EAORC BULLETIN 1,055 – 3 September 2023

CONTENTS

NOTICES

PUBLICATION ALERTS

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

EDITORIAL INTERJECTIONS

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

ACADEMIA.EDU – The Lower and Middle Palaeolithic origins of semiotics

In AlexanderYevglevsky (ed.), Structural and Semiotic Investigations in Archaeology, Donetsk University Press, 89-107 (2006).

ROBERT G. BEDNARIK – The Lower and Middle Palaeolithic origins of semiotics

This paper reviews critically the performance of orthodox archaeology in defining the cultural and cognitive evolution of hominids, and in describing their Pleistocene cultural sequence. It is argued that archaeology has largely failed in this, and has instead sought to focus on the technological and skeletal evolution of humans. It can therefore only provide an inadequate empirical basis from which to speculate about the origins of symbolism. A more suitable basis is established here by revisiting some of the key evidence in any proper consideration of early symbolling, such as beads, engravings, or the introduction of iconicity or language. This leads to the recognition of a significantly longer and slower development of semiotics during the Pleistocene than traditional archaeology has reported. In particular it is noted that there could have been important developments about 900,000 or 800,000 years ago that led to significant changes in hominid communication and cognition, and perhaps acceleration in the evolution of symbolling abilities. These probably involved the ability of creating arbitrary relationships between referrer and referent, the key factor in symbolling. This is therefore where the origins of semiotics are most likely to be found. By the time of the late Lower Palaeolithic, these abilities were probably well advanced, as indicated by the use of beads, engravings and petroglyphs. Such a scenario differs from the traditional view by a time factor of about one to twenty, indicating severe shortcomings in this traditional model.
https://www.academia.edu/105768729/The_Lower_and_Middle_Palaeolithic_origins_of_semiotics

ACADEMIA.EDU – The Neolithic revolution and the emergence of humanity

In Joanne Clarke (ed.), Archaeological perspectives on the transmission and transformation of culture in the Eastern Mediterranean, Oxbow Books, 84-88 (2005).

TREVOR WATKINS – The Neolithic revolution and the emergence of humanity: a cognitive approach to the first comprehensive world-view

It has been usual to say that the beginning of the Neolithic in southwest Asia is a significant time because it was then that people first began to abandon hunting and gathering and to adopt the practice of farming. While there were indeed changes in subsistence strategy, there were also other changes that were more significant. One development of that time in particular represents a crucial milestone in the evolution of our humanity, the facility to operate in terms of symbolic representation. The classic example of symbolic representation is human speech and language, which are now generally thought to have emerged in the form which we know them at the turn of the middle to the upper Palaeolithic. However, this paper follows a suggestion of Colin Renfrew that 'external symbolic storage' is not confined to written language, but is practised by humans in their symbolic use of material culture. In this way, it is possible to understand the Neolithic revolution as the discovery by humans of the potential of material culture for the storage and transmission of ideas and concepts, elements of symbolic reference. Thus it may be said that the first people to be fully human, to share the humanity that is common to human societies in the world today, came into existence at the beginning of the Neolithic in southwest Asia. And the success of their new ideas, new ideology and new symbols was the foundation on which was built their rapid expansion and side-spread adoption.
https://www.academia.edu/270175/The_Neolithic_revolution_and_the_emergence_of_humanity_a_cognitive_approach_to_the_first_comprehensive_world_view

ACADEMIA.EDU – Social Anthropology and Human Origins

Cambridge University Press (2011).

ALAN BARNARD – Social Anthropology and Human Origins

Social anthropology is a discipline largely missing from the study of human origins. Until now, the discipline has sidelined itself. Yet its central concerns with notions like society, culture and cross-cultural comparison make it of the utmost relevance for understanding the origins of human social life, and relevant too as an aid for speculation on the kinds of society our ancestors inhabited. Like archaeologists, social anthropologists can dig backwards through layers of time, into the origins of language, symbolism, ritual, kinship and the ethics and politics of reciprocity.
When did human origins begin? That is a trick question. Of course, human origins began when humanity began, but in another sense human origins began when origins became an intellectual issue. There is no real history of engagement between social anthropology and early humanity, so one must be created here. Social anthropology's ancestral disciplines, like moral philosophy and jurisprudence, natural history and antiquarianism, travelogue and philology, all fed into post-medieval developments in building a picture of 'early man'. Yet, as I have implied, social anthropology proper has been absent. Since the days of Franz Boas at the dawn of the twentieth century, the study of human origins has been seen instead as the preserve of biological or physical anthropology. While not wishing to encroach too deeply into biological territory, in this book I want to carve out within social anthropology a new subdiscipline. I see this as a subdiscipline that touches on the biological and makes full use too of a century and a half of social anthropology – its accumulated experience and especially some of its more recent, and relevant, developments.

https://www.academia.edu/105576025/Social_Anthropology_and_Human_Origins

ACADEMIA.EDU – The evolution of early symbolic behavior in Homo sapiens

PNAS 117:9, 4578-4584 (2020).

KRISTIAN TYLÉN et al with FELIX RIEDE & MARLIZE LOMBARD – The evolution of early symbolic behavior in Homo sapiens

How did human symbolic behavior evolve? Dating up to about100,000 y ago, the engraved ochre and ostrich eggshell fragments from the South African Blombos Cave and Diepkloof Rock Shelter provide a unique window into presumed early symbolic traditions of Homo sapiens and how they evolved over a period of more than 30,000 y. Using the engravings as stimuli, we report five experiments which suggest that the engravings evolved adaptively, becoming better-suited for human perception and cognition. More specifically, they became more salient, memorable, reproducible, and expressive of style and human intent. However, they did not become more discriminable over time between or within the two archeological sites. Our observations provide support for an account of the Blombos and Diepkloof engravings as decorations and as socially transmitted cultural traditions. By contrast, there was no clear indication that they served as denotational symbolic signs. Our findings have broad implications for our understanding of early symbolic communication and cognition in H. sapiens.
https://www.academia.edu/106201964/The_evolution_of_early_symbolic_behavior_in_Homo_sapiens

NEWS

GUARDIAN SCIENCE – Study casts doubt on Neanderthal 'flower burial' theory

Buried in a partial foetal position and surrounded by flower pollen, the discovery of Shanidar 4 – a Neanderthal skeleton unearthed in 1960 – prompted a dramatic reappraisal of our ancient cousins. Far from being brutish thugs, the Shanidar flower burial, as it became known, painted a picture of Neanderthals as empathic beings who cared enough for their dead to scour the mountains for funeral bouquets. Now, fresh evidence suggests this interpretation may have been incorrect – although Neanderthals may still have had strong funerary rituals.
https://www.theguardian.com/science/2023/aug/28/study-casts-doubt-on-neanderthal-flower-burial-theory

NATURE BRIEFING – Human ancestors nearly went extinct

Roughly 900,000 years ago, climate changes sweeping the globe might have pushed our distant ancestors to the brink of extinction. The unknown human-like species was reduced to just 1,280 breeding individuals, creating a genetic bottleneck that is still detectable in the DNA of modern-day humans. The population didn't expand for more than 100,000 years, after which it bloomed again and the progenitors of our species and of our extinct relatives, the Denisovans and the Neanderthals, emerged.
https://www.nature.com/articles/d41586-023-02712-4

SCIENCEADVISER – Did our ancestors come close to extinction?

Modern humans dominate Earth, to the point that our influence is embedded in the planet's rocks. But that almost wasn't the case, according to a new Science study. Using a genomic model they developed called Fit-Coal, researchers estimate that around 930,000 years ago, nearly 99% of our hominin ancestors were wiped out, and this bottleneck persisted for roughly 120,000 years.
https://www.science.org/doi/full/10.1126/science.adj9484

SCIENCE.ORG NEWS – Human ancestors may have survived a brush with extinction 900,000 years ago

Population of our ancestors shrank to about 1300 breeding adults, modeling study suggests.
https://www.science.org/content/article/human-ancestors-may-have-survived-brush-extinction-900-000-years-ago

PUBLICATIONS

American Journal of Biological Anthropology

REVIEWS

KIMBERLY K. FOECKE – Is broader better?

Review of 'The evolution of everything: The patterns and causes of big history' by Brian Villmoare (Ed.), Cambridge University Press. 2022.
https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24837

Cell Reports

PAPERS

BENJAMIN VOLOH et al – Hierarchical action encoding in prefrontal cortex of freely moving macaques

Our natural behavioral repertoires include coordinated actions of characteristic types. To better understand how neural activity relates to the expression of actions and action switches, we studied macaques performing a freely moving foraging task in an open environment. We developed a novel analysis pipeline that can identify meaningful units of behavior, corresponding to recognizable actions such as sitting, walking, jumping, and climbing. On the basis of transition probabilities between these actions, we found that behavior is organized in a modular and hierarchical fashion. We found that, after regressing out many potential confounders, actions are associated with specific patterns of firing in each of six prefrontal brain regions and that, overall, encoding of action category is progressively stronger in more dorsal and more caudal prefrontal regions. Together, these results establish a link between selection of units of primate behavior on one hand and neuronal activity in prefrontal regions on the other.

https://www.cell.com/cell-reports/fulltext/S2211-1247(23)01102-6

LING HUANG et al – A source for category-induced global effects of feature-based attention in human prefrontal cortex

Global effects of feature-based attention (FBA) are generally limited to stimuli sharing the same or similar features, as hypothesized in the "feature-similarity gain model." Visual perception, however, often reflects categories acquired via experience/learning; whether the global-FBA effect can be induced by the categorized features remains unclear. Here, human subjects were trained to classify motion directions into two discrete categories and perform a classical motion-based attention task. We found a category-induced global-FBA effect in both the middle temporal area (MT+) and frontoparietal areas, where attention to a motion direction globally spread to unattended motion directions within the same category, but not to those in a different category. Effective connectivity analysis showed that the category-induced global-FBA effect in MT+ was derived by feedback from the inferior frontal junction (IFJ). Altogether, our study reveals a category-induced global-FBA effect and identifies a source for this effect in human prefrontal cortex, implying that FBA is of greater ecological significance than previously thought.

https://www.cell.com/cell-reports/fulltext/S2211-1247(23)01091-4

Current Biology

PAPERS

KINGA ANNA BOHUS et al – The scope and role of deduction in infant cognition

The origins of the human capacity for logically structured thought are still a mystery. Studies on young humans, which can be particularly informative, present conflicting results. Infants seem able to generate competing hypotheses and monitor the certainty or probability of one-shot outcomes, suggesting the existence of an articulated language of thought. However, sometimes toddlers and even children younger than fail tasks seemingly requiring the same representational abilities. One fundamental test for the presence of logical abilities is the concept of disjunction as a way into the conception of alternative possibilities, and of disjunctive elimination as a way to prune them. Here, we document their widespread presence in 19-month-old infants. In a word-referent association task, both bilingual and monolingual infants display a pattern of oculomotor inspection previously found to be a hallmark of disjunctive reasoning in adults and children, showing that the onset of logical reasoning is not crucially dependent on language experience. The pattern appears when targets are novel, but also when both objects and words are known, though likely not yet sedimented into a mature lexicon. Disjunctive reasoning also surfaces in a non-linguistic location search task, not prompted by violated expectations, showing that infants reason by elimination spontaneously. Together, these results help answer long-standing empirical and philosophical puzzles about the role of logic in early knowledge development, suggesting that by increasing confidence in some options while eliminating alternatives, logic provides scaffolding for the organization of knowledge about the world, language, and language-world relations.

https://www.cell.com/current-biology/fulltext/S0960-9822(23)01071-0

eLife

ARTICLES

A monkey's eye view

Rhesus monkeys have similar 'gaze biases' to humans, making them good candidates to study the brain bases of decision-making.

https://elifesciences.org/digests/78205/a-monkey-s-eye-view

PAPERS

JOHANNES FALCK et al – Longitudinal Changes in Value-based Learning in Middle Childhood: Distinct Contributions of Hippocampus and Striatum

The hippocampal-dependent memory system and striatal-dependent memory system modulate reinforcement learning depending on feedback timing in adults, but their contributions during development remain unclear. In a 2-year longitudinal

study, 6-to-7-year-old children performed a reinforcement learning task in which they received feedback immediately or with a short delay following their response. Children's learning was found to be sensitive to feedback timing modulations in their reaction time and inverse temperature parameter, which quantifies value-guided decision-making. They showed longitudinal improvements towards more optimal value-based learning, and their hippocampal volume showed protracted maturation. Better delayed model-derived learning covaried with larger hippocampal volume longitudinally, in line with the adult literature. In contrast, a larger striatal volume in children was associated with both better immediate and delayed model-derived learning longitudinally. These findings show, for the first time, an early hippocampal contribution to the dynamic development of reinforcement learning in middle childhood, with neurally less differentiated and more cooperative memory systems than in adults.
https://elifesciences.org/reviewed-preprints/89483

SHIRA M LUPKIN & VINCENT B MCGINTY – Monkeys exhibit human-like gaze biases in economic decisions
In economic decision-making individuals choose between items based on their perceived value. For both humans and nonhuman primates, these decisions are often carried out while shifting gaze between the available options. Recent studies in humans suggest that these shifts in gaze actively influence choice, manifesting as a bias in favor of the items that are viewed first, viewed last, or viewed for the overall longest duration in a given trial. This suggests a mechanism that links gaze behavior to the neural computations underlying value-based choices. In order to identify this mechanism, it is first necessary to develop and validate a suitable animal model of this behavior. To this end, we have created a novel value-based choice task for macaque monkeys that captures the essential features of the human paradigms in which gaze biases have been observed. Using this task, we identified gaze biases in the monkeys that were both qualitatively and quantitatively similar to those in humans. In addition, the monkeys' gaze biases were well-explained using a sequential sampling model framework previously used to describe gaze biases in humans—the first time this framework has been used to assess value-based decision mechanisms in nonhuman primates. Together, these findings suggest a common mechanism that can explain gaze-related choice biases across species, and open the way for mechanistic studies to identify the neural origins of this behavior.
https://elifesciences.org/articles/78205

Frontiers in Psychology

PAPERS

IRA A. NOVECK, NICHOLAS GRIFFEN & DIANA MAZZARELLA – Taking stock of an idiom's background assumptions: an alternative relevance theoretic account
This paper begins by presenting the theoretical background of, and the accompanying psycholinguistic findings on, idiom processing. The paper then widens its lens by comparing the idiom processing literature to that of metaphor and irony. We do so partly to better understand the idiom superiority effect, according to which idiomatic sentences (unlike metaphoric and ironic ones) are generally processed faster than their literal controls; part of our motivation is to reconcile the differences between idiom processing, on the one hand, and metaphor and irony processing on the other. This ultimately leads us to Relevance Theory (RT), which has provided original insights into the processing of figurative language generally, but especially with respect to metaphor and irony. RT has paid less attention to idiomatic expressions (such as break the ice, fan the flames, or spill the beans), where one finds a single RT account that likens idioms to conventional metaphors. Through our overview, we ultimately arrive at an alternative RT account of idioms: We argue that idioms include a procedural meaning that takes into account relevant presuppositional information. For example, an idiomatic string such as break the ice not only asserts initiate social contact, it prompts the recovery of background assumptions such as there exists a social distance that calls for relief. This leads us (a) to apply linguistic-intuition tests of our presuppositional hypothesis, and; (b) to describe the paradigm and results from a pilot experiment. Both provide support for our claims. In doing so, we provide an original explanation for the idiom superiority effect.
https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1117847/full

iScience

PAPERS

DERRY TAYLOR et al – Vocal functional flexibility in the grunts of young chimpanzees
All living things communicate yet only humans can be said to communicate using language. How this came to be the case is a fundamental mystery unsolved by contemporary science. Within a human lifetime, language emerges from a complex developmental process. As such, understanding chimpanzee vocal development is essential to understanding the evolutionary roots of language. In human development, language is directly built upon the early capacity for 'vocal functional flexibility' – the ability to flexibly express the same vocalisations in different ways to achieve different functions. Primate vocalisations, by contrast, have long been believed to be relatively inflexible regarding both production and function. In this paper, we break new ground by providing evidence for vocal functional flexibility in one of the first systematic studies of early chimpanzee vocal production and function. This finding implies the developmental foundations for language are rooted in our primate evolutionary heritage.
https://www.cell.com/iscience/fulltext/S2589-0042(23)01868-0

ALAVIE MIRFATHOLLAHI et al – Decoding hand kinetics and kinematics using somatosensory cortex activity in active and passive movement

Area 2 of the primary somatosensory cortex (S1), encodes proprioceptive information of limbs. Several studies investigated the encoding of movement parameters in this area. However, the single-trial decoding of these parameters, which can provide additional knowledge about the amount of information available in sub-regions of this area about instantaneous limb movement, has not been well investigated. We decoded kinematic and kinetic parameters of active and passive hand movement during center-out task using conventional and state-based decoders. Our results show that this area can be used to accurately decode position, velocity, force, moment, and joint angles of hand. Kinematics had higher accuracies compared to kinetics and active trials were decoded more accurately than passive trials. Although the state-based decoder outperformed the conventional decoder in the active task, it was the opposite in the passive task. These results can be used in intracortical micro-stimulation procedures to provide proprioceptive feedback to BCI subjects.
https://www.cell.com/iscience/fulltext/S2589-0042(23)01885-0

JOHAN NAKUCI, JASON SAMAHA & DOBROMIR RAHNEV – Brain signatures indexing variation in internal processing during perceptual decision-making

Brain activity is highly variable during a task. Discovering, characterizing, and linking variability in brain activity to internal processes has primarily relied on experimental manipulations. However, changes in internal processing could arise from many factors independent of experimental conditions. Here we utilize a data-driven clustering method based on modularity-maximation to identify consistent spatial-temporal EEG activity patterns across individual trials. Subjects (N = 25) performed a motion discrimination task with six interleaved levels of coherence. Clustering identified two discrete subtypes of trials with different patterns of activity. Surprisingly, Subtype 1 occurred more frequently on trials with lower motion coherence but was associated with faster response times. Computational modeling suggests that Subtype 1 was characterized by a lower threshold for reaching a decision. These results highlight trial variability in decision processes traditionally hidden to experimenters and provide a method for identifying endogenous brain state variability relevant to cognition and behavior.
https://www.cell.com/iscience/fulltext/S2589-0042(23)01827-8

Linguistic Anthropology

PAPERS

ALESSANDRO DURANTI – If it is language that speaks, what do speakers do? Confronting Heidegger's language ontology

Many of Heidegger's statements about language should sound familiar to linguistic anthropologists, starting with the pragmatic-indexical functions of speaking (in Sein und Zeit) and continuing, in later years, with something resembling linguistic relativity. But a comparison of Heidegger's ideas with those of some of his contemporaries who wrote about similar themes reveals that he had different goals, first among them "the destruction of western metaphysics," which he pursued by means of a new philosophical metalanguage, full of unorthodox etymologies, ambiguous metaphors, and linguistic constructions that gave agency to non-human entities (e.g., "the world worlds," "language speaks"). While offering himself as the prophet of innovative thinking and speaking, Heidegger also endorsed a conservative language ideology whereby some languages and some writers were said to be better equipped than others to capture the truth about the human condition. His decentering of the human subject ultimately turned into an antihumanist and elitist stance whereby most speakers are inauthentic "sounding boxes." Drawing from concepts and analytic tools familiar to linguistic anthropologists I offer ways to counter Heidegger's apocalyptic languageontology, explain the reasons of his success, and reflect on our own language ontology.
https://anthrosource.onlinelibrary.wiley.com/doi/full/10.1111/jola.12404

Nature

NEWS

Human ancestors nearly went extinct 900,000 years ago

A new technique analysing modern genetic data suggests that pre-humans survived in a group of only 1,280 individuals.
https://www.nature.com/articles/d41586-023-02712-4

Nature Ecology & Evolution

PAPERS

FABIO A. MACHADO et al – Rules of teeth development align microevolution with macroevolution in extant and extinct primates

Macroevolutionary biologists have classically rejected the notion that higher-level patterns of divergence arise through microevolutionary processes acting within populations. For morphology, this consensus partly derives from the inability of quantitative genetics models to correctly predict the behaviour of evolutionary processes at the scale of millions of years. Developmental studies (evo-devo) have been proposed to reconcile micro- and macroevolution. However, there has been

little progress in establishing a formal framework to apply evo-devo models of phenotypic diversification. Here we reframe this issue by asking whether using evo-devo models to quantify biological variation can improve the explanatory power of comparative models, thus helping us bridge the gap between micro- and macroevolution. We test this prediction by evaluating the evolution of primate lower molars in a comprehensive dataset densely sampled across living and extinct taxa. Our results suggest that biologically informed morphospaces alongside quantitative genetics models allow a seamless transition between the micro- and macroscales, whereas biologically uninformed spaces do not. We show that the adaptive landscape for primate teeth is corridor like, with changes in morphology within the corridor being nearly neutral. Overall, our framework provides a basis for integrating evo-devo into the modern synthesis, allowing an operational way to evaluate the ultimate causes of macroevolution.
https://www.nature.com/articles/s41559-023-02167-w

Nature Scientific Reports

PAPERS

ALEXANDER LATOURRETTE, DANA MICHELLE CHAN & SANDRA R. WAXMAN – A principled link between object naming and representation is available to infants by seven months of age

By their first birthdays, infants represent objects flexibly as a function of not only whether but how the objects are named. Applying the same name to a set of different objects from the same category supports object categorization, with infants encoding commonalities among objects at the expense of individuating details. In contrast, applying a distinct name to each object supports individuation, with infants encoding distinct features at the expense of categorical information. Here, we consider the development of this nuanced link between naming and representation in infants' first year. Infants at 12 months (Study 1; N = 55) and 7 months (Study 2; N = 96) participated in an online recognition memory task. All infants saw the same objects, but their recognition of these objects at test varied as a function of how they had been named. At both ages, infants successfully recognized objects that had been named with distinct labels but failed to recognize these objects when they had all been named with the same, consistent label. This new evidence demonstrates that a principled link between object naming and representation is available by 7 months, early enough to support infants as they begin mapping words to meaning.
https://www.nature.com/articles/s41598-023-41538-y

MATKO GLUNČIĆ et al – Tandem NBPF 3mer HORs (Olduvai triplets) in Neanderthal and two novel HOR tandem arrays in human chromosome 1 T2T-CHM13 assembly

It is known that the ~ 1.6 kb Neuroblastoma BreakPoint Family (NBPF) repeats are human specific and contributing to cognitive capabilities, with increasing frequency in higher order repeat 3mer HORs (Olduvai triplets). From chimpanzee to modern human there is a discontinuous jump from 0 to ~ 50 tandemly organized 3mer HORs. Here we investigate the structure of NBPF 3mer HORs in the Neanderthal genome assembly of Pääbo et al., comparing it to the results obtained for human hg38.p14 chromosome 1. Our findings reveal corresponding NBPF 3mer HOR arrays in Neanderthals with slightly different monomer structures and numbers of HOR copies compared to humans. Additionally, we compute the NBPF 3mer HOR pattern for the complete telomere-to-telomere human genome assembly (T2T-CHM13) by Miga et al., identifying two novel tandem arrays of NBPF 3mer HOR repeats with 5 and 9 NBPF 3mer HOR copies. We hypothesize that these arrays correspond to novel NBPF genes (here referred to as NBPFA1 and NBPFA2). Further improving the quality of the Neanderthal genome using T2T-CHM13 as a reference would be of great interest in determining the presence of such distant novel NBPF genes in the Neanderthal genome and enhancing our understanding of human evolution.
https://www.nature.com/articles/s41598-023-41517-3

ANNE DELAGNES et al – Long-term behavioral adaptation of Oldowan toolmakers to resource-constrained environments at 2.3 Ma in the Lower Omo Valley (Ethiopia)

The long stratigraphic sequence of the Shungura Formation in the Lower Omo Valley documents 3 million years (Ma) of hominin evolution, which, when combined with detailed paleo-depositional environmental data, opens new perspectives for understanding the complex interactions between hominin landscape use and the development of stone tool-mediated activities. Stone tool assemblages produced by Paranthropus aethiopicus and/or a species of early Homo from ~ 2.3 Ma, reflect their ability to deal with the raw material scarce environment of the Lower Omo Valley. It remains to be seen whether this activity can be related to a single, brief occupation event or the expression of an emergent new adaptation. Here we report on the newly investigated site complex of OMO 79, which produced the first evidence for multiple phases of hominin tool-making and use in the Shungura Formation. The development of this long-lasting techno-economic behavior marks a cognitive tipping point around 2.3 Ma in the Lower Omo Valley, evidenced by the adaptability of the early hominins to resource-constrained environments.
https://www.nature.com/articles/s41598-023-40793-3

SOURAV ROY et al – Time delays shape the eco-evolutionary dynamics of cooperation

We study the intricate interplay between ecological and evolutionary processes through the lens of the prisoner's dilemma game. But while previous studies on cooperation amongst selfish individuals often assume instantaneous interactions, we

take into consideration delays to investigate how these might affect the causes underlying prosocial behavior. Through analytical calculations and numerical simulations, we demonstrate that delays can lead to oscillations, and by incorporating also the ecological variable of altruistic free space and the evolutionary strategy of punishment, we explore how these factors impact population and community dynamics. Depending on the parameter values and the initial fraction of each strategy, the studied eco-evolutionary model can mimic a cyclic dominance system and even exhibit chaotic behavior, thereby highlighting the importance of complex dynamics for the effective management and conservation of ecological communities. Our research thus contributes to the broader understanding of group decision-making and the emergence of moral behavior in multidimensional social systems.
https://www.nature.com/articles/s41598-023-41519-1

JIANING CHEN, ZENG LIAN & JIE ZHENG – Self-serving reward and punishment: evidence from the laboratory
Reward for altruism and punishment for selfishness are crucial components for the maintenance of society. Past studies have provided strong evidence that people are willing to incur costs to punish selfish behaviors and to reward altruistic behaviors, but how their willingness to do so depends on their relationship with the individuals conducting the anti-social or pro-social behaviors is much less explored. To probe into this question, we devised a three-stage experiment that combined a revised dictator game and third-party reward or punishment. We employed two payoff frameworks, alignment and conflict, and analyzed how third-party's willingness to reward and punish differed when their interests were either aligned or in conflict with the first-party under observation. We found that due to considerations for personal interests, third-party's reward and punishment levels deviated from what was deemed "legitimate" by society, that is, the level of reward and punishment that enhances society's intrinsic motivations to comply with social norms and act pro-socially. When an anti-social behavior was observed, third-party punished less severely under the alignment framework than under the conflict framework; when a pro-social behavior was observed, third-party demonstrated self-serving reward under the alignment framework, but they rewarded altruistically under the conflict framework. These findings provided evidence for third-party's self-serving reward and punishment.
https://www.nature.com/articles/s41598-023-41256-5

M. MURILLO-BARROSO, A. MARTÍN CÓLLIGA & M. MARTINÓN-TORRES – The earliest Baltic amber in Western Europe
The occurrence of Baltic amber through Europe has traditionally been associated to the spread of the Bell Beaker culture during the 3rd millennium BC. In Iberia, this phenomenon is particularly noticeable in the southern half. Here we present an amber bead recovered in a Late Neolithic funerary cave (3634–3363 cal BC) from northeastern Iberia where more than 12 individuals had been buried. Fourier transform infrared spectroscopy results of four samples revealed their complete resemblance with Baltic succinite reference spectra. Despite being a single bead, this finding provides the earliest evidence for the arrival of Baltic amber to the Mediterranean and Western Europe, before the Bell Beaker phenomenon and more than a millennium earlier than traditionally thought. This finding has implications for our understanding of early exchange networks of exotic materials, and their associated social structures.
https://www.nature.com/articles/s41598-023-41293-0

Neuron

PAPERS

RINA ZELMANN et al – Differential cortical network engagement during states of un/consciousness in humans
What happens in the human brain when we are unconscious? Despite substantial work, we are still unsure which brain regions are involved and how they are impacted when consciousness is disrupted. Using intracranial recordings and direct electrical stimulation, we mapped global, network, and regional involvement during wake vs. arousable unconsciousness (sleep) vs. non-arousable unconsciousness (propofol-induced general anesthesia). Information integration and complex processing we`re reduced, while variability increased in any type of unconscious state. These changes were more pronounced during anesthesia than sleep and involved different cortical engagement. During sleep, changes were mostly uniformly distributed across the brain, whereas during anesthesia, the prefrontal cortex was the most disrupted, suggesting that the lack of arousability during anesthesia results not from just altered overall physiology but from a disconnection between the prefrontal and other brain areas. These findings provide direct evidence for different neural dynamics during loss of consciousness compared with loss of arousability.
https://www.cell.com/neuron/fulltext/S0896-6273(23)00618-9

New Scientist

NEWS

How artefacts are found tells its own story – if we want to hear it
It is easy to overlook the circumstances surrounding the discovery of ancient artefacts, but the insight this gives us into modern lives is just as valuable as the find itself.
https://www.newscientist.com/article/mg25934543-400-how-artefacts-are-found-tells-its-own-story-if-we-want-to-hear-it/

Women and men throw spears equally well using ancient atlatl tool
Men typically throw objects with a greater velocity than women can – but with a spear-launching tool called an atlatl, men and women's throwing velocity is indistinguishable.
https://www.newscientist.com/article/2388999-women-and-men-throw-spears-equally-well-using-ancient-atlatl-tool/

ARTICLES

PAIGE MADISON – The untold story of the curiously controversial Homo floresiensis dig
The discovery of Homo floresiensis revolutionised the study of human evolution, but it was rocked by accusations of theft. Twenty years on, here's the full story behind the episode.
https://www.newscientist.com/article/mg25934540-900-the-untold-story-of-the-curiously-controversial-homo-floresiensis-dig/

PeerJ

PAPERS

JUAN ANTONIO PÉREZ-CLAROS & PAUL PALMQVIST – Heterochronies and allometries in the evolution of the hominid cranium: a morphometric approach using classical anthropometric variables
This article studies the evolutionary change of allometries in the relative size of the two main cranial modules (neurocranium and splanchnocranium) in the five living hominid species and a diverse sample of extinct hominins. We use six standard craniometric variables as proxies for the length, width and height of each cranial module. Factor analysis and two-block partial least squares (2B-PLS) show that the great apes and modern humans share a pervasive negative ontogenetic allometry in the neurocranium and a positive one in the splanchnocranium. This developmental constraint makes it possible to interpret the cranial heterochronies in terms of ontogenetic scaling processes (i.e., extensions or truncations of the ancestral ontogenetic trajectory) and lateral transpositions (i.e., parallel translations of the entire trajectory starting from a different shape for a given cranial size). We hypothesize that ontogenetic scaling is the main evolutionary modality in the australopithecines while in the species of Homo it is also necessary to apply transpositions. Both types of processes are coordinated in Homo, which result in an evolutionary trend toward an increase in brain size and in the degree of paedomorphosis from the earliest habilines.
https://peerj.com/articles/13991/

Proceedings of the Royal Society B

PAPERS

TOM R. KUPFER & JOSHUA M. TYBUR – Third-party punishers who express emotions are trusted more
Third party punishment (TPP) is thought to be crucial to the evolution and maintenance of human cooperation. However, this type of punishment is often not rewarded, perhaps because punishers' underlying motives are unclear. We propose that the expression of moral emotions could solve this problem by advertising such motives. In each of three experiments (n = 1711), a third-party punishment game was followed by a trust game. Third parties expressed anger or disgust instead of, or in addition to, financial punishment. Results showed that third parties who expressed these emotions were trusted more than those who didn't express (Experiment 1), and more than those who financially punished (Experiment 2). Moreover, third parties who expressed while financially punishing were trusted more than those who punished without expressing (Experiment 3). Findings suggest that emotion expression might play a role in the evolution and maintenance of cooperation by facilitating TPP.
https://royalsocietypublishing.org/doi/abs/10.1098/rspb.2023.0916

KENICHI AOKI et al with MARCUS W. FELDMAN – Infectious diseases may have arrested the southward advance of microblades in Upper Palaeolithic East Asia
An unsolved archaeological puzzle of the East Asian Upper Palaeolithic is why the southward expansion of an innovative lithic technology represented by microblades stalled at the Qinling–Huaihe Line. It has been suggested that the southward migration of foragers with microblades stopped there, which is consistent with ancient DNA studies showing that populations to the north and south of this line had differentiated genetically by 19 000 years ago. Many infectious pathogens are believed to have been associated with hominins since the Palaeolithic, and zoonotic pathogens in particular are prevalent at lower latitudes, which may have produced a disease barrier. We propose a mathematical model to argue that mortality due to infectious diseases may have arrested the wave-of-advance of the technologically advantaged foragers from the north.
https://royalsocietypublishing.org/doi/full/10.1098/rspb.2023.1262

Royal Society Open Science

PAPERS

ZIEN HUANG et al – The role of awareness in shaping responses in human visual cortex
The visual cortex contains information about stimuli even when they are not consciously perceived. However, it remains unknown whether the visual system integrates local features into global objects without awareness. Here, we tested this by

measuring brain activity in human observers viewing fragmented shapes that were either visible or rendered invisible by fast counterphase flicker. We then projected measured neural responses to these stimuli back into visual space. Visible stimuli caused robust responses reflecting the positions of their component fragments. Their neural representations also strongly resembled one another regardless of local features. By contrast, representations of invisible stimuli differed from one another and, crucially, also from visible stimuli. Our results demonstrate that even the early visual cortex encodes unconscious visual information differently from conscious information, presumably by only encoding local features. This could explain previous conflicting behavioural findings on unconscious visual processing.
https://royalsocietypublishing.org/doi/full/10.1098/rsos.230380

DANIEL Z. ATWATER – Suppression force-fields and diffuse competition: competition de-escalation is an evolutionarily stable strategy
Competition theory is founded on the premise that individuals benefit from harming their competitors, which helps them secure resources and prevent inhibition by neighbours. When multiple individuals compete, however, competition has complex indirect effects that reverberate through competitive neighbourhoods. The consequences of such 'diffuse' competition are poorly understood. For example, competitive effects may dilute as they propagate through a neighbourhood, weakening benefits of neighbour suppression. Another possibility is that competitive effects may rebound on strong competitors, as their inhibitory effects on their neighbours benefit other competitors in the community. Diffuse competition is unintuitive in part because we lack a clear conceptual framework for understanding how individual interactions manifest in communities of multiple competitors. Here, I use mathematical and agent-based models to illustrate that diffuse interactions—as opposed to direct pairwise interactions—are probably the dominant mode of interaction among multiple competitors. Consequently, competitive effects may regularly rebound, incurring fitness costs under certain conditions, especially when kin–kin interactions are common. These models provide a powerful framework for investigating competitive ability and its evolution and produce clear predictions in ecologically realistic scenarios.
https://royalsocietypublishing.org/doi/10.1098/rsos.230222

Science

ARTICLES

NICK ASHTON & CHRIS STRINGER – Did our ancestors nearly die out?
Earth's climate system began to change during the Middle Pleistocene transition, which is associated with a severe cooling phase about 900,000 years ago. How this change might have affected human populations is difficult to determine, because the human fossil and archaeological records are relatively sparse for this period and lie beyond the reach of ancient DNA recovery. On page 979 of this issue, Hu et al. (1) use a new method of analysis called FitCoal to project current human genetic variation backward in time, to estimate the size of populations at specific points in the past. The results suggest that our ancestors suffered a severe population bottleneck that started around 930,000 years ago and lasted for almost 120,000 years. This is estimated to have reduced the number of breeding individuals to ~1300, bringing our ancestors close to extinction.
https://www.science.org/doi/full/10.1126/science.adj9484

PAPERS

WANGJIE HU et al – Genomic inference of a severe human bottleneck during the Early to Middle Pleistocene transition
Population size history is essential for studying human evolution. However, ancient population size history during the Pleistocene is notoriously difficult to unravel. In this study, we developed a fast infinitesimal time coalescent process (FitCoal) to circumvent this difficulty and calculated the composite likelihood for present-day human genomic sequences of 3154 individuals. Results showed that human ancestors went through a severe population bottleneck with about 1280 breeding individuals between around 930,000 and 813,000 years ago. The bottleneck lasted for about 117,000 years and brought human ancestors close to extinction. This bottleneck is congruent with a substantial chronological gap in the available African and Eurasian fossil record. Our results provide new insights into our ancestry and suggest a coincident speciation event.
https://www.science.org/doi/10.1126/science.abq7487

Trends in Cognitive Sciences

ARTICLES

LI WANG & YI JIANG – Action observation network: domain-specific or domain-general?
The action observation network (AON) has traditionally been thought to be dedicated to recognizing animate actions. A recent study by Karakose-Akbiyik et al. invites rethinking this assumption by demonstrating that the AON contains a shared neural code for general events, regardless of whether those events involve animate or inanimate entities.
https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00208-5

Trends in Ecology and Evolution

PAPERS

SALLY A. KEITH et al – Macrobehaviour: behavioural variation across space, time, and taxa

We explore how integrating behavioural ecology and macroecology can provide fundamental new insight into both fields, with particular relevance for understanding ecological responses to rapid environmental change. We outline the field of macrobehaviour, which aims to unite these disciplines explicitly, and highlight examples of research in this space. Macrobehaviour can be envisaged as a spectrum, where behavioural ecologists and macroecologists use new data and borrow tools and approaches from one another. At the heart of this spectrum, interdisciplinary research considers how selection in the context of large-scale factors can lead to systematic patterns in behavioural variation across space, time, and taxa, and in turn, influence macroecological patterns and processes. Macrobehaviour has the potential to enhance forecasts of future biodiversity change.
https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347(23)00218-5

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