EAORC BULLETIN 976 – 27 February 2022

CONTENTS

NOTICES

PUBLICATION ALERTS

If you have had a paper or book published, or you see something which would be of interest to the group, please send me a publication alert so that I can include it in the newsletter. Many thanks to those who have already sent in alerts.
If there is a journal you feel I should be tracking on a regular basis, let me know.
And if you have any other ideas for extending the "EAORC experience", please contact me.

ACADEMIA.EDU – The Movius Line controversy: the state of the debate

World Archaeology 42:4, 521-544 (2010).

STEPHEN J. LYCETT & CHRISTOPHER J. BAE – The Movius Line controversy: the state of the debate

Patterns of Palaeolithic variability between eastern Asia and western portions of the Old World continue to engender controversial discussion. Most famously, debate has focused on variability in the absence/presence of 'handaxes' east and west of the so-called 'Movius Line'. However, it is becoming equally apparent that cross-regional contrasts can be made using categories of data other than handaxe presence/absence alone. This, in turn, is leading to a reconfiguration of the archaeological patterns that demand explanation. Here, we outline the current state of the Movius Line controversy in these terms, and undertake a series of metric analyses of eastern and western biface samples. This leads us to highlight specific lines of enquiry that may be important for future attempts to address these enduring questions.
https://www.academia.edu/26873642/The_Movius_Line_controversy_the_state_of_the_debate

ACADEMIA.EDU – Debating Acheulian group size at Attirampakkam, India

Journal of Human Evolution 130, 109-125 (2019).

SHANTI PAPPU & KUMAR AKHILESH – Tools, trails and time: Debating Acheulian group size at Attirampakkam, India

Estimating Acheulian group sizes based on a fragmentary archaeological record is fraught with difficulties, more so in regions like India, where lithics form the primary source of information. Here, we review current approaches towards modeling group size in Indian archaeology. We then examine to what extent one may address issues related to seasonality, fission-fusion strategies and group size in the context of Acheulian sites, drawing on our research along the southeastern coast of India. We move between multiple scales of analysis: from the regional Acheulian archaeological record to specific studies at the site of Attirampakkam (ATM). We consider aspects of site distribution, sizes, artefact densities and Acheulian lithic reduction strategies, factoring in issues related to geomorphology, taphonomy and chronology. Acheulian hominins occupied the study region over the early to middle Pleistocene, and the fragmented lithic reduction sequence noted on landscape scales suggests diverse site functions structured by ease of access to quartzite raw material for large flake production in addition to other resources. In contrast to most sites, the absence of raw material at ATM necessitated groups to anticipate this, and organize their behavior on landscape scales, and on-site, to resolve this issue. We show how successive groups were attracted to the site over the early Pleistocene, potentially aiming at exploiting seasonally predictable biological resources in a riparian environment, knowledge of which was transmitted across generations. Considerations of the spatial and temporal variability in artefact densities across a vast site area, along with aspects of the lithic reduction sequences suggests a short-duration occupation by a potentially large group, possibly resulting from aggregation of several small groups as noted in some ethnographic examples of hunter-gatherer fission-fusion strategies. We show drastic changes in behavioral organization in the succeeding Middle Palaeolithic phases at the site and in the region.
https://www.academia.edu/39232681/Tools_trails_and_time_Debating_Acheulian_group_size_at_Attirampakkam_India

NEWS

SAPIENS – Chimp Self-Medication

New observations of chimpanzees in Gabon lead researchers to wonder if the tendency to medicate ourselves and others really is unique to humans.
https://sapiens.us11.list-manage.com/track/click?u=80f6cf678900daf984bf763b7&id=392a7fc4e1&e=dc0eff6180

SCIENCE DAILY – Ancient DNA reveals surprises about how early Africans lived, traveled and interacted

A new analysis of human remains that were buried in African archaeological sites has produced the earliest DNA from the continent, telling a fascinating tale of how early humans lived, traveled and even found their significant others.
https://www.sciencedaily.com/releases/2022/02/220223111223.htm

SCIENCE DAILY – Largest ever human family tree: 27 million ancestors

Researchers have taken a major step towards mapping the entirety of genetic relationships among humans: a single genealogy that traces the ancestry of all of us.
https://www.sciencedaily.com/releases/2022/02/220224140841.htm

SCIENCE NEWS – Oldest human DNA from Africa reveals complex migrations

Signs of isolation during ice age match archaeological clues.
https://www.science.org/content/article/oldest-human-dna-africa-reveals-complex-migrations

THE CONVERSATION – Scammers like the Tinder Swindler exploit a core feature of human nature

Despite the belief that people are deeply skeptical of strangers, study after study shows that humans are primed to trust one another.
https://theconversationuk.cmail19.com/t/r-l-tyljdujk-khhlilahh-v/

PUBLICATIONS

American Journal of Biological Anthropology

PAPERS

MARIO MODESTO-MATA et al with JOSÉ MARÍA BERMÚDEZ DE CASTRO – Early and Middle Pleistocene hominins from Atapuerca (Spain) show differences in dental developmental patterns

The Bayesian statistical approach considers teeth as forming a developmental module, as opposed to a tooth-by-tooth analysis. This approach has been employed to analyze Upper Pleistocene hominins, including Neandertals and some anatomically modern humans, but never earlier populations. Here, we show its application on five hominins from the TD6.2 level of the Gran Dolina site (Homo antecessor, Early Pleistocene) and the Sima de los Huesos site (Middle Pleistocene) of the Sierra de Atapuerca (Burgos, northern Spain). Our results show an advanced development of the third molars in both populations with respect to modern Homo sapiens. In addition, the Sima de los Huesos hominins differ from H. sapiens and H. antecessor in the relatively advanced development of their second molar. The relative mineralization of I1/M1 in H. antecessor appears to be similar to that of modern humans, as opposed to that of Neandertals, which appear to be unique. These observations, combined with reduced enamel formation times and the advanced development of the third molars, appear to indicate a shorter ontogenetic period in the hominins from Gran Dolina and Sima de los Huesos in comparison to modern human average.
https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24487

GARY D. RICHARDS et al – Neanderthal child's occipital from Baume Moula-Guercy (Soyons, Ardèche, France)

Description of the M-S-41 and M-S-61 occipital fragments (≈6–8 years) is based on observations of original fossils, casts, CT scans, literature descriptions, and virtual ectocranial and endocranial reconstructions. Our ontogenetically based sample represents a Preneanderthal-Neanderthal group and a Homo sapiens group. These groups are subdivided into (1) Preneanderthals (≈MIS 14–9), Early Neanderthals (MIS 7–5e), and Late Neanderthals (MIS 5d-3), and (2) Middle (MIS 5), Upper (MIS 3–1), and Late (MIS ≈ 1) Paleolithic H. sapiens. Measurements and developmental age determinations follow standard techniques. Based on the M-S-41/M-S-61 composite, the strongly convex upper occipital scale flattens into the vertical suprainiac fossa, as in immature Early Neanderthals. A doubled suprainiac fossa expressing a weakly developed bounding torus and pocking of the central region is typical of immature Neanderthals. The transverse torus is thickened medially, lacks significant lateral development, has a laterally placed protuberance, and is concave medially. A linear (triangular) tubercle, as opposed to an external occipital protuberance, is present. An occipital bun is absent.
https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24489

JOSEP MARIA POTAU et al – Comparative anatomy of the ligaments and muscles of the radiocarpal joint in chimpanzees and humans

In the present study, we have analyzed the anatomy of the radiocarpal joint ligaments and muscles in Pan troglodytes and Homo sapiens in order to identify similarities and differences between the two species that may be related to differences in hand use and function. Anatomical dissections of the ligaments and muscles of the radiocarpal joint were performed in six adult chimpanzees and 12 humans. The mass of each ligament and of the functional ligament groups were calculated relative to the total ligament mass and compared between the two species. The mass of the functional muscle groups relative to the total mass of the muscles of the radiocarpal joint was also calculated and compared between the two species. The ligaments of the radiocarpal joint had similar anatomical characteristics in chimpanzees and humans. The relative mass of the palmar ligaments was greater in humans, while that of the dorsal radiocarpal ligament was greater in chimpanzees. In both species, the relative mass of the palmar and dorsal muscle groups was inversely related to that of the corresponding ligament groups. The greater relative mass of the palmar ligaments in humans may be related to the importance of wrist extension during manipulative tasks. The greater relative mass of the dorsal radiocarpal ligament in chimpanzees may be related to the need to stabilize the radiocarpal joint in flexion, mainly during arboreal locomotion.
https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24490

Biology Letters

PAPERS

JAN M. ENGELMANN et al – Chimpanzees consider freedom of choice in their evaluation of social action

Judgements of wrongdoing in humans often hinge upon an assessment of whether a perpetrator acted out of free choice: whether they had more than one option. The classic inhibitors of free choice are constraint (e.g. having your hands tied together) and ignorance (e.g. being unaware that an alternative exists). Here, across two studies, we investigate whether chimpanzees consider these factors in their evaluation of social action. Chimpanzees interacted with a human experimenter who handed them a non-preferred item of food, either because they were physically constrained from accessing the preferred item (Experiment 1) or because they were ignorant of the availability of the preferred item (Experiment 2). We found that chimpanzees were more likely to accept the non-preferred food and showed fewer negative emotional responses when the experimenter was physically constrained compared with when they had free choice. We did not, however, find an

effect of ignorance on chimpanzee's evaluation. Freedom of choice factors into chimpanzees' evaluation of how they are treated, but it is unclear whether mental state reasoning is involved in this assessment.
https://royalsocietypublishing.org/doi/full/10.1098/rsbl.2021.0502

ROSA RUGANI et al – Relative numerical middle in rhesus monkeys
Animals show vast numerical competence in tasks that require both ordinal and cardinal numerical representations, but few studies have addressed whether animals can identify the numerical middle in a sequence. Two rhesus monkeys (Macaca mulatta) learned to select the middle dot in a horizontal sequence of three dots on a touchscreen. When subsequently presented with longer sequences composed of 5, 7 or 9 items, monkeys transferred the middle rule. Accuracy decreased as the length of the sequence increased. In a second test, we presented monkeys with asymmetrical sequences composed of nine items, where the numerical and spatial middle were distinct and both monkeys selected the numerical middle over the spatial middle. Our results demonstrate that rhesus macaques can extract an abstract numerical rule to bisect a discrete set of items.
https://royalsocietypublishing.org/doi/full/10.1098/rsbl.2021.0426

Current Biology

PAPERS

SAM V. NORMAN-HAIGNERE et al with NANCY KANWISHER – A neural population selective for song in human auditory cortex
How is music represented in the brain? While neuroimaging has revealed some spatial segregation between responses to music versus other sounds, little is known about the neural code for music itself. To address this question, we developed a method to infer canonical response components of human auditory cortex using intracranial responses to natural sounds, and further used the superior coverage of fMRI to map their spatial distribution. The inferred components replicated many prior findings, including distinct neural selectivity for speech and music, but also revealed a novel component that responded nearly exclusively to music with singing. Song selectivity was not explainable by standard acoustic features, was located near speech- and music-selective responses, and was also evident in individual electrodes. These results suggest that representations of music are fractionated into subpopulations selective for different types of music, one of which is specialized for the analysis of song.
https://www.cell.com/current-biology/fulltext/S0960-9822(22)00131-2

ALLISON A. GALEZO et al with SUSAN C. ALBERTS – Mechanisms of inbreeding avoidance in a wild primate
Inbreeding often imposes net fitness costs, leading to the expectation that animals will engage in inbreeding avoidance when the costs of doing so are not prohibitive. However, one recent meta-analysis indicates that animals of many species do not avoid mating with kin in experimental settings, and another reports that behavioral inbreeding avoidance generally evolves only when kin regularly encounter each other and inbreeding costs are high. These results raise questions about the processes that separate kin, how these processes depend on kin class and context, and whether kin classes differ in how effectively they avoid inbreeding via mate choice—in turn, demanding detailed demographic and behavioral data within individual populations. Here, we address these questions in a wild mammal population, the baboons of the Amboseli ecosystem in Kenya. We find that death and dispersal are very effective at separating opposite-sex pairs of close adult kin. Nonetheless, adult kin pairs do sometimes co-reside, and we find strong evidence for inbreeding avoidance via mate choice in kin classes with relatedness ≥0.25. Notably, maternal kin avoid inbreeding more effectively than paternal kin despite having identical coefficients of relatedness, pointing to kin discrimination as a potential constraint on effective inbreeding avoidance. Overall, demographic and behavioral processes ensure that inbred offspring are rare in undisturbed social groups (1% of offspring). However, in an anthropogenically disturbed social group with reduced male dispersal, we find inbreeding rates 10× higher. Our study reinforces the importance of demographic and behavioral contexts for understanding the evolution of inbreeding avoidance.
https://www.cell.com/current-biology/fulltext/S0960-9822(22)00222-6

Evolutionary Human Sciences

PAPERS

LAURENT LEHMANN, SIMON T. POWERS & CAREL P. VAN SCHAIK – Four levers of reciprocity across human societies: concepts, analysis and predictions
This paper surveys five human societal types – mobile foragers, horticulturalists, pre-state agriculturalists, state-based agriculturalists, and liberal democracies – from the perspective of three core social problems faced by interacting individuals: coordination problems, social dilemmas, and contest problems. We characterize the occurrence of these problems in the different societal types and enquire into the main force keeping societies together given the prevalence of these. To address this, we consider the social problems in light of the theory of repeated games, and delineate the role of intertemporal incentives in sustaining cooperative behaviour through the reciprocity principle. We analyze the population, economic and political structural features of the five societal types, and show that intertemporal incentives have been adapted to the changes in scope and scale of the core social problems as societies grew in size. In all societies, reciprocity mechanisms

appear to solve the social problems by enabling lifetime direct benefits to individuals for cooperation. Our analysis leads us to predict that as societies increase in complexity, they need more of the following four features to enable the scalability and adaptability of the reciprocity principle: nested grouping, decentralized enforcement and local information, centralized enforcement and coercive power, and formal rules.
https://www.cambridge.org/core/journals/evolutionary-human-sciences/article/four-levers-of-reciprocity-across-human-societies-concepts-analysis-and-predictions/A2D6C61F8866CD27D05E3F33AA7F04B9

J. STEPHEN LANSING et al – Deep ancestry of collapsing networks of nomadic hunter-gatherers in Borneo
Theories of early cooperation in human society often draw from a small sample of ethnographic studies of surviving populations of hunter-gatherers, most of which are now sedentary. Borneo hunter-gatherers (Punan, Penan) have seldom figured in comparative research because of a decades-old controversy about whether they are the descendants of farmers who adopted a hunting and gathering way of life. In 2018 we began an ethnographic study of a group of still-nomadic hunter-gatherers who call themselves Punan Batu (Cave Punan). Our genetic analysis clearly indicates that they are very unlikely to be the descendants of neighbouring agriculturalists. They also preserve a song language that is unrelated to other languages of Borneo. Dispersed traveling groups of Punan Batu with fluid membership use message sticks to stay in contact, co- operate and share resources as they journey between rock shelters and forest camps. Message sticks were once widespread among nomadic Punan in Bor- neo, but have largely disappeared in sedentary Punan villages. Thus the small community of Punan Batu offers a rare glimpse of a hunting and gathering way of life that was once widespread in the forests of Borneo, where prosocial behaviour extended beyond the face-to-face community, facilitating successful collective adaptation to the diverse resources of Borneo's forests.
https://www.cambridge.org/core/journals/evolutionary-human-sciences/article/deep-ancestry-of-collapsing-networks-of-nomadic-huntergatherers-in-borneo/3E5BDE9823F6CD827E66DAF7C307273F

Frontiers in Psychology

PAPERS

NICOLETTA SALERNI & CHIARA SUTTORA – Semantic Contingency of Maternal Verbal Input Directed at Very Preterm and Full-Term Children
Several studies have testified to the importance of a responsive linguistic input for children's language acquisition and development. In particular, maternal use of expansions, imitations, interpretations, and labels has been shown to promote both children's language comprehension and production. From this perspective, the present study examined the semantically contingent linguistic input addressed to very preterm children's comparing it to that directed to full-term children observed during a semi-structured play session when the children were 24 months of age. The relationships between maternal contingent utterances and children's communicative repertoires were also investigated. The main results showed that mothers of full-term children produced a higher proportion of semantically contingent utterances than those of very preterm children; moreover, this variable was associated with children's more advanced communicative-linguistic outcomes. Overall, this study supports the interdependence between mothers' use of certain linguistic strategies and children's communicative-linguistic repertoire, extending this evidence to children born very preterm and suggesting the importance of considering the semantic contingency aspect of child-directed speech to support the communicative and linguistic development of these children.
https://www.frontiersin.org/articles/10.3389/fpsyg.2022.800568/full

FREDY QUINTERO et al with D KLAUS ZUBERBÜHLER – An Audience Effect in Sooty Mangabey Alarm Calling
How does intentional communication evolve? Comparative studies can shed light on the evolutionary history of this relevant feature of human language and its distribution before modern humans. The current animal literature on intentional signaling consists mostly of ape gestural studies with evidence of subjects persisting and elaborating with sometimes arbitrary signals toward a desired outcome. Although vocalizations can also have such imperative qualities, they are typically produced in a functionally fixed manner, as if evolved for a specific purpose. Yet, intentionality can sometimes transpire even in functionally fixed calls, for example, if production is adapted to audience composition. In this study, we carried out field experiments to test whether free-ranging sooty mangabeys adjusted snake alarm call production to their audiences. We found a positive relation between alarm call production and naïve individuals arriving, suggesting that callers attempted to influence their behaviors relative to the snake. Subjects called more with smaller audiences, if they had not heard other calls before, and if socially important individuals were in the area. We concluded that sooty mangabeys alarm call production can be explained as an active attempt to refer to an external event, rather than a mere readout of an internal state.
https://www.frontiersin.org/articles/10.3389/fpsyg.2022.816744/full

---

Language and Cognition

PAPERS

JESSICA KEISER – Language without information exchange
This paper attempts to revive a once-lively program in the philosophy of language—that of reducing linguistic phenomena to facts about mental states and actions. I argue that recent skepticism toward this project is generated by features of

traditional implementations of the project, rather than the project itself. A picture of language as essentially a mechanism for cooperative information exchange attracted theorists to metasemantic accounts grounding language use in illocutionary action (roughly, using an utterance to elicit a propositional attitude). When this picture is rejected, a metasemantics grounding language in locutionary action (using an utterance to direct attention) emerges as a more viable proposal, dissolving an intractable issue for traditional theories: the metasemantics of subsentential expressions.
https://onlinelibrary.wiley.com/doi/full/10.1111/mila.12303

SAM CLARKE – Beyond the icon: Core cognition and the bounds of perception
This paper refines a controversial proposal: That core systems belong to a perceptual kind, marked by the format of its representational outputs. Following Susan Carey, this proposal has been understood in terms of core representations having an iconic format, like certain paradigmatically perceptual outputs. I argue that they do not, but suggest that the proposal may be better formulated in terms of a broader analogue format type. Formulated in this way, the proposal accommodates the existence of genuine icons in perception, and avoids otherwise troubling objections.
https://onlinelibrary.wiley.com/doi/abs/10.1111/mila.12315

Nature

ARTICLES

Ancient DNA illuminates how humans travelled and interacted in Stone Age Africa
Archaeologists have various hypotheses for how populations changed in Africa about 50,000 years ago, during the Later Stone Age transition. Now, the earliest available ancient-DNA sequences from sub-Saharan Africa reveal a complex Late Pleistocene population structure, pointing to large shifts in human movement and in patterns of social interaction.
https://www.nature.com/articles/d41586-022-00479-8

PAPERS

MARK LIPSON et mul with DAVID REICH – Ancient DNA and deep population structure in sub-Saharan African foragers
Multiple lines of genetic and archaeological evidence suggest that there were major demographic changes in the terminal Late Pleistocene epoch and early Holocene epoch of sub-Saharan Africa. Inferences about this period are challenging to make because demographic shifts in the past 5,000 years have obscured the structures of more ancient populations. Here we present genome-wide ancient DNA data for six individuals from eastern and south-central Africa spanning the past approximately 18,000 years (doubling the time depth of sub-Saharan African ancient DNA), increase the data quality for 15 previously published ancient individuals and analyse these alongside data from 13 other published ancient individuals. The ancestry of the individuals in our study area can be modelled as a geographically structured mixture of three highly divergent source populations, probably reflecting Pleistocene interactions around 80–20 thousand years ago, including deeply diverged eastern and southern African lineages, plus a previously unappreciated ubiquitous distribution of ancestry that occurs in highest proportion today in central African rainforest hunter-gatherers. Once established, this structure remained highly stable, with limited long-range gene flow. These results provide a new line of genetic evidence in support of hypotheses that have emerged from archaeological analyses but remain contested, suggesting increasing regionalization at the end of the Pleistocene epoch.
https://www.nature.com/articles/s41586-022-04430-9

Nature Human Behaviour

PAPERS

ITAY YARON et al – The ConTraSt database for analysing and comparing empirical studies of consciousness theories
Understanding how consciousness arises from neural activity remains one of the biggest challenges for neuroscience. Numerous theories have been proposed in recent years, each gaining independent empirical support. Currently, there is no comprehensive, quantitative and theory-neutral overview of the field that enables an evaluation of how theoretical frameworks interact with empirical research. We provide a bird's eye view of studies that interpreted their findings in light of at least one of four leading neuroscientific theories of consciousness (N = 412 experiments), asking how methodological choices of the researchers might affect the final conclusions. We found that supporting a specific theory can be predicted solely from methodological choices, irrespective of findings. Furthermore, most studies interpret their findings post hoc, rather than a priori testing critical predictions of the theories. Our results highlight challenges for the field and provide researchers with an open-access website (https://ContrastDB.tau.ac.il) to further analyse trends in the neuroscience of consciousness.
https://www.nature.com/articles/s41562-021-01284-5

Nature Lab Animal

COMMENTARIES

ALEXANDRA LE BRAS – Humanized mouse models provide new insights into human evolution

Dutrow, E.V., et al. Nat. Commun. 13, 304 (2022)

As a species, we possess unique biological features that distinguish us from nonhuman primates (NHPs), including our closest relatives the chimpanzee and bonobo. Uniquely human traits are the result of genetic changes between humans and NHPs, but identifying these critical changes is challenging. Comparative genomics studies have identified DNA sequences known as Human Accelerated Regions (HARs) that are unique to humans and could contribute to the phenotypic differences between human and NHP. However, functional studies are needed to validate the role of these DNA regulatory regions in human evolution.

https://www.nature.com/articles/s41684-022-00931-2

Nature Scientific Reports

PAPERS

MARION DE VEVEY et al with KLAUS ZUBERBÜHLER – Thermal imaging reveals audience-dependent effects during cooperation and competition in wild chimpanzees

Accessing animal minds has remained a challenge since the beginnings of modern science. Here, we used a little-tried method, functional infrared thermal imaging, with wild chimpanzees during common social interactions. After removing confounds, we found that chimpanzees involved in competitive events had lower nose skin temperatures whereas those involved in cooperative events had higher temperatures, the latter more so in high- than low-ranking males. Temperatures associated with grooming were akin to those of cooperative events, except when males interacted with a non-reciprocating alpha male. In addition, we found multiple audience effects. Notably, the alpha male's presence reduced positive effects associated with cooperation, whereas female presence buffered negative effects associated with competition. Copulation was perceived as competitive, especially during furtive mating when other males were absent. Overall, patterns suggest that chimpanzees categorise ordinary social events as cooperative or competitive and that these perceptions are moderated by specific audiences.

https://www.nature.com/articles/s41598-022-07003-y

HANNA MARNO et al with DAN SPERBER & JOSEP CALL – Learning from communication versus observation in great apes

When human infants are intentionally addressed by others, they tend to interpret the information communicated as being relevant to them and worth acquiring. For humans, this attribution of relevance leads to a preference to learn from communication, making it possible to accumulate knowledge over generations. Great apes are sensitive to communicative cues, but do these cues also activate an expectation of relevance? In an observational learning paradigm, we demonstrated to a sample of nonhuman great apes (bonobos, chimpanzees, orangutans; N = 24) how to operate on a food dispenser device. When apes had the opportunity to choose between an effective and an ineffective method in the baseline conditions, the majority of them chose the effective method. However, when the ineffective method was demonstrated in a communicative way, they failed to prioritize efficiency, even though they were equally attentive in both conditions. This suggests that the ostensive demonstration elicited an expectation of relevance that modified apes' interpretation of the situation, potentially leading to a preference to learn from communication, as human children do.

https://www.nature.com/articles/s41598-022-07053-2

RACHEL L. LUPIEN et al – Orbital controls on eastern African hydroclimate in the Pleistocene

Understanding eastern African paleoclimate is critical for contextualizing early human evolution, adaptation, and dispersal, yet Pleistocene climate of this region and its governing mechanisms remain poorly understood due to the lack of long, orbitally-resolved, terrestrial paleoclimate records. Here we present leaf wax hydrogen isotope records of rainfall from paleolake sediment cores from key time windows that resolve long-term trends, variations, and high-latitude effects on tropical African precipitation. Eastern African rainfall was dominantly controlled by variations in low-latitude summer insolation during most of the early and middle Pleistocene, with little evidence that glacial–interglacial cycles impacted rainfall until the late Pleistocene. We observe the influence of high-latitude-driven climate processes emerging from the last interglacial (Marine Isotope Stage 5) to the present, an interval when glacial–interglacial cycles were strong and insolation forcing was weak. Our results demonstrate a variable response of eastern African rainfall to low-latitude insolation forcing and high-latitude-driven climate change, likely related to the relative strengths of these forcings through time and a threshold in monsoon sensitivity. We observe little difference in mean rainfall between the early, middle, and late Pleistocene, which suggests that orbitally-driven climate variations likely played a more significant role than gradual change in the relationship between early humans and their environment.

https://www.nature.com/articles/s41598-022-06826-z

JULIO MERCADER et al – Microbotanical residues for the study of early hominin tools
More than 2 million years ago in East Africa, the earliest hominin stone tools evolved amidst changes in resource base, with pounding technology playing a key role in this adaptive process. Olduvai Gorge (now Oldupai) is a famed locality that remains paramount for the study of human evolution, also yielding some of the oldest battering tools in the world. However, direct evidence of the resources processed with these technologies is lacking entirely. One way to obtain this evidence is through the analysis of surviving residues. Yet, linking residues with past processing activities is not simple. In the case of plant exploitation, this link can only be established by assessing site-based reference collections inclusive of both anthropogenic and natural residues as a necessary first step and comparative starting point. In this paper, we assess microbotanical remains from rock clasts sourced at the same quarry utilized by Oldowan hominins at Oldupai Gorge. We mapped this signal and analysed it quantitatively to classify its spatial distribution objectively, extracting proxies for taxonomic identification and further comparison with freestanding soils. In addition, we used blanks to manufacture pounding tools for blind, controlled replication of plant processing. We discovered that stone blanks are in fact environmental reservoirs in which plant remains are trapped by lithobionts, preserved as hardened accretions. Tool use, on the other hand, creates residue clusters; however, their spatial distribution can be discriminated from purely natural assemblages by the georeferencing of residues and statistical analysis of resulting patterns. To conclude, we provide a protocol for best practice and a workflow that has the advantage of overcoming environmental noise, reducing the risk of false positive, delivering a firm understanding of residues as polygenic mixtures, a reliable use of controls, and most importantly, a stronger link between microbotanical remains and stone tool use.
https://www.nature.com/articles/s41598-022-06959-1

STEFANIA MILANO et al – Temporal and spatial variability of prehistoric aquatic resource procurement: a case study from Mesolithic Northern Iberia
Prehistoric shell middens hold valuable evidence of past human–environment interactions. In this study, we used carbon (δ13C) and oxygen (δ18O) stable isotopes of Mytilus galloprovincialis shells excavated from El Perro, La Fragua and La Chora, three Mesolithic middens in Cantabria, Northern Spain, to examine hunter-gatherer subsistence strategies in terms of seasonality and collection areas. Furthermore, we used shell δ18O to reconstruct water temperature during the early Holocene. Stable isotopes reveal a shellfish harvesting diversification trend represented by the gradual establishment of the upper estuaries as new procurement areas and an increase of harvesting mobility in both coastal and in-land sites. These innovations in subsistence strategies during the Mesolithic coincided with major changes in the surrounding environment as attested by the water temperature reconstructions based on δ18O and backed by several global and regional records. Overall, our results show that shell δ13C and δ18O stable isotopes have an underexplored potential as provenance proxies which stimulates their application to the archaeological record to further understand prehistoric human resource procurement and diet.
https://www.nature.com/articles/s41598-022-07239-8

New Scientist

NEWS

Orangutans can learn how to use stone tools as hammers and knives
Captive orangutans that had never seen stone tools could work out how to use them to hit or cut things – but they couldn't get the hang of making them.
https://www.newscientist.com/article/2308133-orangutans-can-learn-how-to-use-stone-tools-as-hammers-and-knives/#ixzz7LvWE8Jsa

---

PLoS Biology

PAPERS

JANNES JEGMINAT, SIMONE CARLO SURACE & JEAN-PASCAL PFISTER – Learning as filtering: Implications for spike-based plasticity
Most normative models in computational neuroscience describe the task of learning as the optimisation of a cost function with respect to a set of parameters. However, learning as optimisation fails to account for a time-varying environment during the learning process and the resulting point estimate in parameter space does not account for uncertainty. Here, we frame learning as filtering, i.e., a principled method for including time and parameter uncertainty. We derive the filtering-based learning rule for a spiking neuronal network—the Synaptic Filter—and show its computational and biological relevance. For the computational relevance, we show that filtering improves the weight estimation performance compared to a gradient learning rule with optimal learning rate. The dynamics of the mean of the Synaptic Filter is consistent with spike-timing dependent plasticity (STDP) while the dynamics of the variance makes novel predictions regarding spike-timing dependent changes of EPSP variability. Moreover, the Synaptic Filter explains experimentally observed negative correlations between homo- and heterosynaptic plasticity.
https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1009721

PLoS One

PAPERS

RYAN M. CAMPBELL, GABRIEL VINAS & MACIEJ HENNEBERG – Relationships between the hard and soft dimensions of the nose in Pan troglodytes and Homo sapiens reveal the positions of the nasal tips of Plio-Pleistocene hominids

By identifying homogeneity in bone and soft tissue covariation patterns in living hominids, it is possible to produce facial approximation methods with interspecies compatibility. These methods may be useful for producing facial approximations of fossil hominids that are more realistic than currently possible. In this study, we conducted an interspecific comparison of the nasomaxillary region in chimpanzees and modern humans with the aim of producing a method for predicting the positions of the nasal tips of Plio-Pleistocene hominids. We addressed this aim by first collecting and performing regression analyses of linear and angular measurements of nasal cavity length and inclination in modern humans (Homo sapiens; n = 72) and chimpanzees (Pan troglodytes; n = 19), and then performing a set of out-of-group tests. The first test was performed on four subjects that belonged to the same genus as the training sample, i.e., Homo (n = 2) and Pan (n = 2), and the second test, which functioned as an interspecies compatibility test, was performed on Pan paniscus (n = 1), Gorilla gorilla (n = 3), Pongo pygmaeus (n = 1), Pongo abelli (n = 1), Symphalangus syndactylus (n = 3), and Papio hamadryas (n = 3). We identified statistically significant correlations in both humans and chimpanzees with slopes that displayed homogeneity of covariation. Prediction formulae combining these data were found to be compatible with humans and chimpanzees as well as all other African great apes, i.e., bonobos and gorillas. The main conclusion that can be drawn from this study is that our set of regression models for approximating the position of the nasal tip are homogenous among humans and African apes, and can thus be reasonably extended to ancestors leading to these clades.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0259329

TORSTEN MARTINY-HUENGER, YEVHEN DAMANSKYY & ELIZABETH J. PARKS-STAMM – From thought to action: On the relevance of including situational cues in thought about intended actions

Successful everyday self-regulation often hinges on implementing intended responses at a later time–often in specific situations. We address this self-regulation challenge by examining the role of individuals' thought about intended actions–and specifically whether it does or does not include situational cues. We hypothesized that including situational cues when thinking about intended actions enables stimulus-response learning, thereby increasing the likelihood of implementing the intended actions. Consequently, we pre-registered and found (N = 392, age range 18–94) a positive relationship between the self-reported habitual inclusion of situational cues in thought about intended actions and everyday self-regulation success (assessed by self-reported self-efficacy and self-control beliefs). In addition, we provide exploratory evidence that the inclusion of situational cues in thought about intended actions mediates the relationship between conscientiousness and self-regulation success. We discuss the results and the theoretical perspective in relation to how self-control outcomes can be explained by associative learning.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0264342

SASCHA GREHL & ANDREAS TUTIĆ – Intuition, reflection, and prosociality: Evidence from a field experiment

Are humans instinctively good or is it only our capacity for reflection that enables us to restrain our selfish traits and behave prosocially? Against the background of dual-process theory, the question of whether people tend to behave prosocially on intuitive grounds has been debated controversially for several years. Central to this debate is the so-called social heuristic hypothesis (SHH), which states that subjects orient their behavior more closely to their deeply ingrained norms and attitudes when the behavior comes about in an intuitive rather than reflective manner. In this paper, we apply the SHH to a novel setting and investigate whether its implications hold true in a non-reactive field experiment, in which subjects are unaware that they are part of a study. We test whether subjects report a misdirected email or try to use the opportunity to reap a monetary benefit. Since all subjects participated six months prior to the field experiment in a lab experiment, we have solid measures of the subjects' general tendency to behave intuitively and their prosocial attitudes. In addition, participants were asked in a follow-up survey to self-report their intuitiveness at the time of the decision. While we observe a significant and positive effect on prosocial behavior for self-reported intuitiveness (but not for general intuitiveness) in the bivariate analyses, this effect becomes insignificant when controlling for interaction effects with attitudes. In addition, for both forms of intuitiveness, we find a significant and positive interaction effect with subjects' prosocial attitudes on prosocial behavior. Hence, this study confirms previous findings from laboratory as well as online studies and provides external validity by demonstrating that the SHH applies in a real-life situation.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0262476

ASHLEY RANSOM et al – Face-to-face learning enhances the social transmission of information

Learning from others provides the foundation for culture and the advancement of knowledge. Learning a new visuospatial skill from others represents a specific challenge—overcoming differences in perspective so that we understand what someone is doing and why they are doing it. The "what" of visuospatial learning is thought to be easiest from a shared 0° first-person perspective and most difficult from a 180° third-person perspective. However, the visual disparity at 180° promotes face-to-face interaction, which may enhance learning by scaffolding social perspective taking, the "why" of visuospatial learning. We tested these potentially conflicting hypotheses in child and young adult learners. Thirty-six children (4–6 years) and 57 young adults (18–27 years) observed a live model open a puzzle box from a first-person (0°) or third-

person (90° or 180°) perspective. The puzzle box had multiple solutions, only one of which was modelled, which allowed for the assessment of imitation and goal emulation. Participants had three attempts to open the puzzle box from the model's perspective. While first-person (0°) observation increased imitation relative to a 180° third-person perspective, the 180° observers opened the puzzle box most readily (i.e., fastest). Although both age groups were excellent imitators and able to take the model's perspective, adults were more faithful imitators, and children were more likely to innovate a new solution. A shared visual perspective increased imitation, but a shared mental perspective promoted goal achievement and the social transmission of innovation. "Perfection of means and confusion of goals—in my opinion—seem to characterize our age" Einstein (1973) pg 337, Ideas and Opinions
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0264250

PNAS

PAPERS

KATHARINA DULIAS et al with THE SCOTTISH GENOMES PARTNERSHIP – Ancient DNA at the edge of the world: Continental immigration and the persistence of Neolithic male lineages in Bronze Age Orkney

Orkney was a major cultural center during the Neolithic, 3800 to 2500 BC. Farming flourished, permanent stone settlements and chambered tombs were constructed, and long-range contacts were sustained. From ∼3200 BC, the number, density, and extravagance of settlements increased, and new ceremonial monuments and ceramic styles, possibly originating in Orkney, spread across Britain and Ireland. By ∼2800 BC, this phenomenon was waning, although Neolithic traditions persisted to at least 2500 BC. Unlike elsewhere in Britain, there is little material evidence to suggest a Beaker presence, suggesting that Orkney may have developed along an insular trajectory during the second millennium BC. We tested this by comparing new genomic evidence from 22 Bronze Age and 3 Iron Age burials in northwest Orkney with Neolithic burials from across the archipelago. We identified signals of inward migration on a scale unsuspected from the archaeological record: As elsewhere in Bronze Age Britain, much of the population displayed significant genome-wide ancestry deriving ultimately from the Pontic-Caspian Steppe. However, uniquely in northern and central Europe, most of the male lineages were inherited from the local Neolithic. This suggests that some male descendants of Neolithic Orkney may have remained distinct well into the Bronze Age, although there are signs that this had dwindled by the Iron Age. Furthermore, although the majority of mitochondrial DNA lineages evidently arrived afresh with the Bronze Age, we also find evidence for continuity in the female line of descent from Mesolithic Britain into the Bronze Age and even to the present day.
https://www.pnas.org/content/119/8/e2108001119.abstract

CÉLINE SPRIET et al – Visual object categorization in infancy

Humans make sense of the world by organizing things into categories. When and how does this process begin? We investigated whether real-world object categories that spontaneously emerge in the first months of life match categorical representations of objects in the human visual cortex. Using eye tracking, we measured the differential looking time of 4-, 10-, and 19-mo-olds as they looked at pairs of pictures belonging to eight animate or inanimate categories (human/nonhuman, faces/bodies, real-world size big/small, natural/artificial). Taking infants' looking times as a measure of similarity, for each age group, we defined a representational space where each object was defined in relation to others of the same or of a different category. This space was compared with hypothesis-based and functional MRI-based models of visual object categorization in the adults' visual cortex. Analyses across different age groups showed that, as infants grow older, their looking behavior matches neural representations in ever-larger portions of the adult visual cortex, suggesting progressive recruitment and integration of more and more feature spaces distributed over the visual cortex. Moreover, the results characterize infants' visual categorization as an incremental process with two milestones. Between 4 and 10 mo, visual exploration guided by saliency gives way to an organization according to the animate–inanimate distinction. Between 10 and 19 mo, a category spurt leads toward a mature organization. We propose that these changes underlie the coupling between seeing and thinking in the developing mind.
https://www.pnas.org/content/119/8/e2105866119.abstract

Proceedings of the Royal Society B

PAPERS

NICOLE WALASEK, WILLEM E. FRANKENHUIS & KARTHIK PANCHANATHAN – Sensitive periods, but not critical periods, evolve in a fluctuating environment: a model of incremental development

Sensitive periods, during which the impact of experience on phenotype is larger than in other periods, exist in all classes of organisms, yet little is known about their evolution. Recent mathematical modelling has explored the conditions in which natural selection favours sensitive periods. These models have assumed that the environment is stable across ontogeny or that organisms can develop phenotypes instantaneously at any age. Neither assumption generally holds. Here, we present a model in which organisms gradually tailor their phenotypes to an environment that fluctuates across ontogeny, while receiving cost-free, imperfect cues to the current environmental state. We vary the rate of environmental change, the reliability of cues and the duration of adulthood relative to ontogeny. We use stochastic dynamic programming to compute optimal policies. From these policies, we simulate levels of plasticity across ontogeny and obtain mature phenotypes. Our results show that sensitive periods can occur at the onset, midway through and even towards the end of ontogeny. In contrast with models assuming stable environments, organisms always retain residual plasticity late in ontogeny. We

conclude that critical periods, after which plasticity is zero, are unlikely to be favoured in environments that fluctuate across ontogeny.
https://royalsocietypublishing.org/doi/full/10.1098/rspb.2021.2623

Royal Society Open Science

PAPERS

JOANA BESSA, DORA BIRO & KIMBERLEY HOCKINGS – Inter-community behavioural variation confirmed through indirect methods in four neighbouring chimpanzee communities in Cantanhez NP, Guinea-Bissau

Culture, while long viewed as exclusively human, has now been demonstrated across diverse taxa and contexts. However, most animal culture data are constrained to well-studied, habituated groups. This is the case for chimpanzees, arguably the most 'cultural' non-human species. While much progress has been made charting wild chimpanzees' cultural repertoire, large gaps remain in our knowledge of the majority of the continent's chimpanzees. Furthermore, few studies have compared neighbouring communities, despite such comparisons providing the strongest evidence for culture, and few have studied communities living in anthropogenic habitats although their culture is in imminent danger of disappearing. Here we combine direct, indirect and remote methods, including camera traps, to study, over 2 years, four unhabituated neighbouring chimpanzee communities inhabiting human-impacted habitats in Cantanhez NP, Guinea-Bissau. From traces collected during 1089 km of reconnaissance walks and 4197 videos from 56 camera trap locations, we identified 18 putative cultural traits. These included some noteworthy novel behaviours for these communities, and behaviours possibly new to the species. We created preliminary behavioural profiles for each community, and found inter-community differences spanning tool use, communication, and social behaviour, demonstrating the importance of comparing neighbouring communities and of studying previously neglected communities including those inhabiting anthropogenic landscapes.
https://royalsocietypublishing.org/doi/full/10.1098/rsos.211518

DAVID WISNIEWSKI et al – Relating free will beliefs and attitudes

Most people believe in free will, which is foundational for our sense of agency and responsibility. Past research demonstrated that such beliefs are dynamic, and can be manipulated experimentally. Much less is known about free will attitudes (FWAs; do you value free will?), whether they are equally dynamic, and about their relation to free will beliefs (FWBs). If FWAs were strongly positive, people might be reluctant to revise their beliefs even in the face of strong evidence to do so. In this registered report, we developed a novel measure of FWAs and directly related FWBs and attitudes for the first time. We found FWBs and attitudes to be positively related, although to a lesser degree than determinism or dualism beliefs/attitudes. Nevertheless, an experimental manipulation technique aimed at reducing FWBs (Crick text) showed remarkably specific effects on FWBs only, and no effects on FWAs. Overall, these results provide valuable new insights into laypeople's views on free will by including a novel measure of FWAs. They also provide evidence for the validity of a common experimental technique that has been rightfully criticized in the literature lately.
https://royalsocietypublishing.org/doi/full/10.1098/rsos.202018

WEI WU & PAUL HOFFMAN – Validated measures of semantic knowledge and semantic control: normative data from young and older adults for more than 300 semantic judgements

Recent studies suggest that knowledge representations and control processes are the two key components underpinning semantic cognition, and are also crucial indicators of the shifting cognitive architecture of semantics in later life. Although there are many standardized assessments that provide measures of the quantity of semantic knowledge participants possess, normative data for tasks that probe semantic control processes are not yet available. Here, we present normative data from more than 200 young and older participants on a large set of stimuli in two semantic tasks, which probe controlled semantic processing (feature-matching task) and semantic knowledge (synonym judgement task). We verify the validity of our norms by replicating established age- and psycholinguistic-property-related effects on semantic cognition. Specifically, we find that older people have more detailed semantic knowledge than young people but have less effective semantic control processes. We also obtain expected effects of word frequency and inter-item competition on performance. Parametrically varied difficulty levels are defined for half of the stimuli based on participants' behavioural performance, allowing future studies to produce customized sets of experimental stimuli based on our norms. We provide all stimuli, data and code used for analysis, in the hope that they are useful to other researchers.
https://royalsocietypublishing.org/doi/full/10.1098/rsos.211056

OLIVER BRAGANZA – Proxyeconomics, a theory and model of proxy-based competition and cultural evolution

Competitive societal systems by necessity rely on imperfect proxy measures. For instance, profit is used to measure value to consumers, patient volumes to measure hospital performance, or the journal impact factor to measure scientific value. While there are numerous reasons why proxies will deviate from the underlying societal goals, they will nevertheless determine the selection of cultural practices and guide individual decisions. These considerations suggest that the study of proxy-based competition requires the integration of cultural evolution theory and economics or decision theory. Here, we attempt such an integration in two ways. First, we describe an agent-based simulation model, combining methods and insights from these disciplines. The model suggests that an individual intrinsic incentive can constrain a cultural evolutionary pressure, which would otherwise enforce fully proxy-oriented practices. The emergent outcome is distinct from that with either the isolated

economic or evolutionary mechanism. It reflects what we term lock-in, where competitive pressure can undermine the ability of agents to pursue the shared social goal. Second, we elaborate the broader context, outlining the system-theoretic foundations as well as some philosophical and practical implications, towards a broader theory. Overall, we suggest such a theory may offer an explanatory and predictive framework for diverse subjects, ranging from scientific replicability to climate inaction, and outlining strategies for diagnosis and mitigation.
https://royalsocietypublishing.org/doi/full/10.1098/rsos.211030

Science

NEWS

Oldest human DNA from Africa reveals complex migrations
Signs of isolation during ice age match archaeological clues.
https://www.science.org/content/article/oldest-human-dna-africa-reveals-complex-migrations

ARTICLES

JASMIN REES & AIDA ANDRÉS – Inferring human evolutionary history
Genomes are invaluable tools for inferring the demographic and adaptive history of human populations, including migrations, population splits, admixture, and genetic adaptations. Growing datasets of modern and ancient genomes make this possible, but their massive size comes with important challenges, demanding techniques that analyze immense amounts of data in reasonable amounts of time while using as much information as possible. Combining genomes from different datasets poses perhaps an even greater challenge, especially when it comes to integrating ancient and modern genomes. On page 836 of this issue, Wohns et al. report surmounting some of these challenges to construct the largest human genealogy to date, integrating modern and ancient genomes from multiple datasets to infer key events in human history together with their timings and geographical locations.
https://www.science.org/doi/10.1126/science.abo0498

PAPERS

ANTHONY WILDER WOHNS et al with DAVID REICH – A unified genealogy of modern and ancient genomes
The sequencing of modern and ancient genomes from around the world has revolutionized our understanding of human history and evolution. However, the problem of how best to characterize ancestral relationships from the totality of human genomic variation remains unsolved. Here, we address this challenge with nonparametric methods that enable us to infer a unified genealogy of modern and ancient humans. This compact representation of multiple datasets explores the challenges of missing and erroneous data and uses ancient samples to constrain and date relationships. We demonstrate the power of the method to recover relationships between individuals and populations as well as to identify descendants of ancient samples. Finally, we introduce a simple nonparametric estimator of the geographical location of ancestors that recapitulates key events in human history.
https://www.science.org/doi/10.1126/science.abi8264

Trends in Cognitive Sciences

PAPERS

JOHN D. MOLLON, CHIE TAKAHASHI & MARINA V. DANILOVA – What kind of network is the brain?
The different areas of the cerebral cortex are linked by a network of white matter, comprising the myelinated axons of pyramidal cells. Is this network a neural net, in the sense that representations of the world are embodied in the structure of the net, its pattern of nodes, and connections? Or is it a communications network, where the same physical substrate carries different information from moment to moment? This question is part of the larger question of whether the brain is better modeled by connectionism or by symbolic artificial intelligence (AI), but we review it in the specific context of the psychophysics of stimulus comparison and the format and protocol of information transmission over the long-range tracts of the brain.
https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(22)00022-5

SUBSCRIBE to the EAORC Bulletin

If you would like to subscribe to this free weekly newsletter, please contact martin.edwardes@btopenworld.com.

UNSUBSCRIBE from the EAORC Bulletin

Send an email to martin.edwardes@btopenworld.com with the subject "EAORC unsubscribe".

PRODUCED BY AND FOR THE EAORC EMAIL GROUP

EAORC is a fee-free academic internet news service and has no commercial sponsorship or other commercial interests.
EAORC website information is at http://martinedwardes.me.uk/eaorc/

If you have received this bulletin, and are unhappy about receiving it, please contact martin.edwardes@btopenworld.com.