

EAORC BULLETIN 1,035 – 16 April 2023

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NOTICES

PUBLICATION ALERTS

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

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

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

EDITORIAL INTERJECTIONS

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

PUBLICATION ALERT – John J. Shea (2023) *The Unstoppable Human Species*

JOHN J. SHEA (2023) *The Unstoppable Human Species: The Emergence of Homo Sapiens in Prehistory*. Cambridge University Press, New York. ISBN: 9781108452984.

In *The Unstoppable Human Species* John Shea explains how the earliest humans achieved mastery over all but the most severe, biosphere-level, extinction threats. He explores how and why we humans owe our survival skills to our global geographic range, a diaspora that was achieved during prehistoric times. By developing and integrating a suite of Ancestral Survival Skills, humans overcame survival challenges better than other hominins, and settled in previously unoccupied habitats. But how did they do it? How did early humans endure long enough to become our ancestors? Shea places 'how did they survive?' questions front and centre in prehistory. Using an explicitly scientific, comparative, and hypothesis-testing

approach, *The Unstoppable Human Species* critically examines much 'archaeological mythology' about prehistoric humans. Written in clear and engaging language, Shea's volume offers an original and thought-provoking perspective on human evolution. Moving beyond unproductive archaeological debates about prehistoric population movements, *The Unstoppable Human Species* generates new and interesting questions about human evolution.

<https://www.cambridge.org/gb/academic/subjects/archaeology/prehistory/unstoppable-human-species-emergence-homo-sapiens-prehistory>

ACADEMIA.EDU – Knapping skill acquisition & reproduction of Late Acheulean handaxe morphology

In Journal of Archaeological Science: Reports 49, 103974 (2023)

CHENG LIU, NADA KHREISHEH, DIETRICH STOUT & JUSTIN PARGETER – Differential effects of knapping skill acquisition on the cultural reproduction of Late Acheulean handaxe morphology: Archaeological and experimental Insights

Despite the extensive literature focusing on Acheulean handaxes, especially the sources and meaning of their morphological variability, many aspects of this topic remain elusive. Archaeologists cite several factors that contribute to handaxe morphological variability, including knapping skill and mental templates. Integrating these two lines of literature into a broader theoretical framework of cultural reproduction, here we present new results from a multidisciplinary study of Late Acheulean handaxe-making skill acquisition involving thirty naïve participants trained for up to 90 h in Late Acheulean style handaxe production and three expert knappers. We compare the experimental handaxe shapes to the Late Acheulean handaxe assemblage from Boxgrove, UK. Through the principal component analysis of morphometric data derived from images, our study suggested that knapping skill acquisition has a differential effect on the cultural reproduction of different aspects of handaxe morphology. More specifically, compared with elongation and pointedness (PC2), cross-sectional thinning (PC1) is more constrained by knapping skill. Our findings thus shed new light on how skill learning can bias the cultural reproduction of artifact morphology.

https://www.academia.edu/99986941/Differential_effects_of_knapping_skill_acquisition_on_the_cultural_reproduction_of_Late_Acheulean_handaxe_morphology_Archaeological_and_experimental_insights

RESEARCHGATE – Children's syntax is supported by different brain areas at ages 3 & 4

In Cerebral Cortex, bhac430, https://doi.org/10.1093/cercor/bhac430 (2022).

CHESLIE C. KLEIN et al with ANGELA D. FRIEDERICI – Children's syntax is supported by the maturation of BA44 at 4 years, but of the posterior STS at 3 years of age

Within the first years of life, children learn major aspects of their native language. However, the ability to process complex sentence structures, a core faculty in human language called syntax, emerges only slowly. A milestone in syntax acquisition is reached around the age of 4 years, when children learn a variety of syntactic concepts. Here, we ask which maturational changes in the child's brain underlie the emergence of syntactically complex sentence processing around this critical age. We relate markers of cortical brain maturation to 3- and 4-year-olds' sentence processing in contrast to other language abilities. Our results show that distinct cortical brain areas support sentence processing in the two age groups. Sentence production abilities at 3 years were associated with increased surface area in the most posterior part of the left superior temporal sulcus, whereas 4-year-olds showed an association with cortical thickness in the left posterior part of Broca's area, i.e. BA44. The present findings suggest that sentence processing abilities rely on the maturation of distinct cortical regions in 3- compared to 4-year-olds. The observed shift to more mature regions involved in processing syntactically complex sentences may underlie behavioral milestones in syntax acquisition at around 4 years.

https://www.researchgate.net/publication/363716265_Children%27s_syntax_is_supported_by_the_maturation_of_BA44_at_4_years_but_of_the_posterior_STS_at_3_years_of_age

RESEARCHGATE – Prosody contributes to neurophysiological responses previously attributed to grammar

In Scientific Reports 12, 14759 (2022).

ANASTASIAGLUSHKO, DAVID POEPEL & KARSTEN STEINHAEUER – Overt and implicit prosody contribute to neurophysiological responses previously attributed to grammatical processing

Recent neurophysiological research suggests that slow cortical activity tracks hierarchical syntactic structure during online sentence processing. Here we tested an alternative hypothesis: electrophysiological activity peaks at constituent phrase as well as sentence frequencies reflect cortical tracking of overt or covert (implicit) prosodic grouping. Participants listened to series of sentences presented in three conditions while electroencephalography (EEG) was recorded. First, prosodic cues in the sentence materials were neutralized. We found an EEG spectral power peak elicited at a frequency that only 'tagged' covert, implicit prosodic change, but not any major syntactic constituents. In the second condition, participants listened to a series of sentences with overt prosodic grouping cues that either aligned or misaligned with the syntactic phrasing in the sentences (initial overt prosody trials). Following each overt prosody trial, participants were presented with a second series of sentences lacking overt prosodic cues (instructed prosody trial) and were instructed to imagine the prosodic contour present in the previous, overt prosody trial. The EEG responses reflected an interactive relationship between syntactic processing and prosodic tracking at the frequencies of syntactic constituents (sentences and phrases): alignment of syntax

and prosody boosted EEG responses, whereas their misalignment had an opposite effect. This was true for both overt and imagined prosody conditions. We conclude that processing of both overt and covert prosody is reflected in the frequency-tagged neural responses at sentence constituent frequencies. These findings need to be incorporated in any account that aims to identify neural markers reflecting syntactic processing.

https://www.researchgate.net/publication/363118674_Overt_and_implicit_prosody_contribute_to_neurophysiological_responses_previously_attributed_to_grammatical_processing

LECTURE ALERT – Pragmatics: Language, Animal Communication, and ‘Protolanguage’

Speaker: Prof Dorit Bar-On (University of Connecticut)
 Title: Pragmatics: Language, Animal Communication, and ‘Protolanguage’
 Date and time: Tuesday 6th June 2023 – 4:00pm (UK Time)
 Location: Room B01, Chandler House, 2 Wakefield St., London, WC1N 1PF
 Abstract: TBC.

NEWS

NATURE BRIEFING – Crazy ants have the strangest genomes

Male yellow crazy ants (*Anoplolepis gracilipes*) are all chimaeras: they are composed of two warring cell lineages with two entirely different sets of genomes. Usually, an organism’s cells all carry the same genes. In yellow crazy ants, some cells carry only maternal and others only paternal genetic material. “It’s a piece of biology that’s unparalleled as far as we know,” says biologist Daniel Kronauer. Chimerism can happen by accident in other animals, but the ants are the first known animal for which this property is an essential aspect of life — although it’s not clear why.

<https://nature.us17.list-manage.com/track/click?u=2c6057c528fdc6f73fa196d9d&id=e9d10e4c3d&e=1db4b9a19b>

SOCIETY FOR SCIENCE – How ChatGPT and similar AI will disrupt education

The new chatbot ChatGPT and other generative AI encourage cheating and offer up incorrect info, but they could also be used for good.

<https://www.sciencenews.org/article/chatgpt-ai-artificial-intelligence-education-cheating-accuracy>

THE CONVERSATION – Great apes like to spin themselves dizzy, a lot like children do

Orangutans, gorillas and chimpanzees seem to enjoy the buzz of getting dizzy.

<https://theconversationuk.cmail19.com/t/r-l-ttqhjjd-khhlilahh-s/>

PUBLICATIONS

Current Biology

ARTICLES

DANIEL WEGMANN & RAPHAEL ECKEL – Human evolution: When admixture met selection

Admixture has been a major force during human evolution. Two new studies using ancient DNA now show how two key admixture events in the evolutionary history of Europeans altered their adaptive trajectories and facilitated rapid evolution.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00267-1](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00267-1)

ALISON J. BARKER – Acoustic communication: Deer mice join the chorus

A new study has identified two distinct pup vocalizations in deer mice, showing that discrete genetic loci explain the acoustic variation between these two call types and that the calls elicit different levels of maternal responsiveness.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00160-4](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00160-4)

WOUTER VAN DER BIJL & JUDITH E. MANK – Sexual selection: Changing the definition of the fittest

Sexual selection has long been known to produce rapid evolution of spectacular traits. A new study reveals how sexual selection can also rapidly reshape the genome.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00264-6](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00264-6)

PAPERS

NICHOLAS JOURJINE et al – Two pup vocalization types are genetically and functionally separable in deer mice

Vocalization is a widespread social behavior in vertebrates that can affect fitness in the wild. Although many vocal behaviors are highly conserved, heritable features of specific vocalization types can vary both within and between species, raising the questions of why and how some vocal behaviors evolve. Here, using new computational tools to automatically detect and cluster vocalizations into distinct acoustic categories, we compare pup isolation calls across neonatal development in eight taxa of deer mice (genus *Peromyscus*) and compare them with laboratory mice (C57BL6/J strain) and free-living, wild house

mice (*Mus musculus domesticus*). Whereas both *Peromyscus* and *Mus* pups produce ultrasonic vocalizations (USVs), *Peromyscus* pups also produce a second call type with acoustic features, temporal rhythms, and developmental trajectories that are distinct from those of USVs. In deer mice, these lower frequency “cries” are predominantly emitted in postnatal days one through nine, whereas USVs are primarily made after day 9. Using playback assays, we show that cries result in a more rapid approach by *Peromyscus* mothers than USVs, suggesting a role for cries in eliciting parental care early in neonatal development. Using a genetic cross between two sister species of deer mice exhibiting large, innate differences in the acoustic structure of cries and USVs, we find that variation in vocalization rate, duration, and pitch displays different degrees of genetic dominance and that cry and USV features can be uncoupled in second-generation hybrids. Taken together, this work shows that vocal behavior can evolve quickly between closely related rodent species in which vocalization types, likely serving distinct functions in communication, are controlled by distinct genetic loci.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00185-9](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00185-9)

DANA RUBI LEVY et al – Mouse spontaneous behavior reflects individual variation rather than estrous state

Behavior is shaped by both the internal state of an animal and its individual behavioral biases. Rhythmic variation in gonadal hormones during the estrous cycle is a defining feature of the female internal state, one that regulates many aspects of sociosexual behavior. However, it remains unclear whether estrous state influences spontaneous behavior and, if so, how these effects might relate to individual behavioral variation. Here, we address this question by longitudinally characterizing the open-field behavior of female mice across different phases of the estrous cycle, using unsupervised machine learning to decompose spontaneous behavior into its constituent elements. We find that each female mouse exhibits a characteristic pattern of exploration that uniquely identifies it as an individual across many experimental sessions; by contrast, estrous state only negligibly impacts behavior, despite its known effects on neural circuits that regulate action selection and movement. Like female mice, male mice exhibit individual-specific patterns of behavior in the open field; however, the exploratory behavior of males is significantly more variable than that expressed by females both within and across individuals. These findings suggest underlying functional stability to the circuits that support exploration in female mice, reveal a surprising degree of specificity in individual behavior, and provide empirical support for the inclusion of both sexes in experiments querying spontaneous behaviors.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00175-6](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00175-6)

MARGARET J. COUVILLON – The multi-modal extravaganza of honey bee dancing

Karl von Frisch, the Austrian ethologist who is best known for his Nobel-prize winning discovery of the honey bee waggle dance, once said “The bee’s life is like a magic well: the more you draw from it, the more it fills with water.” For decades, bee scientists, including myself, have felt the thrill of this seemingly endless, magical source that has piqued our curiosity, but it has sometimes been difficult to take a step back long enough to reconsider the well itself — is it perhaps in need of its own renovation? This is the setting for *Communication Between Honeybees: More than Just a Dance in the Dark*, where Jürgen Tautz lays out his framework for understanding the honey bee waggle dance, one of the most celebrated examples of animal communication. By tracing the history of what we know about bee communication and how we know it, Tautz recharacterizes the dance itself, underscoring that information transfer actually does not end when the dancer and nestmate recruit part ways on the dance floor, but instead continues outside the hive through a woven tapestry of environmental cues and social signals. Importantly, Tautz does not dispute that the waggle dance is a real and significant phenomenon, where a successful forager communicates the distance and direction from the hive to a resource, usually nectar or pollen. Instead, he describes how this canonical explanation is better understood as an imprecise half-truth, where the strict parroting of “a dancer communicates a distance and direction” obscures the importance of other, legitimate aspects of the process.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00196-3](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00196-3)

eLife

PAPERS

XINZHU WEI et al with DAVID REICH & SRIRAM SANKARARAMAN – The lingering effects of Neanderthal introgression on human complex traits

The genetic variants introduced into the ancestors of modern humans from interbreeding with Neanderthals have been suggested to contribute an unexpected extent to complex human traits. However, testing this hypothesis has been challenging due to the idiosyncratic population genetic properties of introgressed variants. We developed rigorous methods to assess the contribution of introgressed Neanderthal variants to heritable trait variation and applied these methods to analyze 235,592 introgressed Neanderthal variants and 96 distinct phenotypes measured in about 300,000 unrelated white British individuals in the UK Biobank. Introgressed Neanderthal variants make a significant contribution to trait variation (explaining 0.12% of trait variation on average). However, the contribution of introgressed variants tends to be significantly depleted relative to modern human variants matched for allele frequency and linkage disequilibrium (about 59% depletion on average), consistent with purifying selection on introgressed variants. Different from previous studies (McArthur et al., 2021), we find no evidence for elevated heritability across the phenotypes examined. We identified 348 independent significant associations of introgressed Neanderthal variants with 64 phenotypes. Previous work (Skov et al., 2020) has suggested that a majority of such associations are likely driven by statistical association with nearby modern human variants

that are the true causal variants. Applying a customized fine-mapping led us to identify 112 regions across 47 phenotypes containing 4303 unique genetic variants where introgressed variants are highly likely to have a phenotypic effect. Examination of these variants reveals their substantial impact on genes that are important for the immune system, development, and metabolism.

<https://elifesciences.org/articles/80757>

Evolutionary Anthropology

PAPERS

CHENG LIU & DIETRICH STOUT – Inferring cultural reproduction from lithic data: A critical review

The cultural reproduction of lithic technology, long an implicit assumption of archaeological theories, has garnered increasing attention over the past decades. Major debates ranging from the origins of the human culture capacity to the interpretation of spatiotemporal patterning now make explicit reference to social learning mechanisms and cultural evolutionary dynamics. This burgeoning literature has produced important insights and methodological innovations. However, this rapid growth has sometimes led to confusion and controversy due to an under-examination of underlying theoretical and methodological assumptions. The time is thus ripe for a critical assessment of progress in the study of the cultural reproduction of lithic technology. Here we review recent work addressing the evolutionary origins of human culture and the meaning of artifact variation at both intrasite and intersite levels. We propose that further progress will require a more extended and context-specific evolutionary approach to address the complexity of real-world cultural reproduction.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/evan.21964>

Frontiers for Young Minds

PAPERS

INBAL ARNON – Starting Big: Why Is Learning a Language Harder for Adults Than for Children?

All normally developing babies learn to speak. For most adults, however, it is hard to learn a new language, even though adults have more knowledge and more developed brains than children have. My research suggests that part of the advantage children have when it comes to learning a language is related to what they do not know: it may be easier for babies to learn a language because they do not know as much about words as adults do! When babies learn language, they need to discover what words are: they learn both individual words and also “chunks” of language that go together, like “time-for-bed.” Because adults already know what a word is, they focus on learning new words when learning a new language, and pay less attention to the sequences. This makes it more difficult for them to learn the connections between words. In this article, I will explain how knowledge of words can explain some of the differences in learning a first and second language, and how our findings can help with learning a second language.

<https://kids.frontiersin.org/articles/10.3389/frym.2023.1011546>

Interface Focus

PAPERS

DAVID C. KRAKAUER – Symmetry–simplicity, broken symmetry–complexity

Complex phenomena are made possible when: (i) fundamental physical symmetries are broken and (ii) from the set of broken symmetries historically selected ground states are applied to performing mechanical work and storing adaptive information. Over the course of several decades Philip Anderson enumerated several key principles that can follow from broken symmetry in complex systems. These include emergence, frustrated random functions, autonomy and generalized rigidity. I describe these as the four Anderson Principles all of which are preconditions for the emergence of evolved function. I summarize these ideas and discuss briefly recent extensions that engage with the related concept of functional symmetry breaking, inclusive of information, computation and causality.

<https://royalsocietypublishing.org/doi/10.1098/rsfs.2022.0075>

GEORG NORTHOFF et al – As without, so within: how the brain's temporo-spatial alignment to the environment shapes consciousness

Consciousness is constituted by a structure that includes contents as foreground and the environment as background. This structural relation between the experiential foreground and background presupposes a relationship between the brain and the environment, often neglected in theories of consciousness. The temporo-spatial theory of consciousness addresses the brain–environment relation by a concept labelled ‘temporo-spatial alignment’. Briefly, temporo-spatial alignment refers to the brain's neuronal activity's interaction with and adaption to interoceptive bodily and exteroceptive environmental stimuli, including their symmetry as key for consciousness. Combining theory and empirical data, this article attempts to demonstrate the yet unclear neuro-phenomenal mechanisms of temporo-spatial alignment. First, we suggest three neuronal layers of the brain's temporo-spatial alignment to the environment. These neuronal layers span across a continuum from longer to shorter timescales. (i) The background layer comprises longer and more powerful timescales mediating topographic-dynamic similarities between different subjects' brains. (ii) The intermediate layer includes a mixture of medium-scaled timescales allowing for stochastic matching between environmental inputs and neuronal activity through the

brain's intrinsic neuronal timescales and temporal receptive windows. (iii) The foreground layer comprises shorter and less powerful timescales for neuronal entrainment of stimuli temporal onset through neuronal phase shifting and resetting. Second, we elaborate on how the three neuronal layers of temporo-spatial alignment correspond to their respective phenomenal layers of consciousness. (i) The inter-subjectively shared contextual background of consciousness. (ii) An intermediate layer that mediates the relationship between different contents of consciousness. (iii) A foreground layer that includes specific fast-changing contents of consciousness. Overall, temporo-spatial alignment may provide a mechanism whose different neuronal layers modulate corresponding phenomenal layers of consciousness. Temporo-spatial alignment can provide a bridging principle for linking physical-energetic (free energy), dynamic (symmetry), neuronal (three layers of distinct time–space scales) and phenomenal (form featured by background–intermediate–foreground) mechanisms of consciousness.

<https://royalsocietypublishing.org/doi/10.1098/rsfs.2022.0076>

JENANN ISMAEL – Reflections on the asymmetry of causation

The most immediately salient asymmetry in our experience of the world is the asymmetry of causation. In the last few decades, two developments have shed new light on the asymmetry of causation: clarity in the foundations of statistical mechanics, and the development of the interventionist conception of causation. In this paper, we ask what is the status of the causal arrow, assuming a thermodynamic gradient and the interventionist account of causation? We find that there is an objective asymmetry rooted in the thermodynamic gradient that underwrites the causal asymmetry: along a thermodynamic gradient, interventionist causal pathways—scaffolded intervention-supporting probabilistic relationships between variables—will propagate influence into the future, but not into the past. The reason is that the present macrostate of the world, in the presence of a low entropy boundary condition, will screen off probabilistic correlations to the past. The asymmetry, however, emerges only under the macroscopic coarse-graining and that raises the question of whether the arrow is simply an artefact of the macroscopic lenses through which we see the world. The question is sharpened and an answer proposed.

<https://royalsocietypublishing.org/doi/10.1098/rsfs.2022.0081>

MARCO MÖLLER & DANIEL POLANI – Emergence of common concepts, symmetries and conformity in agent groups—an information-theoretic model

The paper studies principles behind structured, especially symmetric, representations through enforced inter-agent conformity. For this, we consider agents in a simple environment who extract individual representations of this environment through an information maximization principle. The representations obtained by different agents differ in general to some extent from each other. This gives rise to ambiguities in how the environment is represented by the different agents. Using a variant of the information bottleneck principle, we extract a ‘common conceptualization’ of the world for this group of agents. It turns out that the common conceptualization appears to capture much higher regularities or symmetries of the environment than the individual representations. We further formalize the notion of identifying symmetries in the environment both with respect to ‘extrinsic’ (birds-eye) operations on the environment as well as with respect to ‘intrinsic’ operations, i.e. subjective operations corresponding to the reconfiguration of the agent’s embodiment. Remarkably, using the latter formalism, one can re-wire an agent to conform to the highly symmetric common conceptualization to a much higher degree than an unrefined agent; and that, without having to re-optimize the agent from scratch. In other words, one can ‘re-educate’ an agent to conform to the de-individualized ‘concept’ of the agent group with comparatively little effort.

<https://royalsocietypublishing.org/doi/10.1098/rsfs.2023.0006>

iScience

PAPERS

DEBOTTAM BHATTACHARJEE et al – Prosociality in a despotic society

Prosociality is an intent to improve others’ well-being. Existing hypotheses postulate that enhanced social tolerance and inter-individual dependence may facilitate prosocial preferences, which may favor the evolution of altruism. While most studies are restricted to ‘tolerant’ (cooperatively breeding and self-domesticated) species, despotic societies provide an alternative opportunity to investigate prosociality due to nepotism and ample inter-individual dependencies. Japanese macaques live in hierarchical matrilineal societies, with strong kin bonds. Besides, tolerance among non-kin may persist through reciprocity. Using a group service food-provision paradigm, we found prosocial preferences in a semi free-ranging group of Japanese macaques. The extent of provisioning was at levels comparable to tolerant species. Dyadic tolerance predicted the likelihood and magnitude of provisioning, while kinship predicted the magnitude. We emphasize the role of a complex socio-ecology fostering individual prosocial tendencies through kinship and tolerance. These findings necessitate a framework including different forms of interdependence beyond the generally tolerant species.

[https://www.cell.com/iscience/fulltext/S2589-0042\(23\)00664-8](https://www.cell.com/iscience/fulltext/S2589-0042(23)00664-8)

Language Sciences

PAPERS

KEN HIRSCHKOP – Inference and indexicality, or how to solve Bakhtin's problem with heteroglossia

Bakhtin's concept of heteroglossia was ambiguous on a central point: whether the styles or socio-ideological languages that constituted it were creations of novelistic discourse itself or were already established in everyday speech and incorporated into the novel. The sociolinguistic and anthropological literature on indexicality has greatly enriched our understanding of heteroglossia, but, it, too, leaves this question up in the air. After a brief review of writing on indexicality, we show that the idea of 'n + 1', higher-order, indexicality, first mooted by Silverstein, intersects with debates in analytic philosophy of language about the relative roles of inference and semiosis in linguistic understanding. Higher-order indexicality, crucially, depends upon inferential processes, ranging from simple analogy to complex argument, and this has consequences for where indexical values are established.

<https://www.sciencedirect.com/science/article/pii/S0388000123000098>

PETER E. JONES & CATHERINE READ – Mythbusters united? A dialogue over Harris's integrationist linguistics and Gibson's Ecological Psychology

In this paper an integrationist linguist (Peter E Jones) and an Ecological Psychologist (Catherine Read) open a dialogue on the possibility of a productive relationship between the integrationist approach to language and communication of Roy Harris and James Gibson's Ecological Psychology of perceiving/acting/knowing. Within their own disciplinary contexts, each position is one of profound critique and innovation in relation to established and pervasive 'myths'. Specifically, Harris is concerned with the 'language myth'—the explicit positions and implicit assumptions in the Western language tradition (including modern linguistics) about the nature of language and the relationship between language and communication. In sharp contrast to mainstream approaches, Harris rejects both coding and representational views of meaning and takes signs (including linguistic signs) to be the product, rather than the precondition, of communicational activity. Similarly, Gibson critiques assumptions about how perception takes place, especially in the case of vision, that have informed Western science at least since Descartes' Optics. In particular, Gibson rejects the passive 'retinal image fallacy' of seeing in favour of an activity based non-representational perspective of 'direct perception'. The paper offers a critical dialogue over the key theoretical perspectives of both traditions, focusing particularly on the import and implications of each theorist's claims and assumptions about the other's field. Highlighting key areas of apparent common ground across the two approaches, we also argue that Gibson appears not to be entirely free of assumptions about language that belong to Harris's 'language myth', while Harris appears at times to assume the 'image' based model of perception that Gibson rejected. In the context of current interest in a possible reconciliation or combination of integrational linguistics and Ecological Psychology, the paper, therefore, raises fundamental questions around the extent to which these independently developed programmes of demythologization are compatible or possibly synergistic.

<https://www.sciencedirect.com/science/article/pii/S0388000123000013>

CAMILA ALVIAR, CHRISTOPHER T. KELLO & RICK DALE – Multimodal coordination and pragmatic modes in conversation

Language is intrinsically multimodal. Speakers use gestures, prosody, gaze, and facial expressions as cues that complement and expand the meaning expressed in their words. These varied signals operate in remarkably flexible coordination, constantly adapting to the conversational partners and topics as they change over time. We argue that an ecological approach to multimodal behavior offers a promising account of natural conversation as it takes place both in experimental contexts, and in natural ones outside the lab. After reviewing major historical themes in the study of language and communication, we describe how this ecological perspective situates future work, especially work that seeks to quantify these processes. We describe a quantitative hypothesis that multimodal signals are projected on manifolds of lower dimension that can be described in terms of dynamical systems. We refer to these lower dimensional patterns as "pragmatic modes," and compare this idea to a number of prior theoretical proposals. We describe how the notion of pragmatic mode frames a quantitative basis to supplement and extend prior research with explicitly quantitative goals. The paper concludes with an outline to link quantitative descriptions of multimodality with more abstract, qualitative theories of the past few decades, and describe how future research might explore pragmatic modes, how they change over the course of conversation, and relate to our understanding of human communication.

<https://www.sciencedirect.com/science/article/abs/pii/S038800012200064X>

Nature Ecology & Evolution

ARTICLES

ALEXA MCKAY – Cetacean cooperation

In southern Brazil, artisanal fishers and bottlenose dolphins cooperate to catch mullet fish. Cantor and colleagues, writing in Proceedings of the National Academy of Sciences USA, show that this rare case of human–wildlife cooperation is at risk owing to declining prey populations and subsequent changes in the behaviour of both predators. Fishers engaging in cooperation respond to changes in the behaviour of the dolphins; casting their nets at the precise moments at which the

diving behaviour of the dolphins changes increases the likelihood of success and the total amount of fish captured. Reciprocally, 98% of experienced fishers report that dolphins obtain additional fish during the interaction. Capture–recapture data also suggest a survival benefit in the long term, with cooperative dolphins being 13% more likely to survive than the non-cooperative dolphins. Despite the mutual benefits, over the past two decades human–dolphin cooperation has declined in frequency. Evidence suggests that declining mullet populations reduce the benefits of engaging in cooperation, prompting dolphins and fishers to abandon this tactic; as a result, dolphins have increasingly been caught in more-invasive illegal fishing gear. A simulation model shows that two actions — incentivizing fishers to maintain interactions with dolphins and enforcing the removal of harmful fishing gear — could prevent this mutualism from becoming ‘extinct’ in coming decades.

<https://www.nature.com/articles/s41559-023-02005-z>

PAPERS

BERYL M. JONES et al – Convergent and complementary selection shaped gains and losses of eusociality in sweat bees

Sweat bees have repeatedly gained and lost eusociality, a transition from individual to group reproduction. Here we generate chromosome-length genome assemblies for 17 species and identify genomic signatures of evolutionary trade-offs associated with transitions between social and solitary living. Both young genes and regulatory regions show enrichment for these molecular patterns. We also identify loci that show evidence of complementary signals of positive and relaxed selection linked specifically to the convergent gains and losses of eusociality in sweat bees. This includes two pleiotropic proteins that bind and transport juvenile hormone (JH)—a key regulator of insect development and reproduction. We find that one of these proteins is primarily expressed in subperineurial glial cells that form the insect blood–brain barrier and that brain levels of JH vary by sociality. Our findings are consistent with a role of JH in modulating social behaviour and suggest that eusocial evolution was facilitated by alteration of the proteins that bind and transport JH, revealing how an ancestral developmental hormone may have been co-opted during one of life’s major transitions. More broadly, our results highlight how evolutionary trade-offs have structured the molecular basis of eusociality in these bees and demonstrate how both directional selection and release from constraint can shape trait evolution.

<https://www.nature.com/articles/s41559-023-02001-3>

Nature Scientific Reports

PAPERS

WELMER E. MOLENMAKER et al with CARSTEN K. W. DE DREU – Discriminatory punishment undermines the enforcement of group cooperation

Peer punishment can help groups to establish collectively beneficial public goods. However, when humans condition punishment on other factors than poor contribution, punishment can become ineffective and group cooperation deteriorates. Here we show that this happens in pluriform groups where members have different socio-demographic characteristics. In our public good provision experiment, participants were confronted with a public good from which all group members benefitted equally, and in-between rounds they could punish each other. Groups were uniform (members shared the same academic background) or pluriform (half the members shared the same academic background, and the other half shared another background). We show that punishment effectively enforced cooperation in uniform groups where punishment was conditioned on poor contribution. In pluriform groups, punishment was conditioned on poor contribution too, but also partially on others’ social-demographic characteristics—dissimilar others were punished more than similar others regardless of their contribution. As a result, punishment lost its effectiveness in deterring free-riding and maintaining public good provision. Follow-up experiments indicated that such discriminatory punishment was used to demarcate and reinforce subgroup boundaries. This work reveals that peer punishment fails to enforce cooperation in groups with a pluriform structure, which is rule rather than exception in contemporary societies.

<https://www.nature.com/articles/s41598-023-33167-2>

MOHAMMAD ATARI et al – The paucity of morality in everyday talk

Given its centrality in scholarly and popular discourse, morality should be expected to figure prominently in everyday talk. We test this expectation by examining the frequency of moral content in three contexts, using three methods: (a) Participants’ subjective frequency estimates (N = 581); (b) Human content analysis of unobtrusively recorded in-person interactions (N = 542 participants; n = 50,961 observations); and (c) Computational content analysis of Facebook posts (N = 3822 participants; n = 111,886 observations). In their self-reports, participants estimated that 21.5% of their interactions touched on morality (Study 1), but objectively, only 4.7% of recorded conversational samples (Study 2) and 2.2% of Facebook posts (Study 3) contained moral content. Collectively, these findings suggest that morality may be far less prominent in everyday life than scholarly and popular discourse, and laypeople, presume.

<https://www.nature.com/articles/s41598-023-32711-4>

M^a ÁNGELES MEDINA-ALCAIDE et al – 35,000 years of recurrent visits inside Nerja cave (Andalusia, Spain) based on charcoals and soot micro-layers analyses

Charcoal and micro-layers of soot trapped in speleothems from the inner galleries of Nerja Cave were analysed through an interdisciplinary study. The absolute dating of the prehistoric subterranean activity of the cave and the identification of

different phases of visits to the deep parts are presented and discussed. The charcoal analysis includes anthracological analysis and SEM–EDX. The soot analysis includes optical microscopy, Raman spectroscopy and TEM–EDX, and the microcounting of soot microlayers. The ¹⁴C dating of 53 charcoals identified 12 phases of prehistoric visits to the cave between 41,218 and 3299 cal. BP, putting back the origin of human occupation of this emblematic cave by 10,000 years. The interdisciplinary analysis of the soot microlayers allowed us to perform a high-precision zoom on the last three visitation phases identified by Bayesian analysis (8003–2998 cal. BP.), demonstrating that these phases contain at least 64 distinct incursions, with an average of one visit every 35 years for the Neolithic period. Spatial analysis showed that not all areas of the cave were used in the same periods, highlighting the repetition of visits to certain specific sectors of the Lower Galleries of the cave. Lastly, the anthracological data indicate a cross-cultural and unique use of *Pinus tp. sylvestris-nigra* wood for lighting activities over an extended period between the Gravettian and Upper Magdalenian.

<https://www.nature.com/articles/s41598-023-32544-1>

New Scientist

NEWS

Bone fragment reveals humans wore leather clothes 39,000 years ago

A study of an ancient bone from Spain with a strange pattern of notches hints that it was used by early *Homo sapiens* in Europe as a punch board for making holes in leather.

<https://www.newscientist.com/article/2368783-bone-fragment-reveals-humans-wore-leather-clothes-39000-years-ago/>

PLoS One

PAPERS

GIJS VAN HOUWELINGEN & MARIUS VAN DIJKE – Investing to gain others' trust: Cognitive abstraction increases prosocial behavior and trust received from others

Being trusted has many positive implications for one's wellbeing (e.g., a better career, more satisfying interpersonal relationships). Scholars have suggested that people actively attempt to earn trust. However, it is not clear what makes people invest in actions that may earn them trust. We propose that cognitive abstraction (more than concreteness) facilitates seeing the long-term benefits of performing behaviors (i.e., prosocial behaviors) for gaining trust. We conducted a survey among employees and their supervisors and two yoked experiments—total N = 1098 or 549 pairs. In support of our claim, we find that cognitive abstraction leads to more prosocial behavior, which subsequently increases trust received. Furthermore, the effect of abstraction on the performance of prosocial behavior is limited to situations where such behavior can be observed by others (and thus be a basis for gaining observers' trust). Our research shows when and why people decide to act in ways that may gain them trust and clarifies how cognitive abstraction influences the display of prosocial behavior and the subsequent trust received from fellow organization members.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0284500>

SARAH WITT, SABINE SEEHAGEN & NORBERT ZMYJ – Stress affects the prediction of others' behavior

Predicting behavior of other people is vital for successful social interactions. We tested whether a stress-induced cortisol increase affects healthy young men's prediction of another individual's behavior. Forty-two participants were randomly assigned to a stress or to a control condition. Afterwards, they participated in a modified false-belief task that not only tests false-belief understanding but also the tendency to predict another person's future behavior based on his former behavior. Subjective ratings and salivary cortisol concentrations revealed a successful stress induction. Stress did not affect participants' attribution of false beliefs but it increased the probability to predict that a protagonist would act according to his former behavior. Recognizing that stress fosters the interpretation of others' behavior following their former behavior and not their current goals extends previous research showing that stress fosters our own habitual behavior.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0283782>

EKATERINA V. DORONICHEVA et al – Archaeological evidence for two culture diverse Neanderthal populations in the North Caucasus and contacts between them

Neanderthals were widespread during the Middle Palaeolithic (MP) across Europe and Asia, including the Caucasus Mountains. Occupying the border between eastern Europe and West Asia, the Caucasus is important region regarding the Neanderthal occupation of Eurasia. On current radiometric estimates, the MP is represented in the Caucasus between about 260–210 ka and about 40 ka. Archaeological record indicates that several culture diverse MP hominin populations inhabited the Caucasus, but the region complex population history during this period remains poorly understood. In this paper, we identify for the first time the archaeological evidence indicating contacts between two culture diverse MP Neanderthal populations in the North Caucasus and discuss the nature of these contacts. Basing on the lithic assemblages that we excavated at Mezmaiskaya cave in the north-western Caucasus (Kuban River basin) and Saradj-Chuko grotto in the north-central Caucasus (Terek River basin), dating from MIS 5 to MIS 3, and comparative data from other MP sites in the Caucasus, we identify two large cultural regions that existed during the late MP in the North Caucasus. The distinctive toolkits and stone knapping technologies indicate that the MP assemblages from Mezmaiskaya cave and other sites in the west of North

Caucasus represent a Caucasian variant of the Eastern Micoquian industry that was wide spread in central and eastern Europe, while the assemblages from Saradj-Chuko Grotto and other sites in the east of North Caucasus closely resemble the Zagros Mousterian industry that was wide spread in the Armenian Highlands, Lesser Caucasus and Zagros Mountains. The archaeological evidence implies that two culture diverse populations of Neanderthals settled the North Caucasus during the Late Pleistocene from two various source regions: from the Armenian Highlands and Lesser Caucasus along the Caspian Sea coast, and from Russian plain along the Sea of Azov coast.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0284093>

Science

PAPERS

LAURA M. MACLATCHY et al – The evolution of hominoid locomotor versatility: Evidence from Moroto, a 21 Ma site in Uganda

Inherent in traditional views of ape origins is the idea that, like living apes, early large-bodied apes lived in tropical forests. In response to constraints related to locomoting in forest canopies, it has been proposed that early apes evolved their quintessential upright torsos and acrobatic climbing and suspensory abilities, enhancing their locomotor versatility, to distribute their weight among small supports and thus reach ripe fruit in the terminal branches. This feeding and locomotor transition from a quadruped with a horizontal torso is thought to have occurred in the Middle Miocene due to an increasingly seasonal climate and feeding competition from evolving monkeys. Although ecological and behavioral comparisons among living apes and monkeys provide evidence for versions of terminal branch forest frugivory hypotheses, corroboration from the early ape fossil record has been lacking, as have detailed reconstructions of the habitats where the first apes evolved. The Early Miocene fossil site of Moroto II in Uganda provides a unique opportunity to test the predictions of terminal branch forest frugivory hypotheses. Moroto II documents the oldest [21 million years ago (Ma)] well-established paleontological record of ape teeth and postcranial bones from a single locality and preserves paleoecological proxies to reconstruct the environment. The following lines of evidence from Moroto II were analyzed: (i) the functional anatomy of femora and a vertebra attributed to the ape *Morotopithecus*; (ii) dental traits, including molar shape and isotopic profiles of *Morotopithecus* enamel; (iii) isotopic dietary paleoecology of associated fossil mammals; (iv) biogeochemical signals from paleosols (ancient soils) that reflect local relative proportions of C3 (trees and shrubs) and C4 (tropical grasses and sedges that can endure water stress) vegetation as well as rainfall; and (v) assemblages of phytoliths, microscopic plant-derived silica bodies that reflect past plant communities.

A short, strong femur biomechanically favorable to vertical climbing and a vertebra indicating a dorsostable lower back confirm that ape fossils from Moroto II shared locomotor traits with living apes. Both *Morotopithecus* and a smaller ape from the site have elongated molars with well-developed crests for shearing leaves. Carbon isotopic signatures of the enamel of these apes and of other fossil mammals indicate that some mammals consistently fed on water-stressed C3 plants, and possibly also C4 vegetation, in a woodland setting. Carbon isotope values of pedogenic carbonates, paleosol organic matter, and plant waxes all point to substantial C4 grass biomass on the landscape. Analysis of paleosols also indicates subhumid, strongly seasonal rainfall, and phytolith assemblages include forms from both arid-adapted C4 grasses and forest-indicator plants.

The ancient co-occurrence of dental specializations for leaf eating, rather than ripe fruit consumption, along with ape-like locomotor abilities counters the predictions of the terminal branch forest frugivory hypotheses. The combined paleoecological evidence situates *Morotopithecus* in a woodland with a broken canopy and substantial grass understory including C4 species. These findings call for a new paradigm for the evolutionary origins of early apes. We propose that seasonal, wooded environments may have exerted previously unrecognized selective pressures in the evolution of arboreal apes. For example, some apes may have needed to access leaves in the higher canopy in times of low fruit availability and to be adept at ascending and descending from trees that lacked a continuous canopy.

<https://www.science.org/doi/10.1126/science.abq2835>

DANIEL J. PEPPE et al – Oldest evidence of abundant C4 grasses and habitat heterogeneity in eastern Africa

The assembly of Africa's iconic C4 grassland ecosystems is central to evolutionary interpretations of many mammal lineages, including hominins. C4 grasses are thought to have become ecologically dominant in Africa only after 10 million years ago (Ma). However, paleobotanical records older than 10 Ma are sparse, limiting assessment of the timing and nature of C4 biomass expansion. This study uses a multiproxy design to document vegetation structure from nine Early Miocene mammal site complexes across eastern Africa. Results demonstrate that between ~21 and 16 Ma, C4 grasses were locally abundant, contributing to heterogeneous habitats ranging from forests to wooded grasslands. These data push back the oldest evidence of C4 grass-dominated habitats in Africa—and globally—by more than 10 million years, calling for revised paleoecological interpretations of mammalian evolution.

<https://www.science.org/doi/10.1126/science.abq2834>

REVIEWS

LARA FREIDENFELDS – Understanding the menstrual cycle

Review of 'Period: The Real Story of Menstruation' by Kate Clancy, Princeton University Press, 2023.

<https://www.science.org/doi/10.1126/science.adh0534>

Science Advances

PAPERS

ANNA MARTINEZ-ALVAREZ et al – Prosodic cues enhance infants' sensitivity to nonadjacent regularities

In language, grammatical dependencies often hold between items that are not immediately adjacent to each other. Acquiring these nonadjacent dependencies is crucial for learning grammar. However, there are potentially infinitely many dependencies in the language input. How does the infant brain solve this computational learning problem? Here, we demonstrate that while rudimentary sensitivity to nonadjacent regularities may be present relatively early, robust and reliable learning can only be achieved when convergent statistical and perceptual, specifically prosodic cues, are both present, helping the infant brain detect the building blocks that form a nonadjacent dependency. This study contributes to our understanding of the neural foundations of rule learning that pave the way for language acquisition.

<https://www.science.org/doi/full/10.1126/sciadv.ade4083>

Trends in Cognitive Sciences

PAPERS

DANIEL BALLIET & BJÖRN LINDSTRÖM – Inferences about interdependence shape cooperation

During social interactions in daily life, people possess imperfect knowledge of their interdependence (i.e., how behaviors affect each person's outcomes), and what people infer about their interdependence can shape their behaviors. We review theory and research that suggests people can infer their interdependence with others along several dimensions, including mutual dependence, power, and corresponding-versus-conflicting interests. We discuss how perceptions of interdependence affect how people cooperate and punish others' defection in everyday life. We propose that people understand their interdependence with others through knowledge of the action space, cues during social interactions (e.g., partner behaviors), and priors based on experience. Finally, we describe how learning interdependence could occur through domain-specific and domain-general mechanisms.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(23\)00065-7](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00065-7)

JARED PIAZZA & PAULO SOUSA – Minimal criteria for an impurity domain of morality

No issue in moral psychology has generated more disagreement than the claim that there is a distinct domain of morality tied to the concept of impurity. Impurity sceptics point out that impurity has been characterized and operationalized in vastly heterogeneous ways. Further, this domain is presumed to encompass a wide variety of actions: from licking shoes, eating human flesh, desecrating Bibles, to rape and suicide. This abundance of characterizations and varied action-content makes the search for an impurity domain seem ill-fated. We take a useful step back and propose a minimal set of criteria that researchers could agree upon to test whether such a domain exists. The criteria draw upon social domain theory, social intuitionism, and our own theorizing, and they should be tested cross-culturally to confirm that they reflect a universal learning disposition.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(23\)00071-2](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00071-2)

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