

EAORC BULLETIN 1,120 – 1 December 2024

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NOTICES

FORMATTED VERSION OF THIS BULLETIN

A pdf formatted version of this Bulletin is available for download at martinedwardes.me.uk/eaorc/eaorc_bulletins.htm.

PUBLICATION ALERTS

If you have had a paper or book published, or you see something which would be of interest to the group, please send me a publication alert so that I can include it in the newsletter. Many thanks to those who have already sent in alerts.

If there is a journal you feel I should be tracking on a regular basis, let me know.

And if you have any other ideas for extending the “EAORC experience”, please contact me.

EDITORIAL INTERJECTIONS

Comments in curly brackets are editorial interjections. The Editor reserves the right to be wrong.

ACADEMIA.EDU – A Pleistocene Record of Making Symbols

In Thomas Wynn, Karenleigh Overmann & Frederick Coolidge (eds.), The Oxford Handbook of Cognitive Archaeology, Oxford University Press, ch21, 485-504 (2024).

ERELLA HOVERS & ANNA BELFER-COHEN – A Pleistocene Record of Making Symbols

Symbol making involves active agency, as it is, by definition, intentional and aims to deliver messages, worldviews, and social contents to designated audiences. As archaeology can specify only elements of behavior that are expressed as material objects, it must focus on material objects and their contexts. Accordingly, this chapter does not aim to elucidate the symbolic content of objects. Whether the role of objects is perceived as a clear dichotomy between utilitarian and symbolic or as a “mixed bag,” in the practice of prehistoric archaeology it is the context of artifacts that is often enlisted to provide telltale signs about their role in the behavioral system. Employing archaeological tools (material culture, chronology, and context), the chapter addresses (1) the epistemology of understanding prehistoric symbols by reviewing criteria that are prevalent in the research to assess whether an object may have acted as a symbolic manifestation and (2) the diachronic shift from a cognitive capacity to comprehend and make symbolic objects to a broader, evolved, symbolic behavioral system. Its review of the Pleistocene symbolic record of the Levant suggests that the trajectories of change parallel patterns (though not necessarily the same chronology) observed in neighboring regions. The analysis suggests that rather than changes in the neurological infrastructure per se, the coevolution of symbolic behavior and social complexity is driven by changes in social cognition as a major adaptive tool in hominin cultural evolution.

[https://www.academia.edu/95835031/Hovers E and Belfer Cohen A 2023 A Pleistocene Record of Making Symbols in Wynn T Overmann K A Coolidge F L Eds The Oxford Handbook of Cognitive Archaeology Oxford University Press pp 485 504 https doi org 10 1093 oxfordhb 9780192895950 013 23](https://www.academia.edu/95835031/Hovers_E_and_Belfer_Cohen_A_2023_A_Pleistocene_Record_of_Making_Symbols_in_Wynn_T_Overmann_K_A_Coolidge_F_L_Eds_The_Oxford_Handbook_of_Cognitive_Archaeology_Oxford_University_Press_pp_485_504_https_doi_org_10_1093_oxfordhb_9780192895950_013_23)

ACADEMIA.EDU – The Extension of Social Relations in Time and Space During the Palaeolithic and Beyond

In F. Coward, R. Hosfield, M. Pope & F. Wenban-Smith (eds.), Settlement, Society and Cognition in Human Evolution. Cambridge University Press, ch3, 31-57 (2015).

DWIGHT READ & SANDER VAN DER LEEUW – The Extension of Social Relations in Time and Space During the Palaeolithic and Beyond

In recent work, culminating in the book *Origins and Revolutions*, Clive Gamble has suggested that we need to move away from a focus on the origin of individual, cognitive abilities of modern *Homo sapiens* towards the development of “an external cognitive architecture by which hominins achieved social extension within local groups and a wider community” (Gamble 2010, 32). The shift in focus, he argues, is away from a rational to a relational explanation of behavior (Gamble 2007); that is, from explanations that account for behavior by criteria considering the individual in isolation to explanations framed around relations of individuals to both the material and the social domain.

Gamble argues that we need to work out the cognitive and emotional requirements necessary for individuals to operate simultaneously within a system of bounded groups and without through extended social relations that transcend local groups. He poses two questions. The first asks about “the origins of group identity and ... social boundaries which are the building blocks of all subsequent archaeological periods from the Neolithic to the recent, more familiar past....”, whereas the second, derived from insights regarding the social behavior of primates, casts the process differently: “Here it is how social relations were extended in time and space, which is at issue” (Gamble and Gittins 2004, 97). More recently and in the same

vein he observes, "Increasing brain and community size selected for mechanisms that both integrated and separated individuals in local groups" leading to "ontological security, psychological continuity and the extension of the self to create the release from social proximity [i.e. non-human primate modes of social organization based on face-to-face interaction]" (Gamble 2010, 36, 37).

https://www.academia.edu/22671432/THE_EXTENSION_OF_SOCIAL_RELATIONS_IN_TIME_AND_SPACE_DURING_THE_PALAEOLITHIC_AND_BEYOND

NEWS

SAPIENS – How and When Did Humans First Move into the Pacific?

New archaeological research reveals insights into the first-known seafarers to brave ocean crossings from Asia to the Pacific Islands more than 50,000 years ago.

<https://www.sapiens.org/archaeology/migration-first-seafarers-asia-pacific/>

SCIENCEADVISER – Scientists uncover hearth Neanderthals may have used to make tar

Researchers re-create process of burning branches to make tarry adhesive to haft stone tools.

<https://www.science.org/content/article/scientists-uncover-hearth-neanderthals-may-have-used-make-tar>

SCIENCE DAILY – Earliest evidence of humans using fire to shape the landscape of Tasmania

Some of the first human beings to arrive in Tasmania, over 41,000 years ago, used fire to shape and manage the landscape, about 2,000 years earlier than previously thought.

<https://www.sciencedaily.com/releases/2024/11/241116195644.htm>

SCIENCE DAILY – Backyard birds learn from their new neighbors when moving house

Scientists have found a trigger for social learning in wild animals. An experiment on great tits has pinpointed a single factor -- immigration -- that can cause birds to pay close attention to others, leading them to rapidly adopt useful behaviors. The study is the first to provide experimental support of a long-held assumption that immigrants should strategically use social learning.

<https://www.sciencedaily.com/releases/2024/11/241114161140.htm>

SCIENCE DAILY – 12,000-year-old stones may be very early evidence of wheel-like technology

A collection of perforated pebbles from an archaeological site in Israel may be spindle whorls, representing a key milestone in the development of rotational tools including wheels, according to a new study.

<https://www.sciencedaily.com/releases/2024/11/241113160855.htm>

SCIENCE DAILY – Language used by mothers affects oxytocin levels of infants

Infants whose mothers regularly use language to describe what their child is thinking or feeling, have higher levels of the hormone oxytocin, finds a new study.

<https://www.sciencedaily.com/releases/2024/11/241125145804.htm>

SCIENCE DAILY – Prehistoric hunter-gatherers heard the elks painted on rocks 'talking'

Researchers performed acoustic impulse response measurements in front of 37 rock painting site and found that the same vertical rock surfaces that have the painted elks, humans and boats, are also effective sound reflectors.

<https://www.sciencedaily.com/releases/2024/11/241125125648.htm>

SCIENCE DAILY – Your child, the sophisticated language learner

Sentences contain subtle hints in their grammar that tell young children about the meaning of new words, according to new research.

<https://www.sciencedaily.com/releases/2024/11/241121225852.htm>

SCIENCE DAILY – R sounds are rough, and L sounds are smooth, according to cross-cultural study

People around the world associate a trilled R sound with a rough texture and a jagged shape, and an L sound with smooth texture and a flat shape, according to the findings of a new study. Researchers believe this association may be more universal than the famous bouba/kiki effect.

<https://www.sciencedaily.com/releases/2024/11/241120121638.htm>

SCIENCE DAILY – How children learned for 99% of human history

Unlike kids in the United States, hunter-gatherer children in the Congo Basin have often learned how to hunt, identify edible plants and care for babies by the tender age of six or seven. This rapid learning is facilitated by a unique social environment where cultural knowledge is passed down not just from parents but from the broader community. The research helps explain how many cultural traits have been preserved for thousands of years among hunter-gatherer groups across a wide range of natural environments in Africa.

<https://www.sciencedaily.com/releases/2024/11/241119132717.htm>

SCIENCE DAILY – Friendly social behaviors are contagious for chimpanzees

Chimpanzees are more likely to engage in play or groom each other if they see others performing these social behaviors first, researchers report.

<https://www.sciencedaily.com/releases/2024/11/241120144822.htm>

SCIENCE DAILY – Brains grew faster as humans evolved

Brain size increased gradually within each ancient human species rather than through sudden leaps between species.

<https://www.sciencedaily.com/releases/2024/11/241127140019.htm>

SCIENCE DAILY – Shared genetic foundations between musical rhythm and human language

A study has revealed that genetic variants associated with higher likelihood of rhythm impairments tended to be also associated with higher likelihood of dyslexia. The reverse was also the case: Genetic variants associated with more accurate musical rhythm skills co-occurred with genes linked to higher performance on language and reading tests, and to language-related educational outcomes.

<https://www.sciencedaily.com/releases/2024/11/241127135850.htm>

SCIENCE DAILY – Great apes visually track subject-object relationships like humans do, study finds

Great apes track events with their eyes in the same way that humans do, according to a new study.

<https://www.sciencedaily.com/releases/2024/11/241126145328.htm>

SCIENCE DAILY – 'Genetic time machine' reveals complex chimpanzee cultures

Chimpanzees are known for their remarkable intelligence and use of tools, but could their cultures also evolve over time like human cultures? A new, multidisciplinary study suggests that some of their most advanced behaviors may have been passed down and refined through generations.

<https://www.sciencedaily.com/releases/2024/11/241127135912.htm>

SCIENCE DAILY – 1.5-million-year-old footprints of two different species of human ancestors at same spot

More than a million years ago, on a hot savannah teeming with wildlife near the shore of what would someday become Lake Turkana in Kenya, two completely different species of hominins may have passed each other as they scavenged for food. Scientists know this because they have examined 1.5-million-year-old fossils they unearthed and have concluded they represent the first example of two sets of hominin footprints made about the same time on an ancient lake shore. The discovery will provide more insight into human evolution and how species cooperated and competed with one another, the scientists said.

<https://www.sciencedaily.com/releases/2024/11/241128200732.htm>

SCIENCE.ORG NEWS – Scientists uncover hearth Neanderthals may have used to make tar

Researchers re-create process of burning birch branches to make tarry adhesive to haft stone tools.

<https://www.science.org/content/article/scientists-uncover-hearth-neanderthals-may-have-used-make-tar>

THE CONVERSATION – The whole story of human evolution – from ancient apes via Lucy to us

Our understanding of human ancestry has changed dramatically since the discovery of Lucy the ancient hominin 50 years ago. Here is the history of humanity as we know it today.

[JOHN GOWLETT]

<https://theconversation.com/the-whole-story-of-human-evolution-from-ancient-apes-via-lucy-to-us-in-one-long-read-243960>

THE CONVERSATION – Their DNA survives across the world – but who were the Denisovans?

Linda Ongaro, Trinity College Dublin The discovery of a finger bone in a cave in Siberia some 15 years ago kicked off a race to unravel the mysteries of an entirely new group of humanoids.

<https://theconversation.com/their-dna-survives-in-diverse-populations-across-the-world-but-who-were-the-denisovans-244441>

PUBLICATIONS

Biology Letters

PAPERS

LEWIS G. HALSEY, DAVID GIOFRÈ & DAVID C. GEARY – Does greater variation reside in the larger sex?

The question of whether males or females are the more variable sex is long-standing, and yet to be fully answered. We investigate the relationships between body mass and variation across species using a phylogenetically informed analysis of the body mass of 337 species representing six mammalian orders. Within each order, we found that the larger sex is typically the more variable sex, whether male or female, and the variation–size relationship is arguably often close to unity. Thus, size may be the main or even sole driver of variability in at least some orders. Deviations from the expected 1 : 1 relationship emerged, however, in regressions of male : female mass variance against male : female mean mass, for Chiroptera and Rodentia, which both presented hyperallometric relationships suggesting that drivers over and above size influence differences in variation between the sexes. In Chiroptera, most species have larger females. The y-intercept value for Artiodactyla and Primates were significantly greater than 0 suggesting greater male variation in species where the sexes are of commensurable size. Historic belief of exclusively greater male variability may have resulted from a focus on species with intense male–male competition and, thus, larger male body sizes. Our results suggest that it is often size, not sex per se, that influences within-sex variability, although additional sex-specific factors might be present in at least some orders.

<https://royalsocietypublishing.org/doi/10.1098/rsbl.2024.0404>

eLife

PAPERS

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>

JUSTIN A. HARRIS & C.R. GALLISTEL – Information, certainty, and learning

More than four decades ago, Gibbon and Balsam (1981) showed that the acquisition of Pavlovian conditioning in pigeons is directly related to the informativeness of the conditioning stimulus (CS) about the unconditioned stimulus (US), where informativeness is defined as the ratio of the US-US interval (C) to the CS-US interval (T). However, the evidence for this relationship in other species has been equivocal. Here, we describe an experiment that measured the acquisition of appetitive Pavlovian conditioning in 14 groups of rats trained with different C/T ratios (ranging from 1.5 to 300) to establish how learning is related to informativeness. We show that the number of trials required for rats to start responding to the CS is determined by the C/T ratio and, remarkably, the specific scalar relationship between the rate of learning and informativeness aligns very closely to that previously obtained with pigeons. We also found that the response rate after extended conditioning is strongly related to T, with the terminal CS response rate being a scalar function of the CS reinforcement rate (1/T). Moreover, this same scalar relationship extended to the rats' response rates during the (never-reinforced) inter-trial interval, which was directly proportional to the contextual rate of reinforcement (1/C). The findings establish that animals encode rates of reinforcement, and that conditioning is directly related to how much information the CS provides about the US. The consistency of the data across species, captured by a simple regression function, suggests a universal model of conditioning.

<https://elifesciences.org/reviewed-preprints/102155>

Evolutionary Human Sciences

PAPERS

EDWIN J. C. VAN LEEUWEN et al – Group-level signatures in bonobo sociality

Humans show remarkable differences in social behaviour between families, groups, communities and cultures, whereas such group-level within-species variation in socio-behavioural propensities is typically overlooked in other species. Studies on

intraspecific variation in animal social structures are needed to inform an evolutionary account of human sociality. Here, we study multiple independent bonobo populations ($n = 6$) in zoological settings to investigate if and how bonobos ($n = 70$) show group-specific signatures in sociality. By applying tailored Bayesian statistical methods, we find that beyond individual and dyadic variation, the groups substantially differ from each other in core dimensions of great ape sociality: social proximity, grooming and play. Moreover, the groups' network structures are distinct regarding cohesiveness and clustering, with some groups forming cohesive wholes, while others showcasing high levels of sub-grouping. Overall, while there is consistent evidence of differences in sociality between the groups, the patterns of cohesiveness and clustering are not consistent across the networks. This suggests that rather than groups having different levels of sociality, different patterns of sociality exist in each group. These findings warrant caution with characterising bonobos' behavioural phenotype at the species level, and identify an essential source of variation that needs to be integrated in phylogenetic analyses.

<https://www.cambridge.org/core/journals/evolutionary-human-sciences/article/grouplevel-signatures-in-bonobo-sociality/C992A9B45BB6029E37433CDE37FEA8AA>

Frontiers in Psychology

PAPERS

OMID KHATIN-ZADEH et al – Prime effects in metaphor comprehension: comparing congruent and opposite schematic primes

This study investigates the role of priming in the process of metaphor comprehension focusing on both literal and gesture-based primes under congruent and opposite conditions. We conducted a two-stage experiment to explore how different priming conditions influence the cognitive processing of metaphors. In stage 1, participants made sensibility judgments on a set of metaphors in congruent literal primes (Group 1), opposite literal primes (Group 2), and no-prime conditions, with Group 3 serving as a baseline. In stage 2, participants performed the same task under congruent gesture-prime (Group 4) and opposite gesture-prime conditions (Group 5), again with Group 3 as the baseline. Sensibility judgments and reaction times were analyzed and compared across all five conditions. Findings of stage 1 reveal that congruent literal primes facilitate process of metaphor comprehension, whereas opposite literal primes delay the process of understanding the subsequent metaphor. Similarly, results of stage 2 show that congruent gesture primes facilitate the process of understanding the subsequent metaphor, while opposite gesture primes delay it. These results align with theories of embodied metaphor comprehension, highlighting the varying influences of primes on metaphor comprehension.

<https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1355045/full>

MIHAILO ANTOVIĆ, VLADIMIR Ž. JOVANOVIĆ & MLADEN POPOVIĆ – From spatial perception to referential meaning: convergent image schemas in the music of and texts about Beethoven's piano sonatas

This paper approaches the connection between musical constructs and visuo-haptic experience through the lens of the cognitive-linguistic notion of the "image schema." The proposal is that the subconscious inference of spatial and haptic schematic constructs in music, such as vertical movement, will motivate their equally common occurrence in the language about that music, irrespective of the fact that this language never describes the musical structure in a one-to-one fashion. We have looked for five schemas in the scores for the first ten piano sonatas by Ludwig van Beethoven and three famous analytical and pedagogical texts about them: FORCE, indicating changes in musical dynamics and referential invocation of power-related terms in the books; PATH, identifying vertical movement in the music and suggestions of upward- or downward motion in the texts; LINK, suggesting the presence or absence of musical slurs and references to attachment or detachment in the language; BALANCE, indicating the loss and regain of consonance in the harmony and invocation of lost and recovered stability in the verbal semantics; and CONTAINMENT, allocating the nonharmonic tones that "belong" to their resolving notes in the scores and referring to physical or metaphorical enclosed areas in the texts. Results of the corpus analysis suggest the following conclusions: musical schemas outnumber linguistic ones sevenfold; moderate schema strengths are typical of both language and music; predominant valences are shared by language and music in three schemas out of five; hierarchies of five schemas by strength differ, though the strongest schemas are mostly shared. Yet the central finding is that the correlations between each schema pair for music and language, by scalarity and valence, are total. This implies that (1) schemas operate as semantic building blocks irrespective of the external "symbolical form" in which they are realized and (2) scalarized image schema complexes perceived in one cognitive mode may motivate the emergence of a corresponding number of the same complexes in another.

<https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1497557/full>

Interface: Journal of the Royal Society

PAPERS

THE ANH HAN, MANH HONG DUONG & MATJAZ PERC – Evolutionary mechanisms that promote cooperation may not promote social welfare

Understanding the emergence of prosocial behaviours among self-interested individuals is an important problem in many scientific disciplines. Various mechanisms have been proposed to explain the evolution of such behaviours, primarily seeking the conditions under which a given mechanism can induce highest levels of cooperation. As these mechanisms usually involve costs that alter individual pay-offs, it is, however, possible that aiming for highest levels of cooperation might be

detrimental for social welfare—the latter broadly defined as the total population pay-off, taking into account all costs involved for inducing increased prosocial behaviours. Herein, by comparing stochastic evolutionary models of two well-established mechanisms of prosocial behaviour—namely, peer and institutional incentives—we demonstrate that the objectives of maximizing cooperation and of maximizing social welfare are often misaligned. First, while peer punishment is often more effective than peer reward in promoting cooperation—especially with a higher impact-to-cost ratio—the opposite is true for social welfare. In fact, welfare typically decreases (increases) with this ratio for punishment (reward). Second, for institutional incentives, while maintaining similar levels of cooperation, rewards result in positive social welfare across a much broader range of parameters. Furthermore, both types of incentives often achieve optimal social welfare when their impact is moderate rather than maximal, indicating that careful planning is essential for costly institutional mechanisms to optimize social outcomes. These findings are consistent across varying mutation rates, selection intensities and game configurations. Overall, we argue for the need of adopting social welfare as the main optimization objective when designing and implementing evolutionary mechanisms for social and collective goods.

<https://royalsocietypublishing.org/doi/10.1098/rsif.2024.0547>

iScience

PAPERS

JIN LI, KELLY J. HIERSCHE & ZEYNEP M. SAYGIN – Demystifying Visual Word Form Area Visual and Nonvisual Response Properties with Precision fMRI

The visual word form area (VWFA) is a region in left ventrottemporal cortex (VTC) whose specificity remains contentious. Using precision fMRI, we examine the VWFA's responses to numerous visual and nonvisual stimuli, comparing them to adjacent category-selective visual regions, and regions involved in language and attentional demand. We find that VWFA responds moderately to non-word visual stimuli, but is unique within VTC in its pronounced selectivity for visual words. Interestingly, the VWFA is also the only category-selective visual region engaged in auditory language, unlike the ubiquitous attentional demand effect throughout the VTC. However, this language selectivity is dwarfed by its visual responses even to nonpreferred categories, indicating the VWFA is not a core (amodal) language region. We also observed two additional auditory language VTC clusters, but these had no specificity for visual words. Our detailed investigation clarifies long-standing controversies about the landscape of visual and auditory language functionality within VTC.

[https://www.cell.com/iscience/fulltext/S2589-0042\(24\)02708-1](https://www.cell.com/iscience/fulltext/S2589-0042(24)02708-1)

Journal of Linguistics

PAPERS

SILVIO CRUSCHINA & LAIA MAYOL – The distribution of focus and the mapping between syntax and information structure

The availability of preverbal focus in Romance is still the subject of controversy in the relevant literature. In this paper, we investigate the distribution of information focus in three Romance languages: Catalan, Spanish and Italian. The main goal is to understand if and to what extent information focus can occur preverbally in these three languages. To this end, we applied a new technique (Questions with a Delayed Answer) to elicit both production data and acceptability judgements. Our results show that preverbal foci are almost never produced in free speech under elicitation but are judged as acceptable by native speakers in rating tasks. The acceptability of preverbal foci, however, is subject to variation: they are more acceptable in Spanish but less so in Catalan and Italian. We interpret this difference across the three Romance languages in the light of the hypothesis formulated in Leonetti (2017), according to which Catalan and especially Italian are more restrictive than Spanish with respect to the mapping between syntax and information structure. While all languages resort to the dedicated word order with a more transparent information-structure partition for a focal subject (i.e. VS), Spanish is more permissive in also allowing a narrow focus interpretation of the subject in an SV order.

<https://www.cambridge.org/core/journals/journal-of-linguistics/article/distribution-of-focus-and-the-mapping-between-syntax-and-information-structure/CABD2AA6224D4A3AEA2F3AC795C22434>

Language Sciences

PAPERS

STEFANO RASTELLI – Third-way linguistics: generative and usage-based theories are both right

Language research remains largely affected by the generative grammar vs usage-based rivalry. The polarization is so pervasive that one seems to have no choice but to assume that language categories are either entirely innate or fully learned. Nonetheless, it is possible to refrain from taking a side in the generative vs nongenerative debate. This paper highlights the work of authors over the last thirty years who believe that, on the one hand, input and domain-general, cognitive constraints alone are insufficient to learn and represent a language and, on the other, that the faculty of language (FL) – if it exists – must incorporate statistics, i.e., a counting device. The core idea of 'third-way' linguistics described in this paper is that languages can work because language users' statistical sensitivity and their innate grammar module interact. For a language to function, language users must implicitly know two things. First, by accumulating experience and memory, language users come to

know that some forms are likely to go together in the input. Second, from a frequency-independent device (the FL) they also know in abstract (i.e., prior to input exposure) why those forms and not others can do so.

<https://www.sciencedirect.com/science/article/pii/S0388000124000743>

Nature

NEWS

Why the word scientist was controversial 100 years ago

The debate about adopting the term scientist, and musings on how the content in Nature has evolved over the years, in this week's pick from the journal's archive.

<https://www.nature.com/articles/d41586-024-03771-x>

Evidence of oldest known alphabet unearthed among Syrian tomb treasures

Cylinders discovered in 2004 are inscribed with the earliest known examples of letters, say archaeologists.

<https://www.nature.com/articles/d41586-024-03876-3>

These two ancient human relatives crossed paths 1.5 million years ago

Remarkably preserved footprints of *Homo erectus* and *Paranthropus boisei* offer direct evidence that extinct hominin species coexisted.

<https://www.nature.com/articles/d41586-024-03907-z>

Nature Communications

PAPERS

JINBO ZAN et al with MICHAEL PETRAGLIA – Mid-Pleistocene aridity and landscape shifts promoted Palearctic hominin dispersals

Population expansions and contractions out of and into Africa since the early Pleistocene have influenced the course of human evolution. While local- and regional-scale investigations have provided insights into the drivers of Eurasian hominin dispersals, a continental-scale and integrated study of hominin-environmental interactions across Palearctic Eurasia has been lacking. Here, we report high-resolution (up to ~5-10 kyr sample interval) carbon isotope time series of loess deposits in Central Asia and northwest China, a region dominated by westerly winds, providing unique paleoecological and paleoclimatic records for over ~3.6 Ma. These data, combined with further syntheses of Pleistocene paleontological and archaeological records and spatio-temporal distributions of Eurasian eolian deposits and river terraces, demonstrate a pronounced transformation of landscapes around the Mid-Pleistocene Climate Transition. Increased climate amplitude and aridity fluctuations over this period led to the widespread formation of more open habitats, river terraces, and desert-loess landscapes, pushing hominins to range more widely and find solutions to increasingly challenging environments. Mid-Pleistocene climatic and ecological transitions, and the formation of modern desert and loess landscapes and river networks, emerge as critical events during the dispersal of early hominins in Palearctic Eurasia.

<https://www.nature.com/articles/s41467-024-54767-0>

Nature Machine Intelligence

PAPERS

GAVIN MISCHLER et al – Contextual feature extraction hierarchies converge in large language models and the brain

Recent advancements in artificial intelligence have sparked interest in the parallels between large language models (LLMs) and human neural processing, particularly in language comprehension. Although previous research has demonstrated similarities between LLM representations and neural responses, the computational principles driving this convergence—especially as LLMs evolve—remain elusive. Here we used intracranial electroencephalography recordings from neurosurgical patients listening to speech to investigate the alignment between high-performance LLMs and the language-processing mechanisms of the brain. We examined a diverse selection of LLMs with similar parameter sizes and found that as their performance on benchmark tasks improves, they not only become more brain-like, reflected in better neural response predictions from model embeddings, but they also align more closely with the hierarchical feature extraction pathways of the brain, using fewer layers for the same encoding. Additionally, we identified commonalities in the hierarchical processing mechanisms of high-performing LLMs, revealing their convergence towards similar language-processing strategies. Finally, we demonstrate the critical role of contextual information in both LLM performance and brain alignment. These findings reveal converging aspects of language processing in the brain and LLMs, offering new directions for developing models that better align with human cognitive processing.

<https://www.nature.com/articles/s42256-024-00925-4>

Nature Mental Health

PAPERS

ISAAC FRADKIN et al – Latent mechanisms of language disorganization relate to specific dimensions of psychopathology

Comprehensible communication is critical for social functioning and well-being. In psychopathology, incoherent discourse is assumed to reflect disorganized thinking, which is classically linked to psychotic disorders. However, people do not express everything that comes to mind, rendering inferences from discourse to the underlying structure of thought challenging. Indeed, a range of psychopathologies are linked to self-reported disorganized thinking in the absence of language output incoherence. Here we combine natural language processing and computational modeling of free association to detail the relationship between disorganized thinking and language (in)coherence in a large sample of participants varying across different dimensions of psychopathology. Our approach allowed us to differentiate between disorganized thinking, disinhibited thought expression and deliberate creativity. We find evidence for both under-regulated and over-regulated disorganized thinking, which relate to two specific dimensions of psychopathology: self-reported eccentricity and suspiciousness. Broadly, these results underscore the theoretical progress afforded by analyzing latent dimensions underlying behavior and psychopathology.

<https://www.nature.com/articles/s44220-024-00351-w>

Nature Scientific Reports

PAPERS

JEAN-JACQUES HERINGS, RONALD PEETERS & ANASTAS P. TENEV – Directed reciprocity subverts cooperation in highly adaptive populations

We examine the generally accepted hypothesis that directed reciprocity is a powerful driver for cooperation. To do so, we consider a framework where agents situated on a circle network interact with their neighbors and have the choice to be egoistic, altruistic, or partially cooperative. We study the interaction between reciprocity, the likelihood that an agent reproduces value to the neighbor who has recently produced value for the agent, and inertia, the tendency of agents to repeat their previous choices even if other strategies are more successful. On the basis of extensive simulations, we conclude that for high levels of inertia, reciprocity enhances cooperation, while for low levels of inertia reciprocity rather subverts cooperation. For intermediate levels of inertia, we find a U-shaped effect. Reciprocity therefore interacts with the level of inertia in a non-monotonic fashion.

<https://www.nature.com/articles/s41598-024-80408-z>

ETHAN KUTLU et al – Linguistic diversity shapes flexible speech perception in school age children

Every day, listeners encounter a wide range of acoustic signals. Successfully solving this variability problem allows them to interpret these signals accurately. While this mechanism tends to be less effortful for adults, children need to learn stable categories in the face of such variability. It is unknown to what extent general maturation or diversity of the input plays a role in shaping different speech categorization profiles that children can employ. Here, we tested school-aged children's speech categorization with a continuous speech categorization task called the Visual Analogue Scaling (VAS) task. We measured the linguistic diversity in each child's social environment through a social network analysis. We found that increased linguistic diversity led to more flexible and gradient speech categorization. On the other hand, less diverse linguistic input led to more categorical speech categorization. We argue that these findings have implications for speech perception as well as linguistic diversity research.

<https://www.nature.com/articles/s41598-024-80430-1>

New Scientist

NEWS

Chimpanzees seem to get more technologically advanced through culture

Groups of wild chimpanzees with more complex tool-using behaviours tend to be genetically linked, providing evidence for cumulative culture in other apes.

<https://www.newscientist.com/article/2457464-chimpanzees-seem-to-get-more-technologically-advanced-through-culture/>

PLoS Biology

PAPERS

VANESSA A. D. WILSON et al with BALTHASAR BICKEL & KLAUS ZUBERBÜHLER – Humans and great apes visually track event roles in similar ways

Human language relies on a rich cognitive machinery, partially shared with other animals. One key mechanism, however, decomposing events into causally linked agent–patient roles, has remained elusive with no known animal equivalent. In humans, agent–patient relations in event cognition drive how languages are processed neurally and expressions structured syntactically. We compared visual event tracking between humans and great apes, using stimuli that would elicit causal

processing in humans. After accounting for attention to background information, we found similar gaze patterns to agent–patient relations in all species, mostly alternating attention to agents and patients, presumably in order to learn the nature of the event, and occasionally privileging agents under specific conditions. Six-month-old infants, in contrast, did not follow agent–patient relations and attended mostly to background information. These findings raise the possibility that event role tracking, a cognitive foundation of syntax, has evolved long before language but requires time and experience to become ontogenetically available.

<https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3002857>

PLoS One

PAPERS

ADAM LEE MILES, MATTEO CAVALIERE & GUOLI YANG – Aiding the resilience of cooperation through the use of network rankings

In many aspects of life on earth, individuals may engage in cooperation with others to contribute towards a goal they may share, which can also ensure self-preservation. In evolutionary game theory, the act of cooperation can be modelled as an altruistic act of an individual producing some form of benefit that can be utilised by others they are associated with at some personal cost. In various scenarios, individuals make use of information that they can perceive within a group to aid with their decision-making regarding who they should associate and cooperate with. However, cooperative individuals can be taken advantage of by opportunistic defectors, which can cause significant disruption to the population. We study a model where the decision to establish interactions with potential partners is based on the opportune integration of the individual's private ability to perceive the intentions of others (private information) and the network position (ranking) of potential partners (public information). We find that there are rankings, such as degree and eigenvector, which can lead to a significant increase to the prosperity of the network, but this greatly increases the likelihood of a network succumbing to cheater invasion. Other rankings, such as betweenness, can instead lead to more stable resilient networks whilst also cultivating some degree of payoff. Our results highlight how commonly used network rankings can be utilised to aid with connection formation within networks and in turn can be utilised to improve the well-being of these networks, helping with stability and allowing for individuals to cultivate cooperation amongst each other. Private information should also continue to be considered when examining the dynamics of these networks as it appears to be a primary driver of encouraging individual agency.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0313198>

JOHN B. NEZLEK – Relationships between personal human values and social value orientation

The present study examined relationships between social value orientation and personal values. Participants, $n = 1655$, were university students ($M_{age} = 18.9$ years, 60% women) who completed the Triple Dominance Measure, a measure of social value orientation, and the PVQ-21, a measure of Schwartz's personal values. Two items were added to the PVQ-21 to measure benevolence toward people in general. The analyses found that pro-socials had significantly higher scores than pro-selfs (Competitors and Individualists) for Benevolence, Universalism, and Conformity values, whereas pro-selfs had significantly higher scores than pro-socials on Hedonic, Achievement, and Power values. These differences reflected the fact that Benevolence, Universalism, and Conformity values concern the feelings and well-being of others, concerns that are consistent with a pro-social orientation. In contrast, Hedonic, Achievement, and Power values concern self-enhancement, concerns that are consistent with a self-focused orientation. There were no significant differences between individualists and competitors for any value, nor were there differences of any kind for Tradition, Security, Self-direction, and Stimulation values. These results complement and expand previous research by demonstrating how individual differences in social value orientation are related to individual differences in fundamental, personal human values.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0312795>

PNAS

OBITUARIES

JANET E. LEVY, WILLIAM H. MARQUARDT & JULIE K. STEIN – Patty Jo Watson, distinguished anthropological archaeologist (1932–2024)

Professor Patty Jo Watson died August 1, 2024, at age 92 in Arlington, Massachusetts, after some years of failing health. She was a distinguished archaeological scholar, working in both North America and the Middle East, a leader in the profession of archaeology, and a stellar mentor to many colleagues and students.

<https://www.pnas.org/doi/full/10.1073/pnas.2422627121>

Proceedings of the Prehistoric Society

PAPERS

RICHARD BRADLEY & AARON WATSON – Sailing to Calanais: Monument Complexes and the Sea in the Neolithic of Western Scotland and Beyond

Ever since Alexander Thom visited Calanais in the Outer Hebrides, groups of Neolithic monuments in western Scotland have been studied in relation to the land and the sky. Less attention has been paid to their close relationship with the sea. These places were secluded and could be difficult or dangerous to reach, yet details of their architecture suggest that there were close links between them. How important were long distance connections between 3000 and 2000 bc? Were some ceremonial centres visited by boat? And was the journey itself treated as a rite of passage? The case extends to structures in Orkney and Ireland.

<https://www.cambridge.org/core/journals/proceedings-of-the-prehistoric-society/article/sailing-to-calanais-monument-complexes-and-the-sea-in-the-neolithic-of-western-scotland-and-beyond/9CDEB4C09EA1156F220BAD7CE4316E31>

Proceedings of the Royal Society A

PAPERS

ALEXANDER KRAUSS – Debunking revolutionary paradigm shifts: evidence of cumulative scientific progress across science

How can scientific progress be conceived best? Does science mainly undergo revolutionary paradigm shifts? Or is the evolution of science mainly cumulative? Understanding whether science advances through cumulative evolution or through paradigm shifts can influence how we approach scientific research, education and policy. The most influential and cited account of science was put forth in Thomas Kuhn's seminal book *The structure of scientific revolutions*. Kuhn argues that science does not advance cumulatively but goes through fundamental paradigm changes in the theories of a scientific field. There is no consensus yet on this core question of the nature and advancement of science that has since been debated across science. Examining over 750 major scientific discoveries (all Nobel Prize and major non-Nobel Prize discoveries), we systematically test this fundamental question about scientific progress here. We find that three key measures of scientific progress—major discoveries, methods and fields—each demonstrate that science evolves cumulatively. First, we show that no major scientific methods or instruments used across fields (such as statistical methods, X-ray methods or chromatography) have been completely abandoned, i.e. subject to paradigm shifts. Second, no major scientific fields (such as biomedicine, chemistry or computer science) have been completely abandoned. Rather, they have all continuously expanded over time, often over centuries, accumulating extensive bodies of knowledge. Third, scientific discoveries including theoretical discoveries are also predominately cumulative, with only 1% of over 750 major discoveries having been abandoned. The continuity of science is most compellingly evidenced by our methods and instruments, which enable the creation of discoveries and fields. We thus offer here a new perspective and answer to this classic question in science and the philosophy and history of science by utilizing methods from statistics and empirical sciences.

<https://royalsocietypublishing.org/doi/10.1098/rspa.2024.0141>

Proceedings of the Royal Society B

PAPERS

ODED RITOV et al – No evidence for inequity aversion in non-human animals: a meta-analysis of accept/reject paradigms

Disadvantageous inequity aversion (IA), a negative response to receiving less than others, is a key building block of the human sense of fairness. While some theorize that IA is shared by species across the animal kingdom, others argue that it is an exclusively human evolutionary adaptation to the selective pressures of cooperation among non-kin. Essential to this debate is the empirical question of whether non-human animals are averse towards unequal resource distributions. Over the past two decades, researchers have reported that individuals from a wide range of taxa exhibit IA; tasks where participants can reject or accept a given distribution of rewards delivered the bulk of this evidence. Yet these results have been questioned on both conceptual and empirical grounds. In the largest empirical investigation of non-human IA to date, we synthesize the primary data from 23 studies using accept/reject tasks, covering 60 430 observations of 18 species. We find no evidence for IA in non-human animals in these tasks. This finding held across all species in the dataset and pre-registered subsets (all species reported to exhibit IA, primates reported to exhibit IA, chimpanzees and capuchin monkeys). Alternative interpretations of the data and implications for the evolution of fairness are discussed.

<https://royalsocietypublishing.org/doi/10.1098/rspb.2024.1452>

CHRISTOPHER YOUNG & MARTHA M. ROBBINS – Homophily in social and demographic traits predict association patterns in female western and mountain gorillas

Affiliative relationships are a hallmark of social relationships in gregarious mammals, but what drives variation of association patterns when kin are absent remains unknown. Gorillas, where females may disperse multiple times in their lives, provide an interesting counterpoint to female philopatric species to examine the factors influencing variation in association patterns. We examined demographic and social factors that may predict association patterns of female western (Gorilla gorilla gorilla;

Loango, Gabon) and mountain gorillas (*Gorilla beringei beringei*; Bwindi, Uganda). We looked at dyadic and individual strength scores of social proximity (37 group-years). For individuals, high dominance rank increased association scores while newly emigrated females had lower scores than resident females. For dyads, higher mean dominance rank and both partners having a dependent infant increased association scores, whereas a partner being an immigrant decreased scores. Furthermore, time-matched analysis of birth and immigration events confirmed the temporal nature of these associations. Overall, female gorilla association patterns show flexibility in strength based on real-time contingencies, namely social and demographic traits. Association patterns in species with female secondary dispersal may be governed by homophily, like that of modern humans. Understanding female gorilla social structure can enhance our knowledge of the evolutionary origins of sociality.

<https://royalsocietypublishing.org/doi/10.1098/rspb.2024.1956>

Science

NEWS

'Systematic reviews' that aim to extract broad conclusions from many studies are in peril

Fake papers are "poisoning the well" for these gold-standard syntheses, researchers say.

{I can see the problem for the reader here, but I don't see the problem for the systematic review writer. The fake papers seem to be posing as "systematic reviews" themselves; but, when producing a systematic review, shouldn't the original papers be reviewed, not other systematic reviews?}

<https://www.science.org/content/article/systematic-reviews-aim-extract-broad-conclusions-many-studies-are-peril>

ARTICLES

WILLIAM E. H. HARCOURT-SMITH – Contemporary hominin locomotor diversity

Footprints in Kenya show that hominin bipedalism had a complex evolutionary history.

<https://www.science.org/doi/10.1126/science.adt8033>

PAPERS

KEVIN G. HATALA et al with LOUISE N. LEAKEY – Footprint evidence for locomotor diversity and shared habitats among early Pleistocene hominins

For much of the Pliocene and Pleistocene, multiple hominin species coexisted in the same regions of eastern and southern Africa. Due to the limitations of the skeletal fossil record, questions regarding their interspecific interactions remain unanswered. We report the discovery of footprints (~1.5 million years old) from Koobi Fora, Kenya, that provide the first evidence of two different patterns of Pleistocene hominin bipedalism appearing on the same footprint surface. New analyses show that this is observed repeatedly across multiple contemporaneous sites in the eastern Turkana Basin. These data indicate a sympatric relationship between *Homo erectus* and *Paranthropus boisei*, suggesting that lake margin habitats were important to both species and highlighting the possible influence of varying levels of coexistence, competition, and niche partitioning in human evolution.

<https://www.science.org/doi/10.1126/science.ado5275>

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