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NOTICES

PUBLICATION ALERTS

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

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

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

ACADEMIA.EDU – Modern Humans in the Philippines

In Robin Dennell & Martin Porr (eds.), Southern Asia, Australia, and the Search for Human Origins. Cambridge University Press, 135-147 (2014).

ALFRED F. PAWLIK, PHILIP J. PIPER & ARMAND SALVADOR B. MIJARES – Modern Humans in the Philippines: Colonization, Subsistence and New Insights into Behavioural Complexity

The Philippines consist of 7,107 islands located at the northern limits of Wallacea and the north-eastern fringes of the islands of Southeast Asia at latitude 13 degrees N and longitude 122 degrees E. It is separated from Borneo to the southwest by the Sulu Sea, from Mainland Southeast Asia to the northwest by the South China Sea, from Taiwan to the north by the Luzon Strait and from Sulawesi to the south by the Celebes Sea, and it is bounded to the east by the Philippine Sea. The Philippine archipelago straddles two distinct biogeographic zones, with Palawan located on the north-eastern edge of the Sunda Shelf, and hence shares a fauna and flora with many of its closest relatives within Island Southeast Asia. A posited land bridge either in the Upper Pleistocene or more likely in the Middle Pleistocene possibly facilitated the colonization of the island by Sundaic Island species, including perhaps hominins. The main archipelago islands of Luzon, the Visayas and Mindanao, situated in Wallacea, on the other hand, have never been physically linked to the Sundaic region, and a sea crossing has always been needed to reach them. Most of the oldest palaeontological sites in the Philippines have been identified on the island of Luzon. It possesses an impoverished island faunal community dominated by good successful open-sea migrants that once reached Luzon and diversified to produce the high endemism characteristic of remote archipelagos in Wallacea. Surveys of northern Luzon have produced an archaic vertebrate fauna containing giant tortoise (*Geochelone*), proboscideans

(Stegodon and Elephas), bovines, cervids, suids and a rhinoceros (*Rhinoceros luzonensis*), and isolated fossil finds that could date to more than 500,000 years ago have been found in the Mindanao and Visayan areas of the Philippines. The Philippines are also home to some of the earliest records of anatomically modern humans in the Island Southeast Asian (ISEA) and Australasian regions. Among them are the remains of several individuals, all assigned to *Homo sapiens*, recovered at Tabon Cave, Palawan Island, during excavations in the 1960s by Robert Fox, and more recently in a re-investigation of the cave by the National Museum of the Philippines and the Muséum national d'histoire naturelle, Institut de Paléontologie Humaine. These remains have been variously dated between 16 and 47ka. Recent excavations at Callao Cave in the Peñablanca karst limestone region of northern Luzon have produced the third metatarsal of an enigmatic hominin, which has been provisionally ascribed to an anatomically modern human and directly dated using U-series ablation to 67±1ka. If this specimen is eventually ascribed to *Homo sapiens*, it will provide further support for the posited early migration from Africa and colonization of Island Southeast Asia by modern humans suggested by sites like Punung in Java and Lenggong in Peninsula Malaysia. If the Callao hominin should turn out to be that of a different hominin species, then it will indicate that non-sapient hominins were more widely distributed throughout Wallacea than just on the island of Flores. What has been made absolutely clear through the evidence of cut marks identified on the animal bones recovered in association with the Callao specimen is that this was a tool-using hominin.

<https://www.cambridge.org/core/books/abs/southern-asia-australia-and-the-search-for-human-origins/modern-humans-in-the-philippines/3DD1C586FD6011D7DAA65FE64B2AA229>

ACADEMIA.EDU – Upper Pleistocene Human Dispersals out of Africa

In International Journal of Evolutionary Biology 2011, 615094 (2011).

AMANUEL BEYIN – Upper Pleistocene Human Dispersals out of Africa: A Review of the Current State of the Debate

Although there is a general consensus on African origin of early modern humans, there is disagreement about how and when they dispersed to Eurasia. This paper reviews genetic and Middle Stone Age/Middle Paleolithic archaeological literature from northeast Africa, Arabia, and the Levant to assess the timing and geographic backgrounds of Upper Pleistocene human colonization of Eurasia. At the center of the discussion lies the question of whether eastern Africa alone was the source of Upper Pleistocene human dispersals into Eurasia or were there other loci of human expansions outside of Africa? The reviewed literature hints at two modes of early modern human colonization of Eurasia in the Upper Pleistocene: (i) from multiple *Homo sapiens* source populations that had entered Arabia, South Asia, and the Levant prior to and soon after the onset of the Last Interglacial (MIS-5), (ii) from a rapid dispersal out of East Africa via the Southern Route (across the Red Sea basin), dating to ~74–60 kya.

https://www.academia.edu/530868/Upper_Pleistocene_Human_Dispersals_Out_of_Africa_A_Review_of_the_Current_State_of_the_Debate

ACADEMIA.EDU – Neandertals revised

In PNAS 113:23, 6372-6379 (2016).

WIL ROEBROEKS & MARIE SORESSI – Neandertals revised

The last decade has seen a significant growth of our knowledge of the Neandertals, a population of Pleistocene hunter-gatherers who lived in (western) Eurasia between ~400,000 and 40,000 y ago. Starting from a source population deep in the Middle Pleistocene, the hundreds of thousands of years of relative separation between African and Eurasian groups led to the emergence of different phenotypes in Late Pleistocene Europe and Africa. Both recently obtained genetic evidence and archeological data show that the biological and cultural gaps between these populations were probably smaller than previously thought. These data, reviewed here, falsify inferences to the effect that, compared with their near-modern contemporaries in Africa, Neandertals were outliers in terms of behavioral complexity. It is only around 40,000 y ago, tens of thousands of years after anatomically modern humans first left Africa and thousands of years after documented interbreeding between modern humans, Neandertals and Denisovans, that we see major changes in the archeological record, from western Eurasia to Southeast Asia, e.g., the emergence of representational imagery and the colonization of arctic areas and of greater Australia (Sahul).

https://www.academia.edu/25934203/Neandertals_revised

ONLINE ARCHIVES – Male Androphilia in the Ancestral Environment: An Ethnological Analysis

In Human Nature 24, 375-401 (2013).

DOUG P. VANDERLAAN, ZHIYUAN REN & PAUL L. VASEY – Male Androphilia in the Ancestral Environment: An Ethnological Analysis

The kin selection hypothesis posits that male androphilia (male sexual attraction to adult males) evolved because androphilic males invest more in kin, thereby enhancing inclusive fitness. Increased kin-directed altruism has been repeatedly documented among a population of transgendered androphilic males, but never among androphilic males in other cultures who adopt gender identities as men. Thus, the kin selection hypothesis may be viable if male androphilia was expressed in the transgendered form in the ancestral past. Using the Standard Cross-Cultural Sample (SCCS), we examined 46 societies in which male androphilia was expressed in the transgendered form (transgendered societies) and 146 comparison societies (non-transgendered societies). We analyzed SCCS variables pertaining to ancestral sociocultural conditions, access to kin, and

societal reactions to homosexuality. Our results show that ancestral sociocultural conditions and bilateral and double descent systems were more common in transgendered than in non-transgendered societies. Across the entire sample, descent systems and residence patterns that would presumably facilitate increased access to kin were associated with the presence of ancestral sociocultural conditions. Among transgendered societies, negative societal attitudes toward homosexuality were unlikely. We conclude that the ancestral human sociocultural environment was likely conducive to the expression of the transgendered form of male androphilia. Descent systems, residence patterns, and societal reactions to homosexuality likely facilitated investments in kin by transgendered males. Given that contemporary transgendered male androphiles appear to exhibit elevated kin-directed altruism, these findings further indicate the viability of the kin selection hypothesis.

<https://link.springer.com/article/10.1007/s12110-013-9182-z>

NEWS

FRONTIERS NEWS – Karen Strier: Lessons from the world’s most peaceful primate

Dr Karen Strier is Vilas Research Professor and Irven DeVore Professor of Anthropology at the University of Wisconsin-Madison. With a Ph.D. in Anthropology from Harvard University, her current research is based in the Atlantic Forest of south-eastern Brazil, studying one of the world’s most endangered primates, the Northern muriqui. In June 2023, she will be celebrating 40 years of this continuous field study on the same population of this species. She is an international authority on the endangered northern muriqui monkey and her pioneering, long-term field research has been critical to conservation efforts on behalf of this species and has been influential in broadening comparative perspectives on primate behavioral and ecological diversity.

<https://blog.frontiersin.org/2022/09/12/karen-strier-lessons-from-the-worlds-most-peaceful-primate/>

FRONTIERS NEWS – Scientists eavesdrop on minke whale conversations in Hawai’i

Scientists writing in *Frontiers in Marine Science* used hydrophones to study hard-to-spot minke whales in Hawai’i, learning that they use their ‘boing’ calls more frequently when they are close to other members of the same species. Minke whales who visit this area are hard to study because they are small, solitary, and visit outside the times when most ship-based surveys are conducted. Passive acoustic monitoring, using hydrophones mounted on the sea bed, allows scientists to listen in on whales all year round.

<https://blog.frontiersin.org/2022/09/12/minke-whales-boing-calls-microplastics/>

NATURE BRIEFING – ‘Papermill alarm’ flags worrying papers

A software tool that analyses the titles and abstracts of scientific papers to detect text similar to that in bogus articles is gaining interest from publishers. The tool, called the Papermill Alarm, found that 1% of papers listed in citation database PubMed contain text very similar to that in articles produced by paper mills — companies or individuals that fabricate scientific manuscripts to order. The Papermill Alarm does not say definitively whether an article is fabricated, but flags those that merit further investigation.

<https://nature.us17.list-manage.com/track/click?u=2c6057c528fdc6f73fa196d9d&id=de4e6174ef&e=1db4b9a19b>

SCIENCE NEWS – ‘Exceptional’ fossil suggests early birds were brainy

“Bird brain” insults be damned. The noggins of our flying friends are packed with neurons, and recent studies have shown birds can develop complex tools and even discriminate between paintings by Claude Monet and Pablo Picasso. But is this avian acumen a recent development, evolutionarily speaking, or does it trace back tens of millions of years? A remarkably preserved fossil unearthed in Brazil may hold some answers. The 80-million-year-old bird skull contains impressions of advanced brain structures, suggesting early birds were bright like modern ones.

<https://www.science.org/content/article/exceptional-fossil-suggests-early-birds-were-brainy>

PUBLICATIONS

Current Biology

PAPERS

PATRICK F. REILLY et al – The contribution of Neanderthal introgression to modern human traits

Neanderthals, our closest extinct relatives, lived in western Eurasia from 400,000 years ago until they went extinct around 40,000 years ago. DNA retrieved from ancient specimens revealed that Neanderthals mated with modern human contemporaries. As a consequence, introgressed Neanderthal DNA survives scattered across the human genome such that 1–4% of the genome of present-day people outside Africa are inherited from Neanderthal ancestors. Patterns of Neanderthal introgressed genomic sequences suggest that Neanderthal alleles had distinct fates in the modern human genetic background. Some Neanderthal alleles facilitated human adaptation to new environments such as novel climate conditions, UV exposure levels and pathogens, while others had deleterious consequences. Here, we review the body of work on Neanderthal introgression over the past decade. We describe how evolutionary forces shaped the genomic landscape of Neanderthal introgression and highlight the impact of introgressed alleles on human biology and phenotypic variation.

eLife

NEWS

Decoding language development

Reduced myelin in key areas of the brain necessary for learning rules, speaking, and listening may impair language acquisition in children.

<https://elifesciences.org/digests/74242/decoding-language-development>

ARTICLES

FAYE SMITH & TIMOTHY D GRIFFITHS – Developmental Language Disorder: What happens in the brain?

A new imaging method reveals previously undetected structural differences that may contribute to developmental language disorder.

<https://elifesciences.org/articles/82258>

PAPERS

NICHOLAS GREBE et al – Mountain gorillas maintain strong maternal affiliative biases despite high male reproductive skew and extensive exposure to paternal kin

Evolutionary theories predict that sibling relationships will reflect a complex balance of cooperative and competitive dynamics. In most mammals, dispersal and death patterns mean that sibling relationships occur in a relatively narrow window during development, and/or only with same-sex individuals. Besides humans, one notable exception are mountain gorillas, in which non-sex biased dispersal, relatively stable group composition, and the long reproductive tenures of alpha males mean that animals routinely reside with both maternally and paternally related siblings, of the same and opposite sex, throughout their lives. Using nearly 40,000 hours of behavioral data collected over 14 years on 699 sibling and 1235 non-sibling pairs of wild mountain gorillas, we demonstrate that individuals have strong affiliative preferences for full and maternal siblings over paternal siblings or unrelated animals, consistent with an inability to discriminate paternal kin. Intriguingly, however, aggression data imply the opposite. Aggression rates were statistically indistinguishable among all types of dyads except one: in mixed-sex dyads, non-siblings engaged in substantially more aggression than siblings of any type. This pattern suggests mountain gorillas may be capable of distinguishing paternal kin, but nonetheless choose not to affiliate with them over non-kin. We observe a preference for maternal kin in a species with high reproductive skew (i.e., high relatedness certainty), even though low reproductive skew (i.e., low relatedness certainty) is believed to underlie such biases in other non-human primates. Our results call into question reasons for strong maternal kin biases when paternal kin are identifiable, familiar, and similarly likely to be long-term groupmates, and they may also suggest behavioral mismatches at play during a transitional period in mountain gorilla society.

<https://elifesciences.org/articles/80820>

SALONI KRISHNAN et al – Quantitative MRI reveals differences in striatal myelin in children with DLD

Developmental language disorder (DLD) is a common neurodevelopmental disorder characterised by receptive or expressive language difficulties or both. While theoretical frameworks and empirical studies support the idea that there may be neural correlates of DLD in frontostriatal loops, findings are inconsistent across studies. Here, we use a novel semiquantitative imaging protocol – multi-parameter mapping (MPM) – to investigate microstructural neural differences in children with DLD. The MPM protocol allows us to reproducibly map specific indices of tissue microstructure. In 56 typically developing children and 33 children with DLD, we derived maps of (1) longitudinal relaxation rate R1 (1/T1), (2) transverse relaxation rate R2* (1/T2*), and (3) Magnetization Transfer saturation (MTsat). R1 and MTsat predominantly index myelin, while R2* is sensitive to iron content. Children with DLD showed reductions in MTsat values in the caudate nucleus bilaterally, as well as in the left ventral sensorimotor cortex and Heschl's gyrus. They also had globally lower R1 values. No group differences were noted in R2* maps. Differences in MTsat and R1 were coincident in the caudate nucleus bilaterally. These findings support our hypothesis of corticostriatal abnormalities in DLD and indicate abnormal levels of myelin in the dorsal striatum in children with DLD.

<https://elifesciences.org/articles/74242>

Mind & Language

PAPERS

PHILIP GERRANS – A vessel without a pilot: Bodily and affective experience in the Cotard delusion of inexistence

The initial cause of Cotard delusion is pervasive dyshomeostasis (dysregulation of basic bodily function). This explanation draws on interoceptive active inference account of self-representation. In this framework, the self is an hierarchical predictive model made by the brain to facilitate homeostatic regulation. The account I provide is an alternative to two factor accounts of the Cotard delusion that treat depersonalisation experience as the first factor in genesis of the Cotard delusion. I argue that depersonalisation experience and the Cotard delusion are produced by different breakdowns in the process of self-modelling.

Nature Ecology & Evolution

PAPERS

SAMUEL ELLIS et al with CATHERINE CROCKFORD – Patterns and consequences of age-linked change in local relatedness in animal societies

The ultimate payoff of behaviours depends not only on their direct impact on an individual, but also on the impact on their relatives. Local relatedness—the average relatedness of an individual to their social environment—therefore has profound effects on social and life history evolution. Recent work has begun to show that local relatedness has the potential to change systematically over an individual's lifetime, a process called kinship dynamics. However, it is unclear how general these kinship dynamics are, whether they are predictable in real systems and their effects on behaviour and life history evolution. In this study, we combine modelling with data from real systems to explore the extent and impact of kinship dynamics. We use data from seven group-living mammals with diverse social and mating systems to demonstrate not only that kinship dynamics occur in animal systems, but also that the direction and magnitude of kinship dynamics can be accurately predicted using a simple model. We use a theoretical model to demonstrate that kinship dynamics can profoundly affect lifetime patterns of behaviour and can drive sex differences in helping and harming behaviour across the lifespan in social species. Taken together, this work demonstrates that kinship dynamics are likely to be a fundamental dimension of social evolution, especially when considering age-linked changes and sex differences in behaviour and life history.

<https://www.nature.com/articles/s41559-022-01872-2>

M. VIDAL-CORDASCO et al – Ecosystem productivity affected the spatiotemporal disappearance of Neanderthals in Iberia

What role did fluctuations play in biomass availability for secondary consumers in the disappearance of Neanderthals and the survival of modern humans? To answer this, we quantify the effects of stadial and interstadial conditions on ecosystem productivity and human spatiotemporal distribution patterns during the Middle to Upper Palaeolithic transition (50,000–30,000 calibrated years before the present) in Iberia. First, we used summed probability distribution, optimal linear estimation and Bayesian age modelling to reconstruct an updated timescale for the transition. Next, we executed a generalized dynamic vegetation model to estimate the net primary productivity. Finally, we developed a macroecological model validated with present-day observations to calculate herbivore abundance. The results indicate that, in the Eurosiberian region, the disappearance of Neanderthal groups was contemporaneous with a significant decrease in the available biomass for secondary consumers, and the arrival of the first *Homo sapiens* populations coincided with an increase in herbivore carrying capacity. During stadials, the Mediterranean region had the most stable conditions and the highest biomass of medium and medium–large herbivores. These outcomes support an ecological cause for the hiatus between the Mousterian and Aurignacian technocomplexes in Northern Iberia and the longer persistence of Neanderthals in southern latitudes.

<https://www.nature.com/articles/s41559-022-01861-5>

Nature Geoscience

PAPERS

VERENA FOERSTER et al – Pleistocene climate variability in eastern Africa influenced hominin evolution

Despite more than half a century of hominin fossil discoveries in eastern Africa, the regional environmental context of hominin evolution and dispersal is not well established due to the lack of continuous palaeoenvironmental records from one of the proven habitats of early human populations, particularly for the Pleistocene epoch. Here we present a 620,000-year environmental record from Chew Bahir, southern Ethiopia, which is proximal to key fossil sites. Our record documents the potential influence of different episodes of climatic variability on hominin biological and cultural transformation. The appearance of high anatomical diversity in hominin groups coincides with long-lasting and relatively stable humid conditions from ~620,000 to 275,000 years BP (episodes 1–6), interrupted by several abrupt and extreme hydroclimate perturbations. A pattern of pronounced climatic cyclicity transformed habitats during episodes 7–9 (~275,000–60,000 years BP), a crucial phase encompassing the gradual transition from Acheulean to Middle Stone Age technologies, the emergence of *Homo sapiens* in eastern Africa and key human social and cultural innovations. Those accumulative innovations plus the alignment of humid pulses between northeastern Africa and the eastern Mediterranean during high-frequency climate oscillations of episodes 10–12 (~60,000–10,000 years BP) could have facilitated the global dispersal of *H. sapiens*.

<https://www.nature.com/articles/s41561-022-01032-y>

Nature Neuroscience

PAPERS

JAMES C. R. WHITTINGTON et al – How to build a cognitive map

Learning and interpreting the structure of the environment is an innate feature of biological systems, and is integral to guiding flexible behaviors for evolutionary viability. The concept of a cognitive map has emerged as one of the leading metaphors for these capacities, and unraveling the learning and neural representation of such a map has become a central

focus of neuroscience. In recent years, many models have been developed to explain cellular responses in the hippocampus and other brain areas. Because it can be difficult to see how these models differ, how they relate and what each model can contribute, this Review aims to organize these models into a clear ontology. This ontology reveals parallels between existing empirical results, and implies new approaches to understand hippocampal–cortical interactions and beyond.

<https://www.nature.com/articles/s41593-022-01153-y>

VERONIKA SAMBORSKA et al – Complementary task representations in hippocampus and prefrontal cortex for generalizing the structure of problems

Humans and other animals effortlessly generalize prior knowledge to solve novel problems, by abstracting common structure and mapping it onto new sensorimotor specifics. To investigate how the brain achieves this, in this study, we trained mice on a series of reversal learning problems that shared the same structure but had different physical implementations.

Performance improved across problems, indicating transfer of knowledge. Neurons in medial prefrontal cortex (mPFC) maintained similar representations across problems despite their different sensorimotor correlates, whereas hippocampal (dCA1) representations were more strongly influenced by the specifics of each problem. This was true for both representations of the events that comprised each trial and those that integrated choices and outcomes over multiple trials to guide an animal's decisions. These data suggest that prefrontal cortex and hippocampus play complementary roles in generalization of knowledge: PFC abstracts the common structure among related problems, and hippocampus maps this structure onto the specifics of the current situation.

<https://www.nature.com/articles/s41593-022-01149-8>

Nature Reviews Neuroscience

ARTICLES

DARRAN YATES – A modern take on neocortical neurogenesis

Neanderthals had similarly sized brains and neocortices to modern humans, but it is not known whether there were differences in neocortical neuron generation between these species. Now, Pinson et al. find that the modern human variant of the gene transketolase-like 1 (TKTL1), but not the Neanderthal variant, promotes the production of basal radial glia (bRG), a type of neuroprogenitor, during neocortical development. bRG produce more neocortical neurons over time than the other type of basal progenitor in this region, the basal intermediate progenitor (bIP), suggesting that modern humans exhibit greater neocortical neurogenesis than did Neanderthals.

<https://www.nature.com/articles/s41583-022-00645-x>

Nature Reviews Psychology

PAPERS

KRISTEN A. LINDQUIST et al – The cultural evolution of emotion

Scholarly debates about the nature of human emotion traditionally pit biological and cultural influences against one another. Although many existing theories acknowledge the role of culture, they mostly treat emotion categories such as 'anger' as biological products. In this Perspective, we summarize traditional assumptions about the roles of biology and culture in emotion alongside supporting and conflicting empirical evidence. Building on constructionist models of emotion, we introduce a cultural evolutionary perspective that moves beyond a strict biology-versus-culture dichotomy. This cultural evolutionary perspective uses dual inheritance models of cultural transmission to explain how variation in emotion can arise across groups, how affect-laden information can travel throughout populations, and why people in different cultures use both similar and different emotion concepts and non-verbal expressions. This cultural evolution framework allows for new hypotheses about the development of emotion categories and challenges longstanding claims about the universality of emotion.

<https://www.nature.com/articles/s44159-022-00105-4>

Nature Scientific Data

PAPERS

SHAONAN WANG et al – A synchronized multimodal neuroimaging dataset for studying brain language processing

We present a synchronized multimodal neuroimaging dataset for studying brain language processing (SMN4Lang) that contains functional magnetic resonance imaging (fMRI) and magnetoencephalography (MEG) data on the same 12 healthy volunteers while the volunteers listened to 6 hours of naturalistic stories, as well as high-resolution structural (T1, T2), diffusion MRI and resting-state fMRI data for each participant. We also provide rich linguistic annotations for the stimuli, including word frequencies, syntactic tree structures, time-aligned characters and words, and various types of word and character embeddings. Quality assessment indicators verify that this is a high-quality neuroimaging dataset. Such synchronized data is separately collected by the same group of participants first listening to story materials in fMRI and then in MEG which are well suited to studying the dynamic processing of language comprehension, such as the time and location of different linguistic features encoded in the brain. In addition, this dataset, comprising a large vocabulary from stories with various topics, can serve as a brain benchmark to evaluate and improve computational language models.

<https://www.nature.com/articles/s41597-022-01708-5>

CHARLOTTE CAUCHETEUX, ALEXANDRE GRAMFORT & JEAN-RÉMI KING – Deep language algorithms predict semantic comprehension from brain activity

Deep language algorithms, like GPT-2, have demonstrated remarkable abilities to process text, and now constitute the backbone of automatic translation, summarization and dialogue. However, whether these models encode information that relates to human comprehension still remains controversial. Here, we show that the representations of GPT-2 not only map onto the brain responses to spoken stories, but they also predict the extent to which subjects understand the corresponding narratives. To this end, we analyze 101 subjects recorded with functional Magnetic Resonance Imaging while listening to 70 min of short stories. We then fit a linear mapping model to predict brain activity from GPT-2's activations. Finally, we show that this mapping reliably correlates with subjects' comprehension scores as assessed for each story. This effect peaks in the angular, medial temporal and supra-marginal gyri, and is best accounted for by the long-distance dependencies generated in the deep layers of GPT-2. Overall, this study shows how deep language models help clarify the brain computations underlying language comprehension.

<https://www.nature.com/articles/s41598-022-20460-9>

ZUBAIDA SHEBANI et al with FRIEDEMANN PULVERMÜLLER – Brain correlates of action word memory revealed by fMRI

Understanding language semantically related to actions activates the motor cortex. This activation is sensitive to semantic information such as the body part used to perform the action (e.g. arm-/leg-related action words). Additionally, motor movements of the hands/feet can have a causal effect on memory maintenance of action words, suggesting that the involvement of motor systems extends to working memory. This study examined brain correlates of verbal memory load for action-related words using event-related fMRI. Seventeen participants saw either four identical or four different words from the same category (arm-/leg-related action words) then performed a nonmatching-to-sample task. Results show that verbal memory maintenance in the high-load condition produced greater activation in left premotor and supplementary motor cortex, along with posterior-parietal areas, indicating that verbal memory circuits for action-related words include the cortical action system. Somatotopic memory load effects of arm- and leg-related words were observed, but only at more anterior cortical regions than was found in earlier studies employing passive reading tasks. These findings support a neurocomputational model of distributed action-perception circuits (APCs), according to which language understanding is manifest as full ignition of APCs, whereas working memory is realized as reverberant activity receding to multimodal prefrontal and lateral temporal areas.

<https://www.nature.com/articles/s41598-022-19416-w>

FRANCESCO D'ERRICO et al – Technological and functional analysis of 80–60 ka bone wedges from Sibudu (KwaZulu-Natal, South Africa)

Fully shaped, morphologically standardized bone tools are generally considered reliable indicators of the emergence of modern behavior. We report the discovery of 23 double-beveled bone tools from ~ 80,000–60,000-year-old archaeological layers at Sibudu Cave in KwaZulu-Natal, South Africa. We analyzed the texture of use-wear on the archaeological bone tools, and on bone tool replicas experimentally used in debarking trees, processing rabbit pelts with and without an ochre compound, digging in sediment in and outside a cave, and on ethnographic artefacts. Debarking trees and digging in humus-rich soil produce use-wear patterns closely matching those observed on most Sibudu tools. This tool type is associated with three different Middle Stone Age cultural traditions at Sibudu that span 20,000 years, yet they are absent at contemporaneous sites. Our results support a scenario in which some southern African early modern human groups developed and locally maintained specific, highly standardized cultural traits while sharing others at a sub-continental scale. We demonstrate that technological and texture analyses are effective means by which to infer past behaviors and assess the significance of prehistoric cultural innovations.

<https://www.nature.com/articles/s41598-022-20680-z>

MALGORZATA KOT et al – Frontiers of the Lower Palaeolithic expansion in Europe: Tunel Wielki Cave (Poland)

Peopling of Central Europe by Middle Pleistocene hominids is highly debatable, mainly due to the relatively harsh climatic and environmental conditions that require cultural and anatomical adjustments. At least several archaeological sites certify human occupation in the region dated back to MIS 13-11, but they represent open-air settlements. Based on the new fieldwork conducted in Tunel Wielki Cave, we can date the human occupation traces in the cave to MIS 14-12. Bipolar-on-anvil knapping technique prevails in the lithic assemblage, made exclusively in flint. The obtained results have given ground for studying the frontiers of human oikumene and the required cultural adaptive abilities.

<https://www.nature.com/articles/s41598-022-20582-0>

ERIC R. SCHUPPE et al – Forebrain nuclei linked to woodpecker territorial drum displays mirror those that enable vocal learning in songbirds

Vocal learning is thought to have evolved in 3 orders of birds (songbirds, parrots, and hummingbirds), with each showing similar brain regions that have comparable gene expression specializations relative to the surrounding forebrain motor circuitry. Here, we searched for signatures of these same gene expression specializations in previously uncharacterized brains of 7 assumed vocal non-learning bird lineages across the early branches of the avian family tree. Our findings using a conserved marker for the song system found little evidence of specializations in these taxa, except for woodpeckers. Instead, woodpeckers possessed forebrain regions that were anatomically similar to the pallial song nuclei of vocal learning birds. Field studies of free-living downy woodpeckers revealed that these brain nuclei showed increased expression of immediate early genes (IEGs) when males produce their iconic drum displays, the elaborate bill-hammering behavior that individuals use to compete for territories, much like birdsong. However, these specialized areas did not show increased IEG expression with vocalization or flight. We further confirmed that other woodpecker species contain these brain nuclei, suggesting that these brain regions are a common feature of the woodpecker brain. We therefore hypothesize that ancient forebrain nuclei for refined motor control may have given rise to not only the song control systems of vocal learning birds, but also the drumming system of woodpeckers.

<https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3001751>

YONGXIN HUANG, HEZHENG WANG & RUI WANG – Deep learning recommendation algorithm based on semantic mining

This paper proposes Deep Semantic Mining based Recommendation (DSMR), which can extract user features and item attribute features more accurately by deeply mining the semantic information of review text and item description documents recommend. First, the proposed model uses the BERT pre-training model to process review texts and item description documents, and deeply mine user characteristics and item attributes, which effectively alleviates the problems of data sparseness and item cold start; Then, the forward LSTM is used to pay attention to the changes of user preferences over time, and a more accurate recommendation is obtained; finally, in the model training stage, the experimental data are randomly divided into 1 to 5 points, 1:1:1:1:1. Extraction ensures that the amount of data for each score is equal, so that the results are more accurate and the model is more robust. Experiments are carried out on four commonly used Amazon public data sets, and the results show that with the root mean square error as the evaluation index, the error of DSMR recommendation results is at least 11.95% lower on average than the two classic recommendation models based only on rating data. At the same time, it is better than the three latest recommendation models based on review text, and it is 5.1% lower than the best model on average.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0274940>

TUJJA KIRKINEN et al – Preservation of microscopic fur, feather, and bast fibers in the Mesolithic ochre grave of Majoonsuo, Eastern Finland

The study of animal and plant fibers related to grave furnishing, garments, and grave goods in thousands-of-year-old burials provides new insights into these funerary practices. Their preservation presupposes favorable conditions, where bacterial and fungal activity is at a minimum, as in anaerobic, wet, salty, arid, or frozen environments. The extreme acidic-soil environments (i.e., podzols) of Finland pose a challenge when it comes to studying funerary deposits, as human remains are rarely found. However, its potential to preserve microparticles allows us to approach the funerary event from a totally different point of view. Here, we present the first multiproxy analyses of a Mesolithic deposit from Finland. A red-ochre burial of a child found in Majoonsuo is studied by analyzing 1) microscopic fibers, 2) fatty acids, and 3) physical-chemical (CIELab color, pH, grain size) properties of 60 soil samples and associated materials. The microscopic fibers evidenced the remains of waterfowl downy feathers, a falcon feather fragment, canid and small rodent hairs as well as bast fibers. These could have been used in furnishing the grave and as ornaments or clothes. Canid hairs could belong to a dog inhumation, or more likely to canid fur used as grave good/clothes. Samples with microparticles have more long-chain and unsaturated fatty acids, although animal species identification was not possible. Soil properties indicate that the burial was made in the local soil, adding homogeneous red ochre and removing the coarser material; no bioturbation was found. The highly acidic sandy soil, together with a slight increase in finer particles when ochre is abundant, probably resulted in micro-scale, anoxic conditions that prevented bacterial attack. This study reveals the first animal hairs and feathers from a Finnish Mesolithic funerary context, and provides clues about how their preservation was possible.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0274849>

MUHAMMAD ATIF et al – Evolution of basic human values orientations: An application of monitoring changes in cluster solutions

This study enumerates the evolution of basic human values orientations and the dynamic relationship between them, computed from Schwartz's value survey conducted in European nations. For this purpose, eight datasets related to the

human value scale were extracted from the European Social Survey; each corresponds to a single round conducted cross-sectionally every two years since 2001. Change detection algorithm was implemented to the cluster solutions of temporal datasets, and the evolution of important clusters was traced. Finding of the study reveals that Universalism and Benevolence values are on the rise in European societies in the last couple of decades. Most of the European inhabitants believe in the smooth group functioning and form the organismic needs of cooperation. The people prefer anxiety-free life, and love for nature, environment, humanity, and kindness to other beings in society are essential constructs for them. They avoid self-centred behaviour and prefer social physiognomies.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0274600>

Royal Society Open Science

PAPERS

GAL BADIHI et al with KLAUS ZUBERBÜHLER & CATHERINE HOBAITER – Flexibility in the social structure of male chimpanzees (*Pan troglodytes schweinfurthii*) in the Budongo Forest, Uganda

Individuals of social species experience competitive costs and social benefits of group living. Substantial flexibility in humans' social structure and the combination of different types of social structure with fission–fusion dynamics allow us to live in extremely large groups—overcoming some of the costs of group living while capitalizing on the benefits. Non-human species also show a range of social strategies to deal with this trade-off. Chimpanzees are an archetypical fission–fusion species, using dynamic changes in day-to-day association to moderate the costs of within-group competition. Using 4 years of association data from two neighbouring communities of East African chimpanzees (*Pan troglodytes schweinfurthii*), we describe an unexplored level of flexibility in chimpanzee social structure. We show that males from the larger Waibira community (N = 24–31) exhibited additional structural levels of semi-stable core–periphery society, while males from the smaller Sonso community (N = 10–13) did not. This novel core–periphery pattern adds to previous results describing alternative modular social structure in other large communities of chimpanzees. Our data support the hypothesis that chimpanzees can incorporate a range of strategies in addition to fission–fusion to overcome costs of social living, and that their social structures may be closer to that of modern humans than previously described.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.220904>

JEFFREY XING et al with TIMOTHY Q. GENTNER – Syntactic modulation of rhythm in Australian pied butcherbird song

The acoustic structure of birdsong is spectrally and temporally complex. Temporal complexity is often investigated in a syntactic framework focusing on the statistical features of symbolic song sequences. Alternatively, temporal patterns can be investigated in a rhythmic framework that focuses on the relative timing between song elements. Here, we investigate the merits of combining both frameworks by integrating syntactic and rhythmic analyses of Australian pied butcherbird (*Cracticus nigrogularis*) songs, which exhibit organized syntax and diverse rhythms. We show that rhythms of the pied butcherbird song bouts in our sample are categorically organized and predictable by the song's first-order sequential syntax. These song rhythms remain categorically distributed and strongly associated with the first-order sequential syntax even after controlling for variance in note length, suggesting that the silent intervals between notes induce a rhythmic structure on note sequences. We discuss the implication of syntactic–rhythmic relations as a relevant feature of song complexity with respect to signals such as human speech and music, and advocate for a broader conception of song complexity that takes into account syntax, rhythm, and their interaction with other acoustic and perceptual features.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.220704>

TOMOS PROFFITT et al – Identifying functional and regional differences in chimpanzee stone tool technology

The earliest hominin archaeological sites preserve a record of stone tools used for cutting and pounding. Traditionally, sharp-edged flakes were seen as the primary means by which our earliest ancestors interacted with the world. The importance of pounding tools is increasingly apparent. In some cases, they have been compared with stone hammers and anvils used by chimpanzees for nut-cracking. However, there has been little focus on providing a robust descriptive and quantitative characterization of chimpanzee stone tools, allowing for meaningful comparisons between chimpanzee groups and with archaeological artefacts. Here we apply a primate archaeological approach to characterize the range of chimpanzee nut-cracking stone tools from Djouroutou in the Taï National Park. By combining a techno-typological analysis, and two- and three-dimensional measures of damage, we identify clear differences in the location and extent of damage between nut-cracking hammerstones and anvils used at Djouroutou and when compared with other wild chimpanzee populations. Furthermore, we discuss these results in relation to interpretations of Plio-Pleistocene percussive technology. We highlight potential difficulties in identifying the underlying function of percussive artefacts based on morphological or techno-typological attributes alone. The material record from Djouroutou represents an important new datum of chimpanzee regional and material culture.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.220826>

MATEUSZ WOŹNIAK & GUENTHER KNOBLICH – Communication and action predictability: two complementary strategies for successful cooperation

Making one's actions predictable and communicating what one intends to do are two strategies to achieve interpersonal coordination. It is less clear whether these two strategies are mutually exclusive or whether they can be used in parallel.

Here, we asked how the availability of communication channels affects the use of strategy to make one's actions predictable. In three experiments, we investigated how people reach joint decisions if they are not allowed to communicate at all (Experiment 1), allowed minimal reciprocal communication (Experiment 2), or allowed to use the full range of conventional communication (Experiment 3). We found that when participants were not allowed to communicate, coordination was achieved by increasing action predictability. When conventional communication was allowed, there were no attempts to increase action predictability. In the minimal reciprocal communication condition, successful pairs both increased action predictability and established a communication system. Overall, this study demonstrates that people are able to flexibly adapt to coordination challenges during joint decision making and that communication reduces behavioural constraints on joint action coordination.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.220577>

Trends in Cognitive Sciences

PAPERS

BEN BAKER, BENJAMIN LANSDELL & KONRAD P. KORDING – Three aspects of representation in neuroscience

Neuroscientists often describe neural activity as a representation of something, or claim to have found evidence for a neural representation, but there is considerable ambiguity about what such claims entail. Here we develop a thorough account of what 'representation' does and should do for neuroscientists in terms of three key aspects of representation. (i) Correlation: a neural representation correlates to its represented content; (ii) causal role: the representation has a characteristic effect on behavior; and (iii) teleology: a goal or purpose served by the behavior and thus the representation. We draw broadly on literature in both neuroscience and philosophy to show how these three aspects are rooted in common approaches to understanding the brain and mind. We first describe different contexts that 'representation' has been closely linked to in neuroscience, then discuss each of the three aspects in detail.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(22\)00210-8](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(22)00210-8)

DAVID POEPEL & WILLIAM IDSARDI – We don't know how the brain stores anything, let alone words

Cognitive, computational, and neurobiological approaches have made impressive advances in characterizing the operations that transform linguistic signals into meanings. But our understanding of how words and concepts are retained in the brain remains inadequate. How is the long-term storage of words, or in fact any representations, achieved? This puzzle requires new thinking to stimulate reinvestigation of the storage problem.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(22\)00206-6](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(22)00206-6)

DAMON CENTOLA – The network science of collective intelligence

The essential puzzle of collective intelligence is whether the collective judgment from a group of people will outperform a smart individual reasoning alone. Recent computational and experimental studies have led to breakthroughs in two of the primary fields of networked collective intelligence: collective problem-solving and the wisdom of the crowd.

Collective problem-solving typically addresses the optimal design for communication networks within organizations. The key network property governing problem-solving outcomes is informational efficiency (i.e., average simple path length).

The wisdom of the crowd shows that the average response from a large group of novices can be more accurate than the opinions of individual experts. The key network property governing the wisdom of the crowd is network centralization.

In the last few years, breakthroughs in computational and experimental techniques have produced several key discoveries in the science of networks and human collective intelligence. This review presents the latest scientific findings from two key fields of research: collective problem-solving and the wisdom of the crowd. I demonstrate the core theoretical tensions separating these research traditions and show how recent findings offer a new synthesis for understanding how network dynamics alter collective intelligence, both positively and negatively. I conclude by highlighting current theoretical problems at the forefront of research on networked collective intelligence, as well as vital public policy challenges that require new research efforts.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(22\)00205-4](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(22)00205-4)

CHRIS D. FRITH & UTA FRITH – The mystery of the brain–culture interface

Nature and culture work together to shape who we are. We are embedded in culture and are profoundly influenced by what those around us say and do. The interface between minds occurs at the level of explicit metacognition, which is at the top of our brain's control hierarchy. But how do our brains do this?

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(22\)00209-1](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(22)00209-1)

MAXWELL B. MADDEN et al – A role for the claustrum in cognitive control

Early hypotheses of claustrum function were fueled by neuroanatomical data and yielded suggestions that the claustrum is involved in processes ranging from salience detection to multisensory integration for perceptual binding. While these hypotheses spurred useful investigations, incompatibilities inherent in these views must be reconciled to further conceptualize claustrum function amid a wealth of new data. Here, we review the varied models of claustrum function and synthesize them with developments in the field to produce a novel functional model: network instantiation in cognitive control (NICC). This model proposes that frontal cortices direct the claustrum to flexibly instantiate cortical networks to

subserve cognitive control. We present literature support for this model and provide testable predictions arising from this conceptual framework.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(22\)00223-6](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(22)00223-6)

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