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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, do 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, do let me know.

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

EAORC NEWS – 1. Biennial Membership Check – Please Respond

2020 is a membership checking year, when I ask for confirmation that you wish to continue receiving the bulletins. So please let me know that you wish to continue by emailing me with **Bulletin Yes**, or something similar. If you do not wish to continue receiving the bulletin then you need do nothing. Anyone who has not indicated they wish to continue will be taken off the list at the end of October. This biennial membership check has been in operation since 2008, and GDPR has made it even more important that it is carried out regularly.

Slawomir and Esther, you have already responded; but feel free to respond again if you wish to be sure to be sure.

EAORC NEWS – 2. New Website Preview Available – Last Call

Since the creation of EAORC I have been using Webplus from Serif. Originally X4, I updated to X5, X6, X7 and X8, and I found it to be an outstanding product. Unfortunately, as is the way of anything outstanding in this World, Serif ceased to support the software in August 2018. Since then I have been using X8, despite its increasing unreliability, and trying out other web design solutions to find an alternative.

Eventually, out of desperation, I tried to redesign one of my websites (the EAORC site, because it’s the simplest) in Microsoft products – mostly Word, with PowerPoint and Paint (good old Paint) to help gussy things up. It turns out that this is a quite good solution. I have now produced a reasonable version of the EAORC website, which is available for your inspection at http://martinedwardes.me.uk/eaorc_test/. If people are content with this new site then I will replace the existing website in September.

Many thanks to those who have already responded.

EAORC NEWS – 3. PDF bulletins? Your choice – Last Call

It has been suggested that, as I produce a weekly pdf bulletin for the website, I could send that to the email group instead of the text email. The pdf has several advantages over the current email in terms of presentation, curation, and searching, but it has the disadvantage of being larger: the average EAORC pdf for the past few months has been about 350kb, the average

bulletin email has been (I think) about 80kb. There are also issues to be considered of how your security system reacts to emails with a lot of links, or how it reacts to emails with attachments.

Let me know which option you prefer by sending me a two-word email: **EAORC pdf** or **EAORC email**. I will go with the majority choice. I will leave the voting open until end August to allow people otherwise out of contact to
Many thanks to those who have already responded.

BREAKING SCIENCE – Archaeologists Find 7,000-Year-Old Stone Monuments in Northern Arabia

An international team of archaeologists has found and studied 104 enigmatic stone structures called 'mustatils' in the southern part of the Nefud Desert in northern Arabia. They've also provided the first chronometric age estimate for this type of structure — a radiocarbon date of 5000 BCE — and described their landscape positions, architecture and associated culture.

http://feedproxy.google.com/~r/BreakingScienceNews/~3/bK5nxxdGC-k/nefud-desert-mustatils-08780.html?utm_source=feedburner&utm_medium=email

LIVESCIENCE – Britain's oldest artwork may depict mammoths from a drowned land

Britain's oldest artwork has been unearthed on the Channel Island of Jersey, showing what appear to be Ice Age scenes of mammoths in ancient lands now drowned by the sea.

<https://www.livescience.com/oldest-artwork-britain.html>

SCIENCE DAILY – Vast stone monuments constructed in Arabia 7,000 years ago

New archaeological research in Saudi Arabia documents hundreds of stone structures interpreted as monumental sites where early pastoralists carried out rituals.

<https://www.sciencedaily.com/releases/2020/08/200825113618.htm>

SCIENCE DAILY – Fossilized teeth reveal dietary shifts in ancient herbivores and hominins

A new study documents dietary shifts in herbivores that lived between 1-3 million years ago in Ethiopia's Lower Omo Valley.

<https://www.sciencedaily.com/releases/2020/08/200825113604.htm>

SCIENCE DAILY – New neural network differentiates Middle and Late Stone Age toolkits

The change from Middle Stone Age (MSA) to Later Stone Age (LSA) marks a major cultural change amongst our hunter-gatherer ancestors, but distinguishing between these two industrial complexes is not straightforward. New research demonstrates how machine learning can provide a valuable tool for archaeologists, and can identify what differentiates the MSA and LSA.

<https://www.sciencedaily.com/releases/2020/08/200826140909.htm>

SCIENCE DAILY – How 'swapping bodies' with a friend changes our sense of self

A new study shows that, when pairs of friends swapped bodies in a perceptual illusion, their beliefs about their own personalities became more similar to their beliefs about their friends' personalities. The findings suggest that this tie between our psychological and physical sense of self is involved in memory function: when our mental self-concept doesn't match our physical self, our memory can become impaired.

<https://www.sciencedaily.com/releases/2020/08/200826110322.htm>

SCIENCE DAILY – How are information, disease, and social evolution linked?

In all social animals, gaining valuable information requires physical contact among individuals, an action that risks spreading contagion. New research describes the opposing evolutionary forces that give rise to the social networks of which we are a part. They developed a dynamic theoretical framework where individuals constantly update their social behaviors to reflect both the benefits and costs of interaction.

<https://www.sciencedaily.com/releases/2020/08/200826101632.htm>

SCIENCE DAILY – Individual dolphin calls used to estimate population size and movement

A new study has shown for the first time that acoustic monitoring can be used in place of photographs to generate abundance estimates of dolphin populations.

<https://www.sciencedaily.com/releases/2020/08/200827102144.htm>

SCIENCE DAILY – How Neanderthals adjusted to climate change

Climate change occurring shortly before their disappearance triggered a complex change in the behavior of late Neanderthals in Europe: they developed more complex tools, suggests new research.

<https://www.sciencedaily.com/releases/2020/08/200828115359.htm>

SCIENCE DAILY – Why are there differing preferences for suffixes and prefixes across languages?

While speakers of English and other Western languages prefer using suffixes more than prefixes, a new study reveals that this preference is not as universal as once thought.

<https://www.sciencedaily.com/releases/2020/08/200828115340.htm>

ACADEMIA.EDU – Storied landscapes makes us (Modern) Human

Journal of Anthropological Archaeology 32 (2013) 614–629

MICHELLE C. LANGLEY – Storied landscapes makes us (Modern) Human: Landscape socialisation in the Palaeolithic and consequences for the archaeological record

The unusual nature of the Neanderthal archaeological record has attracted the attention of archaeologists for the past 150 years. On the one hand, the technical skill apparent in their lithic technology, the practice of symbolic cultural behaviours (such as burials), and their successful survival in harsh environmental conditions for more than 200,000 years demonstrate the adaptive success and underlying humanity of the Neanderthal populations. On the other hand, the apparent lack of abundant and repeated use of symbolic material culture has resulted in a number of researchers arguing that these populations were largely incapable of symbolism – a conclusion with significant implications for social organisation. This paper reviews ideas regarding the use of ‘place’ or ‘landscape’ by Neanderthals and argues that the identified differences between the archaeological records of Neanderthals and late Pleistocene Modern Humans is not so much the result of significant variance in cognitive capacities, but rather the use of contrasting approaches to interaction with the physical landscape. ‘Landscape socialisation’ is a Modern Human universal, but what if Neanderthals did not participate in this kind of landscape interaction? Would this difference in behaviour result in the apparently contradictory archaeological record which has been created? The ideas presented in this paper are drawn together as a hypothesis to be developed and tested.

https://www.academia.edu/5101619/Storied_landscapes_makes_us_Modern_Human_Landscape_socialisation_in_the_Palaeolithic_and_consequences_for_the_archaeological_record?email_work_card=minimal-title

ACADEMIA.EDU – Human Origin Sites and the World Heritage Convention in Eurasia

UNESCO publication – Table of Contents

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KISHORE RAO – Foreword

NURIA SANZ – Scientific Perspectives: Eurasia and HEADS

ROBIN DENNELL – How to use the World Heritage List of cultural and natural criteria to demonstrate the Outstanding Universal Value (OUV) of prehistoric sites in Eurasia, with particular reference to criterion (viii)

MARGHERITA MUSSI – Europe: the Outstanding Universal Value of a marginal area of the Palaeolithic world

MICHAEL D. PETRAGLIA – Prehistoric archaeological sites in Arabia and their potential for nomination to the World Heritage List

SAMAN HEYDARI-GURAN – Tracking Upper Pleistocene human dispersals into the Iranian Plateau: a geoarchaeological model

JEAN-MARIE LE TENSORER – Regional Perspective of early human populations in Syria: the case of El Kowm

MINA WEINSTEIN-EVRON – The case of Mount Carmel: the Levant and Human Evolution, future research in the framework of World Heritage

ROBERT SALA I RAMOS – Early Human Occupation of Orce

NUNO BICHO – Ecological niches of the Iberian Peninsula: a comparative analysis of European coastal adaptations

EKATERINA DEVLET – Rock art from the Russian Far East: the Sikachi-Alyan Tentative World Heritage Site

VIACHESLAV G. KOTOV – Natural and Cultural Complex the Bashkir Urals

DAVID O. LORDKIPANIDZE – The traces of the first humans in Eurasia

ANDREI SINITSYN – Perspectives on the Palaeolithic of Eurasia: Kostenki and related sites

JIŘÍ SVOBODA – Perspectives on the Upper Palaeolithic in Eurasia: the Case of the Dolní Vestonice-Pavlov sites

FRED H. SMITH – Neanderthal adaptation: the biological costs of brawn

GERD-CHRISTIAN WENIGER – Defining a Neanderthal site ‘Cluster’: reasons for international collaboration

https://www.academia.edu/24606865/Tracking_Upper_Pleistocene_human_dispersals_into_the_Iranian_Plateau_a_geoarchaeological_model?email_work_card=minimal-title

THE CONVERSATION – The key to language is universal psychology, not universal grammar

Research on how children learn show we develop language skills by recycling other parts of our minds.

<https://theconversationuk.cmail19.com/t/r-l-jkkhtjyk-khhiliah-g/>

THE CONVERSATION – What archaeology tells us about the music and sounds made by Africa’s ancestors

There is not much information on artefacts used by Stone Age humans to make sound and music – but the first comprehensive survey is a good start.

<https://theconversationuk.cmail19.com/t/r-l-jkuyttkd-khhiliah-yd/>

PUBLICATIONS

American Journal of Physical Anthropology

PAPERS

PETER R. CLARK et al – Morphological variants of silent bared-teeth displays have different social interaction outcomes in crested macaques (*Macaca nigra*)

While it has been demonstrated that even subtle variation in human facial expressions can lead to significant changes in the meaning and function of expressions, relatively few studies have examined primate facial expressions using similarly objective and rigorous analysis. Construction of primate facial expression repertoires may, therefore, be oversimplified, with expressions often arbitrarily pooled and/or split into subjective pigeonholes. Our objective is to assess whether subtle variation in primate facial expressions is linked to variation in function, and hence to inform future attempts to quantify complexity of facial communication.

We used Macaque Facial Action Coding System, an anatomically based and hence more objective tool, to quantify “silent bared-teeth” (SBT) expressions produced by wild crested macaques engaging in spontaneous behavior, and utilized discriminant analysis and bootstrapping analysis to look for morphological differences between SBT produced in four different contexts, defined by the outcome of interactions: Affiliation, Copulation, Play, and Submission.

We found that SBT produced in these contexts could be distinguished at significantly above-chance rates, indicating that the expressions produced in these four contexts differ morphologically. We identified the specific facial movements that were typically used in each context, and found that the variability and intensity of facial movements also varied between contexts.

<https://onlinelibrary.wiley.com/doi/full/10.1002/ajpa.24129?campaign=wolibraryview>

CAROLINE VANSICKLE, ZACHARY COFRAN & DAVID HUNT – Did Neandertals have large brains? Factors affecting endocranial volume comparisons

Common wisdom in paleoanthropology is that Neandertals had bigger brains than recent humans. Here we tested the hypothesis that there is no difference in brain size between Neandertals and recent humans while accounting for methodological variation and the makeup of both the Neandertal and recent human samples.

We examined endocranial volume (ECV) derived from virtually reconstructed endocasts of 11 Neandertals, six of which had associated femoral head diameters (FHD). Our recent human comparative dataset consisted of virtually measured ECV and associated FHD from 94 recent humans from the Robert J. Terry Anatomical Collection (63 male, 31 female). ECV of Neandertals and recent humans was compared using bootstrap resampling, repeating the analysis for two groupings of Neandertals (all and classic) and for three groupings of recent humans (all, males, and females). To examine brain size scaling, we completed an ordinary least squares regression of log (ECV) against log (FHD) for Neandertals and recent humans. The results of the bootstrap resampling analyses indicated that Neandertals only had significantly larger ECV when compared with recent human females. The regression between ECV and FHD suggested that Neandertals fall within the range of variation for larger humans.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24124?campaign=wolibraryview>

STEPHANIE MUSGRAVE, ELIZABETH LONSDORF, DAVID MORGAN & CRICKETTE SANZ – The ontogeny of termite gathering among chimpanzees in the Goulougo Triangle, Republic of Congo

Acquiring tool-assisted foraging skills can potentially improve dietary quality and increase fitness for wild chimpanzees (*Pan troglodytes*). In contrast to chimpanzees in East and West Africa, chimpanzees in the Congo Basin use tool sets and brush-tipped fishing probes to gather termites. We investigated the ontogeny of these tool skills in chimpanzees of the Goulougo Triangle, Republic of Congo, and compared it to that for chimpanzees at Gombe, Tanzania. We assessed whether chimpanzees acquired simple tool behaviors and single tool use before more complex actions and sequential use of multiple tool types.

Using a longitudinal approach, we scored remote video footage to document the acquisition of termite-gathering critical elements for 25 immature chimpanzees at Goulougo.

All chimpanzees termite fished by 2.9 years but did not manufacture brush-tipped probes until an average of 4.3 years.

Acquisition of sequential tool use extended into juvenility and adolescence. While we did not detect significant sex differences, most critical elements except tool manufacture were acquired slightly earlier by females.

These findings contrast with Gombe, where chimpanzees learn to both use and make fishing probes between ages 1.5–3.5 and acquire the complete task by age 5.5. Differences between sites could reflect tool material selectivity and design complexity, the challenge of sequential tool behaviors, and strength requirements of puncturing subterranean termite nests at Goulougo. These results illustrate how task complexity may influence the timing and sequence of skill acquisition, improving models of the ontogeny of tool behavior among early hominins who likely used complex, perishable technologies.

<https://onlinelibrary.wiley.com/doi/full/10.1002/ajpa.24125?campaign=wolibraryview>

Frontiers in Ecology and Evolution

PAPERS

AHANA AURORA FERNANDEZ & MIRJAM KNÖRNSCHILD – Pup Directed Vocalizations of Adult Females and Males in a Vocal Learning Bat

Social feedback plays an important role in human language development and in the vocal ontogeny of non-human animals. A special form of vocal feedback in humans, infant-directed speech – or motherese – facilitates language learning and is socially beneficial by increasing attention and arousal in the child. It is characterized by high pitch, expanded intonation contours and slower speech tempo. Furthermore, the vocal timbre (i.e., “color” of voice) of motherese differs from the timbre of adult-directed speech. In animals, pup-directed vocalizations are very common, especially in females. But so far there is hardly any research on whether there is a similar phenomenon as motherese in animal vocalizations. The greater sac-winged bat, *Saccopteryx bilineata*, is a vocal production learner with a large vocal repertoire that is acquired during ontogeny. We compared acoustic features between female pup-directed and adult-directed vocalizations and demonstrated that they differed in timbre and peak frequency. Furthermore, we described pup-directed vocalizations of adult males. During the ontogenetic period when pups’ isolation calls (ICs) (used to solicit maternal care) are converging toward each other to form a group signature, adult males also produce ICs. Pups’ ICs are acoustically more similar to those of males from the same social group than to other males. In conclusion, our novel findings indicate that parent-offspring communication in bats is more complex and multifaceted than previously thought, with female pup-directed vocalizations reminiscent of human motherese and male pup-directed vocalizations that may facilitate the transmission of a vocal signature across generations.

https://www.frontiersin.org/articles/10.3389/fevo.2020.00265/full?utm_source=F-AAE&utm_medium=EMLF&utm_campaign=MRK_1411754_6_Ecolog_20200825_arts_A

Interface: Journal of the Royal Society

PAPERS

AANJANEYA KUMAR, VALERIO CAPRARO & MATJAŽ PERC – The evolution of trust and trustworthiness

Trust and trustworthiness form the basis for continued social and economic interactions, and they are also fundamental for cooperation, fairness, honesty, and indeed for many other forms of prosocial and moral behaviour. However, trust entails risks, and building a trustworthy reputation requires effort. So how did trust and trustworthiness evolve, and under which conditions do they thrive? To find answers, we operationalize trust and trustworthiness using the trust game with the trustor’s investment and the trustee’s return of the investment as the two key parameters. We study this game on different networks, including the complete network, random and scale-free networks, and in the well-mixed limit. We show that in all but one case, the network structure has little effect on the evolution of trust and trustworthiness. Specifically, for well-mixed populations, lattices, random and scale-free networks, we find that trust never evolves, while trustworthiness evolves with some probability depending on the game parameters and the updating dynamics. Only for the scale-free network with degree non-normalized dynamics, we find parameter values for which trust evolves but trustworthiness does not, as well as values for which both trust and trustworthiness evolve. We conclude with a discussion about mechanisms that could lead to the evolution of trust and outline directions for future work.

<https://royalsocietypublishing.org/doi/full/10.1098/rsif.2020.0491>

Nature Ecology & Evolution

PAPERS

MARKUS BASTIR et al – Rib cage anatomy in *Homo erectus* suggests a recent evolutionary origin of modern human body shape

The tall and narrow body shape of anatomically modern humans (*Homo sapiens*) evolved via changes in the thorax, pelvis and limbs. It is debated, however, whether these modifications first evolved together in African *Homo erectus*, or whether *H. erectus* had a more primitive body shape that was distinct from both the more ape-like *Australopithecus* species and *H. sapiens*. Here we present the first quantitative three-dimensional reconstruction of the thorax of the juvenile *H. erectus* skeleton, KNM-WT 15000, from Nariokotome, Kenya, along with its estimated adult rib cage, for comparison with *H. sapiens* and the Kebara 2 Neanderthal. Our three-dimensional reconstruction demonstrates a short, mediolaterally wide and anteroposteriorly deep thorax in KNM-WT 15000 that differs considerably from the much shallower thorax of *H. sapiens*, pointing to a recent evolutionary origin of fully modern human body shape. The large respiratory capacity of KNM-WT 15000 is compatible with the relatively stocky, more primitive, body shape of *H. erectus*.

<https://www.nature.com/articles/s41559-020-1240-4>

ANDREA COLUMBU et al – Speleothem record attests to stable environmental conditions during Neanderthal–modern human turnover in southern Italy

The causes of Neanderthal–modern human (MH) turnover are ambiguous. While potential biocultural interactions between the two groups are still little known, it is clear that Neanderthals in southern Europe disappeared about 42 thousand years ago (ka) after cohabitation for ~3,000 years with MH. Among a plethora of hypotheses on Neanderthal extinction, rapid climate changes during the Middle to Upper Palaeolithic transition (MUPT) are regarded as a primary factor. Here we show evidence for stable climatic and environmental conditions during the MUPT in a region (Apulia) where Neanderthals and MH

coexisted. We base our findings on a rare glacial stalagmite deposited between ~106 and ~27 ka, providing the first continuous western Mediterranean speleothem palaeoclimate archive for this period. The uninterrupted growth of the stalagmite attests to the constant availability of rainfall and vegetated soils, while its $\delta^{13}\text{C}$ – $\delta^{18}\text{O}$ palaeoclimate proxies demonstrate that Apulia was not affected by dramatic climate oscillations during the MUPT. Our results imply that, because climate did not play a key role in the disappearance of Neanderthals in this area, Neanderthal–MH turnover must be approached from a perspective that takes into account climatic and environmental conditions favourable for both species. <https://www.nature.com/articles/s41559-020-1243-1>

Nature Scientific Reports

PAPERS

BART J. WILSON, SARAH F. BROSNAN, ELIZABETH V. LONSDORF & CRICKETTE M. SANZ – Consistent differences in a virtual world model of ape societies

Practical and ethical constraints limit our ability to experimentally test socioecological theory in wild primates. We took an alternate approach to model this, allowing groups of humans to interact in a virtual world in which they had to find food and interact with both ingroup and outgroup avatars to earn rewards. We altered ratios and distributions of high- and low-value foods to test the hypothesis that hominoids vary with regards to social cohesion and intergroup tolerance due to their feeding ecology. We found larger nesting clusters and decreased attacks on outgroup competitors in the Bonobo condition versus the Chimpanzee condition, suggesting a significant effect of feeding competition alone on social structure. We also demonstrate that virtual worlds are a robust mechanism for testing hypotheses that are impossible to study in the wild. <https://www.nature.com/articles/s41598-020-70955-6>

NIHAAD PARAOUTY, JOEY A. CHARBONNEAU & DAN H. SANES – Social learning exploits the available auditory or visual cues

The ability to acquire a behavior can be facilitated by exposure to a conspecific demonstrator. Such social learning occurs under a range of conditions in nature. Here, we tested the idea that social learning can benefit from any available sensory cue, thereby permitting learning under different natural conditions. The ability of naïve gerbils to learn a sound discrimination task following 5 days of exposure adjacent to a demonstrator gerbil was tested in the presence or absence of visual cues. Naïve gerbils acquired the task significantly faster in either condition, as compared to controls. We also found that exposure to a demonstrator was more potent in facilitating learning, as compared to exposure to the sounds used to perform the discrimination task. Therefore, social learning was found to be flexible and equally efficient in the auditory or visual domains. <https://www.nature.com/articles/s41598-020-71005-x>

PLoS One

PAPERS

PAULINE TONI, GABRIELLA E. C. GALL, TIM H. CLUTTON-BROCK & MARTA B. MANSER – Signalling adjustments to direct and indirect environmental effects on signal perception in meerkats

The efficiency of communication between animals is determined by the perception range of signals. With changes in the environment, signal transmission between a sender and a receiver can be influenced both directly, where the signal's propagation quality itself is affected, and indirectly where the senders or receivers' behaviour is impaired, impacting for example the distance between them. Here we investigated how meerkats (*Suricata suricatta*) in the Kalahari Desert adjust to these challenges in the context of maintaining group cohesion through contact calls. We found that meerkats changed their calling rate when signal transmission was affected indirectly due to increased dispersion of group members as during a drought, but not under typical wet conditions, when signal transmission was directly affected due to higher vegetation density. Instead under these wetter conditions, meerkats remained within proximity to each other. Overall, both direct and indirect environmental effects on signal perception resulted in an increased probability of groups splitting. In conclusion, we provide evidence that social animals can flexibly adjust their vocal coordination behaviour to cope with direct and indirect effects of the environment on signal perception, but these adjustments have limitations. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0238313>

PNAS

ARTICLES

LOUISE C. HAWKLEY & JOHN P. CAPITANIO – Baboons, bonds, biology, and lessons about early life adversity

Adverse childhood experiences (ACEs) have been defined as those that exhibit a dose–response relationship with health risk behaviors and chronic diseases known to increase mortality. ACEs are also associated with biomarkers related to inflammation, genetics, and endocrine functioning (e.g., cortisol). The standard compendium of 10 ACEs includes abuse (physical, emotional, sexual), neglect (physical, emotional), and household dysfunction (mental illness, mother treated violently, divorce, incarcerated relative, substance abuse). ACEs are, unfortunately, an all-too-prevalent reality in the US population. In 2017 to 2018, about 33% of children aged 0 to 17 had experienced at least one ACE, and 14% had experienced two or more. The question that now occupies many researchers in this field is, “How do events that happen in childhood

persist to affect adult physical and mental health?” Data that address life course questions such as this are rarely available in studies of humans. In PNAS, Rosenbaum et al. take advantage of a rich longitudinal data resource in their long-standing field study of female savannah baboons to test the plausibility of a well-reasoned hypothesis: Early life adversity is associated with increased fecal glucocorticoid (fGC) concentrations in adulthood, and this effect is mediated by social bond strength in adulthood.

<https://www.pnas.org/content/early/2020/08/26/2015162117?etoc=>

PAPERS

JONATHAN G. WYNN et al – Isotopic evidence for the timing of the dietary shift toward C4 foods in eastern African Paranthropus

New approaches to the study of early hominin diets have refreshed interest in how and when our diets diverged from those of other African apes. A trend toward significant consumption of C4 foods in hominins after this divergence has emerged as a landmark event in human evolution, with direct evidence provided by stable carbon isotope studies. In this study, we report on detailed carbon isotopic evidence from the hominin fossil record of the Shungura and Usno Formations, Lower Omo Valley, Ethiopia, which elucidates the patterns of C4 dietary utilization in the robust hominin Paranthropus. The results show that the most important shift toward C4 foods occurred at ~2.37 Ma, within the temporal range of the earliest known member of the genus, Paranthropus aethiopicus, and that this shift was not unique to Paranthropus but occurred in all hominins from this fossil sequence. This uptake of C4 foods by hominins occurred during a period marked by an overall trend toward increased C4 grazing by cooccurring mammalian taxa from the same sequence. However, the timing and geographic patterns of hominin diets in this region differ from those observed elsewhere in the same basin, where environmental controls on the underlying availability of various food sources were likely quite different. These results highlight the complexities of dietary responses by hominins to changes in the availability of food resources.

<https://www.pnas.org/content/early/2020/08/19/2006221117.abstract?etoc>

BRYNN E. SHERMAN & NICHOLAS B. TURK-BROWNE – Statistical prediction of the future impairs episodic encoding of the present

Memory is typically thought of as enabling reminiscence about past experiences. However, memory also informs and guides processing of future experiences. These two functions of memory are often at odds: Remembering specific experiences from the past requires storing idiosyncratic properties that define particular moments in space and time, but by definition such properties will not be shared with similar situations in the future and thus may not be applicable to future situations. We discovered that, when faced with this conflict, the brain prioritizes prediction over encoding. Behavioral tests of recognition and source recall showed that items allowing for prediction of what will appear next based on learned regularities were less likely to be encoded into memory. Brain imaging revealed that the hippocampus was responsible for this interference between statistical learning and episodic memory. The more that the hippocampus predicted the category of an upcoming item, the worse the current item was encoded. This competition may serve an adaptive purpose, focusing encoding on experiences for which we do not yet have a predictive model.

<https://www.pnas.org/content/early/2020/08/27/2013291117.abstract?etoc>

Proceedings of the Royal Society B

PAPERS

NAAMA ALJADEFF, LUC-ALAIN GIRALDEAU & ARNON LOTEM – Competitive advantage of rare behaviours induces adaptive diversity rather than social conformity in skill learning

Recent studies have emphasized the role of social learning and cultural transmission in promoting conformity and uniformity in animal groups, but little attention has been given to the role of negative frequency-dependent learning in impeding conformity and promoting diversity instead. Here, we show experimentally that under competitive conditions that are common in nature, social foragers (although capable of social learning) are likely to develop diversity in foraging specialization rather than uniformity. Naive house sparrows that were introduced into groups of foraging specialists did not conform to the behaviour of the specialists, but rather learned to use the alternative food-related cues, thus forming groups of complementary specialists. We further show that individuals in such groups may forage more effectively in diverse environments. Our results suggest that when the benefit from socially acquired skills diminishes through competition in a negative frequency-dependent manner, animal societies will become behaviourally diverse rather than uniform.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.1259>

J. S. MARTIN et al – Harsh environments promote alloparental care across human societies

Alloparental care is central to human life history, which integrates exceptionally short interbirth intervals and large birth size with an extended period of juvenile dependency and increased longevity. Formal models, previous comparative research, and palaeoanthropological evidence suggest that humans evolved higher levels of cooperative childcare in response to increasingly harsh environments. Although this hypothesis remains difficult to test directly, the relative importance of alloparental care varies across human societies, providing an opportunity to assess how local social and ecological factors influence the expression of this behaviour. We therefore, investigated associations between alloparental infant care and socioecology across 141 non-industrialized societies. We predicted increased alloparental care in harsher environments, due

to the fitness benefits of cooperation in response to shared ecological challenges. We also predicted that starvation would decrease alloparental care, due to prohibitive energetic costs. Using Bayesian phylogenetic multilevel models, we tested these predictions while accounting for potential confounds as well as for population history. Consistent with our hypotheses, we found increased alloparental infant care in regions characterized by both reduced climate predictability and relatively lower average temperatures and precipitation. We also observed reduced alloparental care under conditions of high starvation. These results provide evidence of plasticity in human alloparenting in response to ecological contexts, comparable to previously observed patterns across avian and mammalian cooperative breeders. This suggests convergent social evolutionary processes may underlie both inter- and intraspecific variation in alloparental care.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.0758>

MOHAMMAD A. IMRIT et al – Eusociality influences the strength of negative selection on insect genomes

While much of the focus of sociobiology concerns identifying genomic changes that influence social behaviour, we know little about the consequences of social behaviour on genome evolution. It has been hypothesized that social evolution can influence the strength of negative selection via two mechanisms. First, division of labour can influence the efficiency of negative selection in a caste-specific manner; indirect negative selection on worker traits is theoretically expected to be weaker than direct selection on queen traits. Second, increasing social complexity is expected to lead to relaxed negative selection because of its influence on effective population size. We tested these two hypotheses by estimating the strength of negative selection in honeybees, bumblebees, paper wasps, fire ants and six other insects that span the range of social complexity. We found no consistent evidence that negative selection was significantly stronger on queen-biased genes relative to worker-biased genes. However, we found strong evidence that increased social complexity reduced the efficiency of negative selection. Our study clearly illustrates how changes in behaviour can influence patterns of genome evolution by modulating the strength of natural selection.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.1512>

JOANA B. VIEIRA et al – Help or flight? Increased threat imminence promotes defensive helping in humans

In humans and other mammals, defensive responses to danger vary with threat imminence, but it is unknown how those responses affect decisions to help conspecifics. Here, we manipulated threat imminence to investigate the impact of different defensive states on human helping behaviour. Ninety-eight healthy adult participants made trial-by-trial decisions about whether to help a co-participant avoid an aversive shock, at the risk of receiving a shock themselves. Helping decisions were prompted under imminent or distal threat, based on temporal distance to the moment of shock administration to the co-participant. Results showed that, regardless of how likely participants were to also receive a shock, they helped the co-participant more under imminent than distal threat. Reaction times and cardiac changes during the task supported the efficacy of the threat imminence manipulation in eliciting dissociable defensive states, with faster responses and increased heart rate during imminent compared to distal threats. Individual differences in empathic concern were specifically correlated with helping during imminent threats. These results suggest that defensive states driving active escape from immediate danger may also facilitate decisions to help others, potentially by engaging neurocognitive systems implicated in caregiving across mammals.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.1473>

Royal Society Open Science

PAPERS

PATRICK J. TKACZYNSKI et al with CATHERINE CROCKFORD – Long-term repeatability in social behaviour suggests stable social phenotypes in wild chimpanzees

Consistent individual differences in social phenotypes have been observed in many animal species. Changes in demographics, dominance hierarchies or ecological factors, such as food availability or disease prevalence, are expected to influence decision-making processes regarding social interactions. Therefore, it should be expected that individuals show flexibility rather than stability in social behaviour over time to maximize the fitness benefits of social living. Understanding the processes that create and maintain social phenotypes requires data encompassing a range of socioecological settings and variation in intrinsic state or life-history stage or strategy. Using observational data spanning up to 19 years for some individuals, we demonstrate that multiple types of social behaviour are repeatable over the long term in wild chimpanzees, a long-lived species with complex fission–fusion societies. We controlled for temporal, ecological and demographic changes, limiting pseudo-repeatability. We conclude that chimpanzees living in natural ecological settings have relatively stable long-term social phenotypes over years that may be independent of life-history or reproductive strategies. Our results add to the growing body of the literature suggesting consistent individual differences in social tendencies are more likely the rule rather than the exception in group-living animals.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.200454>

HIROMU ITO & JUN TANIMOTO – Dynamic utility: the sixth reciprocity mechanism for the evolution of cooperation

Game theory has been extensively applied to elucidate the evolutionary mechanism of cooperative behaviour. Dilemmas in game theory are important elements that disturb the promotion of cooperation. An important question is how to escape from dilemmas. Recently, a dynamic utility function (DUF) that considers an individual's current status (wealth) and that can

be applied to game theory was developed. The DUF is different from the famous five reciprocity mechanisms called Nowak's five rules. Under the DUF, cooperation is promoted by poor players in the chicken game, with no changes in the prisoner's dilemma and stag-hunt games. In this paper, by comparing the strengths of the two dilemmas, we show that the DUF is a novel reciprocity mechanism (sixth rule) that differs from Nowak's five rules. We also show the difference in dilemma relaxation between dynamic game theory and (traditional) static game theory when the DUF and one of the five rules are combined. Our results indicate that poor players unequivocally promote cooperation in any dynamic game. Unlike conventional rules that have to be brought into game settings, this sixth rule is universally (canonical form) applicable to any game because all repeated/evolutionary games are dynamic in principle.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.200891>

EMIEL CRACCO et al – Cultural pressure and biased responding in free will attitudes

Whether you believe free will exists has profound effects on your behaviour, across different levels of processing, from simple motor action to social cognition. It is therefore important to understand which specific lay theories are held in the general public and why. Past research largely focused on investigating free will beliefs (FWB, 'Do you think free will exists?'), but largely ignored a second key aspect: free will attitudes (FWA, 'Do you like/value will?'). Attitudes are often independently predictive of behaviour, relative to beliefs, yet we currently know very little about FWAs in the general public. One key issue is whether such attitudes are subject to biased, socially desirable responding. The vast majority of the general public strongly believes in the existence of free will, which might create cultural pressure to value free will positively as well. In this registered report, we used a very large (N = 1100), open available dataset measuring implicit and explicit attitudes towards free will and determinism to address this issue. Our results indicate that both explicit and implicit attitudes towards free will are more positive than attitudes towards determinism. We also show that people experience cultural pressure to value free will, and to devalue determinism. Yet, we found no strong evidence that this cultural pressure affected either implicit or explicit attitudes in this dataset.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.191824>

Trends in Cognitive Sciences

PAPERS

JAAN ARU, MOTOTAKA SUZUKI & MATTHEW E. LARKUM – Cellular Mechanisms of Conscious Processing

Recent breakthroughs in neurobiology indicate that the time is ripe to understand how cellular-level mechanisms are related to conscious experience. Here, we highlight the biophysical properties of pyramidal cells, which allow them to act as gates that control the evolution of global activation patterns. In conscious states, this cellular mechanism enables complex sustained dynamics within the thalamocortical system, whereas during unconscious states, such signal propagation is prohibited. We suggest that the hallmark of conscious processing is the flexible integration of bottom-up and top-down data streams at the cellular level. This cellular integration mechanism provides the foundation for Dendritic Information Theory, a novel neurobiological theory of consciousness.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(20\)30175-3?dgcid=raven_jbs_aip_email](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(20)30175-3?dgcid=raven_jbs_aip_email)

COMMENTARIES

FUMIHIRO KANO, JOSEP CALL & CHRISTOPHER KRUPENYE – Primates Pass Dynamically Social Anticipatory-Looking False-Belief Tests

Three recent studies, inspired by seminal work with human infants, have shown that non-human apes and macaques pass anticipatory-looking (AL) false-belief (FB) tests. These results raise the possibility that both apes and monkeys understand that others' actions are driven not by reality but by beliefs about reality, even when those beliefs are false. In response, Horschler et al. argued that these findings 'should be interpreted cautiously due to methodological and theoretical challenges paralleling trends in the human literature.' We agree that continued work is necessary to identify factors that influence reproducibility of AL paradigms and also to specify the mechanisms and functions of the observed behaviors in primates. However, inferences from the human literature should be made with caution because key non-human results have largely been replicated and extended across different groups and species, so far providing a different picture from more variably replicable human studies. Moreover, non-human studies retain only the conceptual design of human paradigms with various improvements and optimization for non-human primates. What we see as the more pressing – but potentially interwoven – matter is resolving discrepancies among comparative findings: apes and monkeys have passed AL-FB tests (visually anticipating that an agent would search for an object where she falsely believed it to be), but monkeys have not succeeded in violation-of-expectation (VoE) FB paradigms (they do not look longer when an agent's search is inconsistent with her FBs). Here, we spotlight crucial methodological differences that may explain the unique success of non-human AL paradigms. In concluding, we discuss adaptive significance and future directions.

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DANIEL J. HORSCHLER, EVAN L. MACLEAN & LAURIE R. SANTOS – Advancing Gaze-Based Research on Primate Theory of Mind

In Horschler et al., we reviewed three new anticipatory looking (AL) studies of false belief (FB) representation in non-human primates (hereafter primates) in relation to similar studies in humans. We concluded that AL evidence of belief

representation in primates should be interpreted cautiously due to challenges shared with the human literature, as well as a large body of work previously suggesting that primates do not represent others' beliefs. In response, Kano, Call, and Krupenye argue that comparative AL studies have been more replicable in primates than in humans, that resolving discrepant findings between AL and violation of expectation (VoE) paradigms should be prioritized, and that issues related to ecological validity may partially explain the lack of evidence for belief representation in previous comparative work. In this article, we address these three points, ultimately emphasizing our agreement on the powerful potential of gaze-based measures in theory of mind research.

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