that do not include archaeological data, and contributes to an appreciation of the extent to which biodiversity has declined because of widespread fire exclusion.
https://www.frontiersin.org/journals/environmental-archaeology/articles/10.3389/fearc.2024.1302604/full

Frontiers in Psychology

PAPERS

IDA MERLIN J. & PRABAKAR SOUBRAMANIAN – From self-awareness to social savvy: how intrapersonal skills shape interpersonal competence in university students

The extant study was conducted over a cross-sectional period and aimed to assess the effect of intrapersonal on the interpersonal dimensions of Emotional Intelligence among University Students.
A literature survey was carried out, and the study's hypotheses were framed. Utilising a standardised Emotional Intelligence Scale, a widely accepted and validated measurement tool in the field, for measurement, the survey was disseminated in digital and physical formats. The researchers employed the snowball sampling technique to distribute the questionnaires and recruit volunteers for the study. The data collection period spanned from August 2023 through September 2023. The demographic information of the individuals was described using the SPSS 25 software, while the dataset for the personal and social competencies was analysed using the SmartPLS software.
The research reveals a statistically significant association between the variables under investigation. Specifically, there exists a negative correlation between Motivation and Social Skills, as well as between Self-regulation and Social Awareness. These findings open up exciting opportunities for future research, inspiring further exploration into the development of intrapersonal and interpersonal competencies among students.
https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1469746/full

Language Sciences

PAPERS

ABEBA BIRHANE & MAREK MCGANN – Large models of what? Mistaking engineering achievements for human linguistic agency

In this paper we argue that key, often sensational and misleading, claims regarding linguistic capabilities of Large Language Models (LLMs) are based on at least two unfounded assumptions: the assumption of language completeness and the assumption of data completeness. Language completeness assumes that a distinct and complete thing such as "a natural language" exists, the essential characteristics of which can be effectively and comprehensively modelled by an LLM. The assumption of data completeness relies on the belief that a language can be quantified and wholly captured by data. Work within the enactive approach to cognitive science makes clear that, rather than a distinct and complete thing, language is a means or way of acting. Languaging is not the kind of thing that can admit of a complete or comprehensive modelling. From an enactive perspective we identify three key characteristics of enacted language; embodiment, participation, and precariousness, that are absent in LLMs, and likely incompatible in principle with current architectures. We argue that these absences imply that LLMs are not now and cannot in their present form be linguistic agents the way humans are. We illustrate the point in particular through the phenomenon of "algospeak", a recently described pattern of high-stakes human language activity in heavily controlled online environments. On the basis of these points, we conclude that sensational and misleading claims about LLM agency and capabilities emerge from a deep misconception of both what human language is and what LLMs are.
https://www.sciencedirect.com/science/article/pii/S0388000124000615

Mind & Language

PAPERS

MATHEW HENDERSON et al with CATHERINE HOBAITER – Shared semantics: Exploring the interface between human and chimpanzee gestural communication

Striking similarities across ape gestural repertoires suggest shared phylogenetic origins that likely provided a foundation for the emergence of language. We pilot a novel approach for exploring possible semantic universals across human and nonhuman ape species. In a forced-choice task, n = 300 participants watched 10 chimpanzee gesture forms performed by a human and chose from responses that paralleled inferred meanings for chimpanzee gestures. Participants agreed on a single meaning for nine gesture forms; in six of these the agreed form-meaning pair response(s) matched those established for chimpanzees. Such shared understanding suggests apes' (including humans') gesturing shares deep evolutionary origins.
https://onlinelibrary.wiley.com/doi/full/10.1111/mila.12500

KEVIN J. LANDE – Pictorial syntax
It is commonly assumed that images, whether in the world or in the head, do not have a privileged analysis into constituent parts. They are thought to lack the sort of syntactic structure necessary for representing complex contents and entering into sophisticated patterns of inference. I reject this assumption. "Image grammars" are models in computer vision that articulate systematic principles governing the form and content of images. These models are empirically credible and can be construed as literal grammars for images. Images can have rich syntactic structure, though of a markedly different form than sentences in language.
https://onlinelibrary.wiley.com/doi/full/10.1111/mila.12497

NERI MARSILI – The definition of assertion: Commitment and truth
According to an influential view, asserting a proposition involves undertaking some "commitment" to the truth of that proposition. But accounts of what it is for someone to be committed to the truth of a proposition are often vague or imprecise, and are rarely put to work to define assertion. This article aims to fill this gap. It offers a precise characterisation of assertoric commitment, and applies it to define assertion. On the proposed view, acquiring commitment is not sufficient for asserting: To assert, commitment must be acquired by explicitly presenting a proposition as true.
{So when I assert that "the eagles of the North saved Sam and Frodo from Mount Doom", what am I presenting as true?}
https://onlinelibrary.wiley.com/doi/full/10.1111/mila.12476

COMMENTARIES

HELEN DE CRUZ – Reasonable compartmentalization?
This is a commentary on Neil Van Leeuwen's Religion as make-believe focusing on the normative aspects of this book. According to Van Leeuwen, religious credences are not factual beliefs, and they are held to different standards of rationality than factual beliefs. Hence, religious believers are able to track and represent those states of affairs that govern their practical lives while also holding views that deviate significantly from it, such as divine omnipotence. Here, I examine whether this reasonable compartmentalization in religious believers holds.
https://onlinelibrary.wiley.com/doi/abs/10.1111/mila.12507

NEIL LEVY – There is more to belief than Van Leeuwen believes
Neil Van Leeuwen argues that many religious people do not act and infer as we would expect believers to act and infer, and on this basis argues that they are not genuine believers. They take some other, nondoxastic, attitude to the claims they profess to believe. In this short commentary, I argue that in many (but far from all) such cases, the content, and not the attitude, explains the departures from the inferential and behavioral stereotype we associate with belief.
https://onlinelibrary.wiley.com/doi/abs/10.1111/mila.12501

NEIL VAN LEEUWEN – Group identity and the willful subversion of rationality: A reply to De Cruz and Levy
De Cruz and Levy, in their commentaries on Religion as make-believe, present distinct questions that can be addressed by clarifying one core idea. De Cruz asks whether one can rationally assess the mental state of religious credence that I theorize. Levy asks why we should not explain the data on religious "belief" merely by positing factual beliefs with religious contents, which happen to be rationally acquired through testimony. To both, I say that having religious credences is p-irrational: a purposeful departure from rational thought and behavior, where the purpose in question is maintaining a group identity.
https://onlinelibrary.wiley.com/doi/abs/10.1111/mila.12512

Nature Communications

PAPERS

TOBIAS J. WIECZOREK et al – A framework for the emergence and analysis of language in social learning agents
Neural systems have evolved not only to solve environmental challenges through internal representations but also, under social constraints, to communicate these to conspecifics. In this work, we aim to understand the structure of these internal representations and how they may be optimized to transmit pertinent information from one individual to another. Thus, we build on previous teacher-student communication protocols to analyze the formation of individual and shared abstractions and their impact on task performance. We use reinforcement learning in grid-world mazes where a teacher network passes a message to a student to improve task performance. This framework allows us to relate environmental variables with individual and shared representations. We compress high-dimensional task information within a low-dimensional representational space to mimic natural language features. In coherence with previous results, we find that providing teacher information to the student leads to a higher task completion rate and an ability to generalize tasks it has not seen before. Further, optimizing message content to maximize student reward improves information encoding, suggesting that an accurate representation in the space of messages requires bi-directional input. These results highlight the role of language as a common representation among agents and its implications on generalization capabilities.
https://www.nature.com/articles/s41467-024-51887-5

BIANCA SERIO et al – Sex differences in functional cortical organization reflect differences in network topology rather than cortical morphometry

Differences in brain size between the sexes are consistently reported. However, the consequences of this anatomical difference on sex differences in intrinsic brain function remain unclear. In the current study, we investigate whether sex differences in intrinsic cortical functional organization may be associated with differences in cortical morphometry, namely different measures of brain size, microstructure, and the geodesic distance of connectivity profiles. For this, we compute a low dimensional representation of functional cortical organization, the sensory-association axis, and identify widespread sex differences. Contrary to our expectations, sex differences in functional organization do not appear to be systematically associated with differences in total surface area, microstructural organization, or geodesic distance, despite these morphometric properties being per se associated with functional organization and differing between sexes. Instead, functional sex differences in the sensory-association axis are associated with differences in functional connectivity profiles and network topology. Collectively, our findings suggest that sex differences in functional cortical organization extend beyond sex differences in cortical morphometry.
https://www.nature.com/articles/s41467-024-51942-1

KYONG-SUN JIN et al with RENÉE BAILLARGEON – Infants expect some degree of positive and negative reciprocity between strangers

Social scientists from different disciplines have long argued that direct reciprocity plays an important role in regulating social interactions between unrelated individuals. Here, we examine whether 15-month-old infants (N = 160) already expect direct positive and negative reciprocity between strangers. In violation-of-expectation experiments, infants watch successive interactions between two strangers we refer to as agent1 and agent2. After agent1 acts positively toward agent2, infants are surprised if agent2 acts negatively toward agent1 in a new context. Similarly, after agent1 acts negatively toward agent2, infants are surprised if agent2 acts positively toward agent1 in a new context. Both responses are eliminated when agent2's actions are not knowingly directed at agent1. Additional results indicate that infants view it as acceptable for agent2 either to respond in kind to agent1 or to not engage with agent1 further. By 15 months of age, infants thus already expect a modicum of reciprocity between strangers: Initial positive or negative actions are expected to set broad limits on reciprocal actions. This research adds weight to long-standing claims that direct reciprocity helps regulate interactions between unrelated individuals and, as such, is likely to depend on psychological systems that have evolved to support reciprocal reasoning and behavior.
https://www.nature.com/articles/s41467-024-51982-7

Nature Communications Biology

PAPERS

THIAGO T. VARELLA, DANIEL Y. TAKAHASHI & ASIF A. GHAZANFAR – Active sampling as an information seeking strategy in primate vocal interactions

Active sensing is a behavioral strategy for exploring the environment. In this study, we show that contact vocal behaviors can be an active sensing mechanism that uses sampling to gain information about the social environment, in particular, the vocal behavior of others. With a focus on the real-time vocal interactions of marmoset monkeys, we contrast active sampling to a vocal accommodation framework in which vocalizations are adjusted simply to maximize responses. We conduct simulations of a vocal accommodation and an active sampling policy and compare them with actual vocal interaction data. Our findings support active sampling as the best model for real-time marmoset monkey vocal exchanges. In some cases, the active sampling model was even able to partially predict the distribution of vocal durations for individuals to approximate the optimal call duration. These results suggest a non-traditional function for primate vocal interactions in which they are used by animals to seek information about their social environments.
https://www.nature.com/articles/s42003-024-06764-8

Nature Ecology & Evolution

PAPERS

LINDELL BROMHAM, KEAGHAN J. YAXLEY & MARCEL CARDILLO – Islands are engines of language diversity

Islands have played a prominent role in evolutionary and ecological theory, centring the theoretical framework for understanding biodiversity in terms of isolation and area and providing 'laboratories' of evolutionary change and adaptive radiation. However, a similar role for islands in understanding global language diversity has not been established, even though one-sixth of the world's languages are spoken on islands which account for <1% of the inhabited land area. The striking diversity of island languages remains largely unexplained. We construct a global database which reveals that 10% of the world's languages are endemic to islands (landmasses <11,000 km2) and we test several key theories of language evolution and diversity. We show that language diversity on islands increases with area but does not show a steady decrease with isolation, nor are island languages at elevated risk of loss. However, number of endemic languages per island increases with both area and isolation. We demonstrate that islands shape language evolution, with fewer phonemes (distinct sounds)

in island endemic languages with increasing isolation. Our results suggest that islands generate language diversity by accelerating both language change and diversification.
https://www.nature.com/articles/s41559-024-02488-4

Nature Experimental & Molecular Medicine

PAPERS

TAE-YONG CHOI, SEJIN JEONG & JA WOOK KOO – Mesocorticolimbic circuit mechanisms of social dominance behavior
Social animals, including rodents, primates, and humans, partake in competition for finite resources, thereby establishing social hierarchies wherein an individual's social standing influences diverse behaviors. Understanding the neurobiological underpinnings of social dominance is imperative, given its ramifications for health, survival, and reproduction. Social dominance behavior comprises several facets, including social recognition, social decision-making, and actions, indicating the concerted involvement of multiple brain regions in orchestrating this behavior. While extensive research has been dedicated to elucidating the neurobiology of social interaction, recent studies have increasingly delved into adverse social behaviors such as social competition and hierarchy. This review focuses on the latest advancements in comprehending the mechanisms of the mesocorticolimbic circuit governing social dominance, with a specific focus on rodent studies, elucidating the intricate dynamics of social hierarchies and their implications for individual well-being and adaptation.
https://www.nature.com/articles/s12276-024-01299-8

Nature Molecular Psychiatry

PAPERS

JUNJIE MA et al – Human-unique brain cell clusters are associated with learning disorders and human episodic memory activity
The advanced evolution of the human cerebral cortex forms the basis for our high-level cognitive functions. Through a comparative analysis of single-nucleus transcriptome data from the human neocortex and that of chimpanzees, macaques, and marmosets, we discovered 20 subgroups of cell types unique to the human brain, which include 11 types of excitatory neurons. Many of these human-unique cell clusters exhibit significant overexpression of genes regulated by human-specific enhancers. Notably, these specific cell clusters also express genes associated with disease risk, particularly those related to brain dysfunctions like learning disorders. Furthermore, genes linked to cortical thickness and human episodic memory encoding activities show heightened expression within these cell subgroups. These findings underscore the critical role of human brain-unique cell clusters in the evolution of human brain functions.
https://www.nature.com/articles/s41380-024-02722-2

Nature Scientific Reports

PAPERS

MAGDA KAPCIA et al – Plant cultivation and diversity at the early neolithic settlement in Biskupice in Poland
The emergence of the Linear Pottery Culture (LBK) during the Neolithic period within Polish territory 5400–4900 BC, introduced plant cultivation, yet the definitive list of cultivated species remains debated. This study examines plant assemblages (fruits, seeds, pollen, and spores) from the LBK settlement in Biskupice, southern Poland, aiming to identify cultivated and wild species used during the development of the first stable settlements in the Carpathian Foothills. Due to extensive sampling, Biskupice yielded over 11,000 macroscopic plant specimens, enabling detailed analysis of plant diversity, distribution, and implications for agrarian and dietary practices. The analysis revealed a focus on emmer and einkorn wheat cultivation, with barley playing a minor role, alongside evidence of flax and pulses. Radiocarbon dating supported the settlement's existence in the 6th millennium BCE, and confirmed the use of barley. However, a younger date excluded bread wheat cultivation at this site. The plant assemblage included a diverse array of herbaceous wild plants like black bindweed, fat hen and brome species, suggesting their economic use. Additionally, the presence of cockspur grass, linked with Southeast Asia, indicates alternative migration routes of weeds in Europe, as supported by radiocarbon dating. Palynological analysis suggests existence of nearby cereal plots or the processing of cereals at the settlement, supporting archaeological evidence.
https://www.nature.com/articles/s41598-024-70546-9

THAÍS R. PANSANI et al – Anthropogenic modification of a giant ground sloth tooth from Brazil supported by a multi-disciplinary approach
Identifying evidence of human modification of extinct animal remains, such as Pleistocene megafauna, is challenging due to the similarity of anthropogenic and non-anthropogenic taphonomic features observed under optical microscopy. Here, we re-investigate a Late Pleistocene ground sloth tooth from northeast Brazil, previously suggested as human-modified based only on optical observation. To characterize the macro- and micro-morphological characteristics of the marks preserved in this tooth and evaluate potential human modification, we used stereomicroscope and scanning electron microscopy (SEM) supplemented by energy dispersive spectroscopy (EDS), UV photoluminescence (UV/PL), synchrotron-based X-ray fluorescence (SR-XRF), and synchrotron micro-computed tomography (SR-µCT). These methods allowed us to discriminate

non-anthropogenic taphonomic features (root and sedimentary damage), anthropogenic marks, and histological features. The latter shows the infiltration of exogenous elements into the dentine from the sediments. Our evidence demonstrates the sequence of anthropogenic and non-anthropogenic taphonomic modification of this tooth and supports its initial intentional modification by humans. We highlight the benefits of emerging imaging and spectral imaging techniques to investigate and diagnose human modification in fossil and archaeological records and propose that human modification of tooth tissues should be further considered when studying possibly anthropogenically altered fossil remains.
https://www.nature.com/articles/s41598-024-69145-5

MAÏLYS RICHARD et al with JEAN-JACQUES HUBLIN & MARIE-HÉLÈNE MONCEL – Multi-method dating reveals 200 ka of Middle Palaeolithic occupation at Maras rock shelter, Rhône Valley, France
The emergence of the Middle Palaeolithic, and its variability over time and space are key questions in the field of prehistoric archaeology. Many sites have been documented in the south-eastern margins of the Massif central and the middle Rhône valley, a migration path that connects Northern Europe with the Mediterranean. Well-dated, long stratigraphic sequences are essential to understand Neanderthals dynamics and demise, and potential interactions with Homo sapiens in the area, such as the one displayed at the Maras rock shelter ("Abri du Maras"). The site is characterised by exceptional preservation of archaeological remains, including bones dated using radiocarbon (14C) and teeth using electron spin resonance combined with uranium series (ESR/U-series). Optically stimulated luminescence was used to date the sedimentary deposits. By combining the new ages with previous ones using Bayesian modelling, we are able to clarify the occupation time over a period spanning 200,000 years. Between ca. 250 and 40 ka, the site has been used as a long-term residence by Neanderthals, specifically during three interglacial periods: first during marine isotopic stage (MIS) 7, between 247 ± 34 and 223 ± 33 ka, and then recurrently during MIS 5 (between 127 ± 17 and 90 ± 9 ka) and MIS 3 (up to 39,280 cal BP).
https://www.nature.com/articles/s41598-024-69380-w

SAMAN H. GURAN et al – Reconstructing contact and a potential interbreeding geographical zone between Neanderthals and anatomically modern humans
While the interbreeding of Homo neanderthalensis (hereafter Neanderthal) and Anatomically modern human (AMH) has been proven, owing to the shortage of fossils and absence of appropriate DNA, the timing and geography of their interbreeding are not clearly known. In this study, we applied ecological niche modelling (maximum entropy approach) and GIS to reconstruct the palaeodistribution of Neanderthals and AMHs in Southwest Asia and Southeast Europe and identify their contact and potential interbreeding zone during marine isotope stage 5 (MIS 5), when the second wave of interbreeding occurred. We used climatic variables characterizing the environmental conditions of MIS 5 ca. 120 to 80 kyr (averaged value) along with the topography and coordinates of Neanderthal and modern human archaeological sites to characterize the palaeodistribution of each species. Overlapping the models revealed that the Zagros Mountains were a contact and potential interbreeding zone for the two human species. We believe that the Zagros Mountains acted as a corridor connecting the Palearctic/Afrotropical realms, facilitating northwards dispersal of AMHs and southwards dispersal of Neanderthals during MIS 5. Our analyses are comparable with archaeological and genetic evidence collected during recent decades.
https://www.nature.com/articles/s41598-024-70206-y

RAPHAËL BERGOIN et al – A developmental model of audio-visual attention (MAVA) for bimodal language learning in infants and robots
A social individual needs to effectively manage the amount of complex information in his or her environment relative to his or her own purpose to obtain relevant information. This paper presents a neural architecture aiming to reproduce attention mechanisms (alerting/orienting/selecting) that are efficient in humans during audiovisual tasks in robots. We evaluated the system based on its ability to identify relevant sources of information on faces of subjects emitting vowels. We propose a developmental model of audio-visual attention (MAVA) combining Hebbian learning and a competition between saliency maps based on visual movement and audio energy. MAVA effectively combines bottom-up and top-down information to orient the system toward pertinent areas. The system has several advantages, including online and autonomous learning abilities, low computation time and robustness to environmental noise. MAVA outperforms other artificial models for detecting speech sources under various noise conditions.
https://www.nature.com/articles/s41598-024-69245-2

New Scientist

NEWS

Marmosets seem to call each other by name
Marmosets are the first non-human primates shown to use personalised signifiers to refer to each other – the discovery could help us better understand how language evolved.
https://www.newscientist.com/article/2445821-marmosets-seem-to-call-each-other-by-name/

REVIEWS

MICHAEL MARSHALL – Nexus review: Yuval Noah Harari is out of his depth in his new book
The author of Sapiens has turned his attention to the information networks that shape our societies, but when you stop and think about what he's saying, it's obvious.
Review of 'Nexus' by Yuval Noah Harari, Fern Press.
https://www.newscientist.com/article/mg26335070-400-nexus-review-yuval-noah-harari-is-out-of-his-depth-in-his-new-book/

Philosophical Transactions of the Royal Society B

PAPERS

JAMES C. THOMPSON & CAROLYN PARKINSON – Interactions between neural representations of the social and spatial environment
Even in our highly interconnected modern world, geographic factors play an important role in human social connections. Similarly, social relationships influence how and where we travel, and how we think about our spatial world. Here, we review the growing body of neuroscience research that is revealing multiple interactions between social and spatial processes in both humans and non-human animals. We review research on the cognitive and neural representation of spatial and social information, and highlight recent findings suggesting that underlying mechanisms might be common to both. We discuss how spatial factors can influence social behaviour, and how social concepts modify representations of space. In so doing, this review elucidates not only how neural representations of social and spatial information interact but also similarities in how the brain represents and operates on analogous information about its social and spatial surroundings.
https://royalsocietypublishing.org/doi/full/10.1098/rstb.2022.0522

BRIAN M. WOOD et al with AUDAX Z. P. MABULLA – Beyond the here and now: hunter–gatherer socio-spatial complexity and the evolution of language
Human evolutionary ecology stands to benefit by integrating theory and methods developed in movement ecology, and in turn, to make contributions to the broader field of movement ecology by leveraging our species' distinct attributes. In this paper, we review data and evolutionary models suggesting that major changes in socio-spatial behaviour accompanied the evolution of language. To illustrate and explore these issues, we present a comparison of GPS measures of the socio-spatial behaviour of Hadza hunter–gatherers of northern Tanzania to those of olive baboons (Papio anubis), a comparatively small-brained primate that is also savanna-adapted. While standard spatial metrics show modest differences, measures of spatial diversity, landscape exploration and spatiotemporal displacement between individuals differ markedly. Groups of Hadza foragers rapidly accumulate a vast, diverse knowledge pool about places and things over the horizon, contrasting with the baboon's narrower and more homogeneous pool of ecological information. The larger and more complex socio-spatial world illustrated by the Hadza is one where heightened cognitive abilities for spatial and episodic memory, navigation, perspective taking and communication about things beyond the here and now all have clear value.
https://royalsocietypublishing.org/doi/full/10.1098/rstb.2022.0521

PLoS One

PAPERS

ALEXANDER J. PRITCHARD et al – Personality trait structures across three species of Macaca, using survey ratings of responses to conspecifics and humans
Comparative studies reliant on single personality surveys to rate wild primates are scarce yet remain critical for developing a holistic comparative understanding of personality. Differences in survey design, item exclusion, and factor selection impede cross-study comparisons. To address these challenges, we used consistently collected data to assess personality trait structures in wild rhesus (Macaca mulatta), bonnet (M. radiata), and long-tailed (M. fascicularis) macaques that varied in their degree of phylogenetic closeness, species-typical social styles, and anthropogenic exposure in urban or urban-rural environments. We administered 51-item personality surveys to familiar raters, and, after reliability and structure screenings, isolated 4–5 factor solutions among the species. Four consistent factors emerged: Confident, Sociable, Active, and Irritable/Equable. This latter factor had differential expression across species. Item composition of the Irritable/Equable factor was consistent with their anticipated differences in social styles, but confounded by cross-site anthropogenic variation. We also administered a 43-item survey confined to human-primate situations which paralleled our findings of social style variation, while also exhibiting variation that aligned with population differences in human density. Our findings indicate that macaque personality trait structures may be emergent outcomes of evolutionary and/or socioecological processes, but further research is needed to parse these processes' relative contributions.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0309946

TSENKA TSANOVA et al with JEAN-JACQUES HUBLIN – Curated character of the Initial Upper Palaeolithic lithic artefact assemblages in Bacho Kiro Cave (Bulgaria)
The dispersal of Homo sapiens across Eurasia during MIS 3 in the Late Pleistocene is marked by technological shifts and other behavioral changes, known in the archaeological record under the term of Initial Upper Paleolithic (IUP). Bacho Kiro Cave in north Bulgaria, re-excavated by us from 2015 to 2021, is one of the reference sites for this phenomenon. The newly excavated lithic assemblages dated by radiocarbon between 45,040 and 43,280 cal BP and attributed to Homo sapiens encompass more than two thousand lithic artifacts. The lithics, primarily from Layer N1-I, exist amid diverse fauna remains, human fossils, pierced animal teeth pendants, and sediment with high organic content. This article focuses on the technological aspects of the IUP lithics, covering raw material origin and use-life, blank production, on-site knapping activities, re-flaking of lithic implements, and the state of retouched lithic components. We apply petrography for the identification of silicites and other used stones. We employ chaîne opératoire and reduction sequence approaches to profile the lithics techno-typologically and explore the lithic economy, particularly blade production methods, knapping techniques, and artifact curation. Raw material analysis reveals Lower Cretaceous flints from Ludogorie and Upper Cretaceous flints from the Danube region, up to 190 km and 130 km, respectively, from Bacho Kiro Cave, indicating long-distance mobility and finished products transport. Imported lithic implements, were a result of unidirectional and bidirectional non-Levallois laminar technology, likely of volumetric concept. Systematic on-anvil techniques (bipolar knapping) and tool segmentation indicate re-flaking and reshaping of lithic implements, reflecting on-site curation and multifaceted lithic economy. A limited comparison with other IUP sites reveals certain shared features and also regional variations. Bacho Kiro Cave significantly contributes to understanding the technological and behavioral evolution of early Homo sapiens in western Eurasia.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0307435

KATHERYN C. TWISS et al – "But some were more equal than others:" Exploring inequality at Neolithic Çatalhöyük
We explore the ways in which residents of Neolithic Çatalhöyük in Anatolia differentiated themselves as well as the ways in which they did not. We integrate numerous data sets in order to assess patterns of inequality (A) across buildings with contemporaneous occupations, (B) between buildings that did or did not burn at abandonment, and (C) through time. We use Gini coefficients so as to maximize comparability with other studies of inequality in the ancient and modern worlds, discussing the underlying data and our results to clarify and enhance the value of the quantitative analyses. We evaluate whether or not trajectories of inequality align across data sets in order to determine how far success in one realm correlated with success in another. Our results indicate no unified trajectory of inequality through time. We perceive broadly similar access to staple foods, but not to goods less directly related to survival; relatively elevated income inequality during the middle portion of the site's occupation, plausibly deliberately tamped down; and no evidence for institutionalized or lasting economic or social inequality. These findings shed light on Neolithic social dynamics and also contribute to broader discussions of inequality and the social ramifications of early agropastoralism.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0307067

PNAS

PAPERS

PETRA BOROVSKA & BENJAMIN DE HAAS – Individual gaze shapes diverging neural representations
Complex visual stimuli evoke diverse patterns of gaze, but previous research suggests that their neural representations are shared across brains. Here, we used hyperalignment to compare visual responses between observers viewing identical stimuli. We find that individual eye movements enhance cortical visual responses but also lead to representational divergence. Pairwise differences in the spatial distribution of gaze and in semantic salience predict pairwise representational divergence in V1 and inferior temporal cortex, respectively. This suggests that individual gaze sculpts individual visual worlds.
https://www.pnas.org/doi/full/10.1073/pnas.2405602121

COMMENTARIES

JENNIFER HU et al with GARY LUPYAN – Language models align with human judgments on key grammatical constructions
Do large language models (LLMs) make human-like linguistic generalizations? Dentella, Günther, and Leivada (DGL) prompt several LLMs ("Is the following sentence grammatically correct in English?") to elicit grammaticality judgments of 80 English sentences, concluding that LLMs demonstrate a "yes-response bias" and a "failure to distinguish grammatical from ungrammatical sentences." We reevaluate LLM performance using well-established practices and find that DGL's data in fact provide evidence for how well LLMs capture human linguistic judgments.
https://www.pnas.org/doi/full/10.1073/pnas.2400917121

EVELINA LEIVADA et al – Reply to Hu et al.: Applying different evaluation standards to humans vs. Large Language Models overestimates AI performance
Dentella et al. (DGL) argued that 3 Large Language Models (LLMs) perform almost at chance in grammaticality judgment tasks, while revealing an absence of response stability. Hu et al.'s (HEA) "re-evaluation" led to different conclusions. HEA argue that i) "LLMs align with human judgments on key grammatical constructions," ii) LLMs show "human-like grammatical

generalization capabilities," while iii) grammaticality judgments (GJs) are not the best evaluation method because they "systematically underestimate" these capabilities. While HEA's aim to elucidate the abilities of LLMs is laudable, their claims are fraught with interpretative difficulties.
https://www.pnas.org/doi/full/10.1073/pnas.2406752121

Royal Society Open Science

PAPERS

S. HOOGEVEEN et al – Prevalence, patterns and predictors of paranormal beliefs in The Netherlands: a several-analysts approach

Paranormal beliefs encompass a wide variety of phenomena, including the existence of supernatural entities such as ghosts and witches, as well as extraordinary human abilities such as telepathy and clairvoyance. In the current study, we used a nationally representative sample (N=2534) to investigate the presence and correlates of paranormal beliefs among the secular Dutch population. The results indicated that most single paranormal phenomena (e.g. belief in clairvoyance) are endorsed by 10–20% of Dutch respondents; however, 55.6% of respondents qualify as paranormal believers based on the preregistered criterion that they believe in at least one phenomenon with considerable certainty. In addition, we invited four analysis teams with different methodological expertise to assess the structure of paranormal beliefs using traditional factor analysis, network analysis, Bayesian network analysis and latent class analysis (LCA). The teams' analyses indicated adequate fit of a four-factor structure reported in a 1985 study, but also emphasized different conclusions across techniques; network analyses showed evidence against strong connectedness within most clusters, and suggested a five-cluster structure. The application of various analytic techniques painted a nuanced picture of paranormal beliefs and believers in The Netherlands and suggests that despite increased secularization, subgroups of the general population still believe in paranormal phenomena.
https://royalsocietypublishing.org/doi/10.1098/rsos.240049

Science

PAPERS

MARIA C. TELLO-RAMOS et al – Architectural traditions in the structures built by cooperative weaver birds

Humans cooperate to build complex structures with culture-specific architectural styles. However, they are not the only animals to build complex structures nor to have culture. We show that social groups of white-browed sparrow weavers (Plocepasser mahali) build structures (nests for breeding and multiple single-occupant roosts for sleeping) that differ architecturally among groups. Morphological differences are consistent across years and are clear even among groups with territories a few meters apart. These repeatable differences are not explained by among-group variation in local weather conditions, bird size, tree height, or patterns of genetic relatedness. Architectural styles are also robust to the immigration of birds from other groups.
https://www.science.org/doi/10.1126/science.adn2573

Trends in Cognitive Sciences

PAPERS

HELEN FISCHER & STEPHEN FLEMING – Why metacognition matters in politically contested domains

Emerging evidence highlights the importance of metacognition – the capacity for insight into the reliability and fallibility of our own knowledge and thought – in politically contested domains. The present synthesis elucidates why metacognition matters in politically charged contexts and its potential impact on how individuals form beliefs, process evidence, and make decisions.
https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(24)00163-3

NED BLOCK – What does decoding from the PFC reveal about consciousness?

Disputes between rival theories of consciousness have often centered on whether perceptual contents can be decoded from the prefrontal cortex (PFC). Failures to decode from the PFC are taken to challenge 'cognitive' theories of consciousness such as the global workspace theory and higher-order monitoring theories, and decoding successes have been taken to confirm these theories. However, PFC decoding shows both too much and too little. Too much because cognitive theories of consciousness do not need PFC rerepresentation of perceptual contents since pointers to perceptual representations suffice. Too little because there is evidence that PFC decoding of perceptual content reflects postperceptual cognitive representation, such as thoughts that have those perceptual contents rather than conscious percepts.
https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(24)00117-7

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

PRISCILLA M. WEHI et al – Woven languages: understanding Indigenous socioecological systems

Language connects cultural and biological diversity and can contribute to both big data and localised approaches to improve conservation. Analysing Indigenous languages at regional level supports understanding of local ecologies and cultural revitalisation. Collated linguistic datasets can help to identify large-scale patterns, including extinctions, and forge robust multidisciplinary approaches to biocultural decision-making.
https://www.cell.com/trends/ecology-evolution/abstract/S0169-5347(24)00197-6

PRITISH CHAKRAVARTY et al with BARBARA FRUTH – The sociality of sleep in animal groups

Group-living animals sleep together, yet most research treats sleep as an individual process. Here, we argue that social interactions during the sleep period contribute in important, but largely overlooked, ways to animal groups' social dynamics, while patterns of social interaction and the structure of social connections within animal groups play important, but poorly understood, roles in shaping sleep behavior. Leveraging field-appropriate methods, such as direct and video-based observation, and increasingly common on-animal motion sensors (e.g., accelerometers), behavioral indicators can be tracked to measure sleep in multiple individuals in a group of animals simultaneously. Sleep proximity networks and sleep timing networks can then be used to investigate the collective dynamics of sleep in wild group-living animals.
https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347(24)00176-9

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