EAORC BULLETIN 1,089 – 28 April 2024

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.

NEWS

GUARDIAN SCIENCE – Do you speak a 'big' global language? Here's what my tiny language can teach you

By Ana Schnabl: "I'm one of the 2.5 million users of Slovene – and English and German speakers would do well to be curious about us."
https://www.theguardian.com/commentisfree/2024/apr/24/language-speak-big-slovene-english-german

JOHN TEMPLETON FOUNDATION – The World's Most Ancient Artists

Blombos Cave sits 300 kilometers east of Cape Town on the edge of the Indian ocean. Twenty years ago, an archaeological discovery in this South African cave challenged what scientists thought they knew about human behavior. There, archaeologists unearthed pockets of tiny, perforated shells apparently used as beads by early humans. While human interest in ornamentation had previously been traced back 50,000 years, the Blombos beads—estimated between 76,000 to 100,000 years old—proved that our interest in aesthetics was much more ancient. With this discovery, the beads entered an ongoing debate. Some archaeologists argued that early humans wore the shells to indicate social status or group membership, making the beads the earliest known evidence of symbolic communication. But what is symbol and what is art? And—a trickier question—how long have humans been making art, really?
https://www.templeton.org/news/the-worlds-most-ancient-artists

NATURE BRIEFING – Face the possibility of animal consciousness

A coalition of scientists has published a declaration that there is "a realistic possibility of conscious experience" in all vertebrates and in many invertebrates, such as octopuses and insects. The group focuses on sentience — an aspect of consciousness often defined as being able to have subjective experiences — pointing to research suggesting that octopuses feel pain and that bees show play behaviour. "When there is a realistic possibility of conscious experience in an animal, it is irresponsible to ignore that possibility in decisions affecting that animal," says the declaration.
https://www.nature.com/articles/d41586-024-01144-y

SAPIENS – When Disaster Tests the Strength of Human Cooperation

In the Andes, minga, a form of collective labor, has existed for centuries, often helping communities weather disasters. But how does it work in practice?
https://www.sapiens.org/culture/minga-mutual-aid/

SCIENCEADVISER – Smart bugs

According to the New York Declaration on Animal Consciousness, made last week at a conference of biologists and philosophers in New York, it's likely bugs, fish, and a variety of other animals have a "conscious experience" of some kind.
https://www.quantamagazine.org/insects-and-other-animals-have-consciousness-experts-declare-20240419/

SCIENCEADVISER – Party drug helps mice feel each other's pain—and relief

The psychoactive drug MDMA, commonly referred to as ecstasy, frequently causes users to experience heightened feelings of emotional connection—a quality that has earned it a reputation as an "empathogen." Although some scientists are already trying to harness the drug's effects to treat conditions like post-traumatic stress disorder, the precise ways in which MDMA influences the brain remain poorly understood.

Now, research in mice may have finally revealed how this psychoactive substance induces empathy . These animals are known to "catch" each other's feelings, with healthy rodents often mimicking the behavior of fearful or injured companions—a phenomenon known as emotional contagion. In the new study, scientists found that injecting mice with MDMA enhanced the social transfer of both pain and pain relief in male animals, while females were mysteriously immune. Although this disparity was unexpected, the study authors say it is consistent with previous research in humans, which suggests that men are more susceptible to MDMA's empathy-enhancing effects. Further experiments also revealed that MDMA stimulates the release of serotonin in the nucleus accumbens, a brain region of the brain that plays a major role in processing emotion and reward.

The researchers also discovered that, when applied directly to the nucleus accumbens, MDMA can reverse the deficits in the empathy-like behavior seen in a mouse model of autism. In the future, the team notes, the drug could be used to alleviate symptoms in a variety of neuropsychiatric disorders.
https://www.science.org/doi/10.1126/sciadv.adl6554

SCIENCE DAILY – Infected: Understanding the spread of behavior

A team of researchers found that long-tie connections accelerate the speed of social contagion.
https://www.sciencedaily.com/releases/2024/04/240423135216.htm

SCIENCE DAILY – Exploring brain synchronization patterns during social interactions

Social interactions synchronize brain activity within individuals and between individuals. In a new study, researchers compared brain synchronization between pairs of people with relatively strong social ties (acquaintance pairs) and pairs with almost no social ties (stranger pairs). The study found that during a cooperative task, the stranger pairs exhibited more closely connected brain networks compared to the acquaintance pairs. These findings challenge the conventional understanding that stronger social bonds lead to greater brain synchronization.
https://www.sciencedaily.com/releases/2024/04/240423113041.htm

SCIENCE DAILY – New study examines the increased adoption of they/them pronouns

People are using 'they/them' pronouns more often, according to a new study.
https://www.sciencedaily.com/releases/2024/04/240419132840.htm

SCIENCE DAILY – Maternal grandmothers' support buffers children against the impacts of adversity

A study shows that investment by maternal grandmothers can improve the well-being of grandchildren who have faced adversities in life. The positive effects can last well into adulthood.
https://www.sciencedaily.com/releases/2024/04/240425131339.htm

THE CONVERSATION – Stonehenge may have aligned with the Moon as well as the Sun

The monument's ancient connection to the skies may run even deeper than we realised.
{… and Fabio Silva et al do it without once mentioning Lionel Sims – although his work on the lunar standstill cycle is clearly in use.}
https://theconversation.com/stonehenge-may-have-aligned-with-the-moon-as-well-as-the-sun-228133

PUBLICATIONS

American Scientist

PAPERS

KATE CLANCY et al with AGUSTIN FUENTES – Biology Is Not Binary
How scientists define sex has evolved over the centuries, and the concept is still incredibly difficult to pin down.
https://www.americanscientist.org/article/biology-is-not-binary

Current Biology

ARTICLES

LEONID L. MOROZ – Evolutionary neurogenomics: Lengthy resolutions for complex brains
Genomic blueprints underlying unique neuronal organization are enigmatic. A new study reveals the recruitment of ancient, larger genes for synaptic machinery, providing evolutionary constraints and flexibility, with increasing gene sizes being found in animal lineages that led to cephalopods and vertebrates.
https://www.cell.com/current-biology/abstract/S0960-9822(24)00313-0

EDUARD MAIER & VALERY GRINEVICH – Social neuroscience: How we learn to avoid the bully
During social interactions, individuals evaluate relationships with their peers and switch from approach to avoidance, particularly in response to aggressive encounters. A new study in mice investigated the underlying brain mechanisms and identified oxytocin as a key regulator of social avoidance learning.
https://www.cell.com/current-biology/abstract/S0960-9822(24)00309-9

STANLEY HEINZE – Neuroethology: Decoding the waggle dance
A new study combining high-speed video recordings and computational modeling has revealed an overlooked feature of the famous honeybee waggle dance, yielding the first biologically plausible neural circuit model of how the information transmitted via the waggle dance could be assimilated by the follower bees.
https://www.cell.com/current-biology/abstract/S0960-9822(24)00249-5

Evolutionary Anthropology

PAPERS

HUGO MEIJER – Janus faced: The co-evolution of war and peace in the human species

The human species presents a paradox. No other species possesses the propensity to carry out coalitionary lethal attacks on adult conspecifics coupled with the inclination to establish peaceful relations with genetically unrelated groups. What explains this seemingly contradictory feature? Existing perspectives, the "deep roots" and "shallow roots" of war theses, fail to capture the plasticity of human intergroup behaviors, spanning from peaceful cooperation to warfare. By contrast, this article argues that peace and war have both deep roots, and they co-evolved through an incremental process over several million years. On the one hand, humans inherited the propensity for coalitionary lethal violence from their chimpanzee-like ancestor. Specifically, having first inherited the skills to engage in cooperative hunting, they gradually repurposed such capacity to execute coalitionary killings of adult conspecifics and subsequently enhanced it through technological innovations like the use of weapons. On the other hand, they underwent a process of cumulative cultural evolution and, subsequently, of self-domestication which led to heightened cooperative communication and increased prosocial behavior within and between groups. The combination of these two biocultural evolutionary processes—coupled with feedback loop effects between self-domestication and Pleistocene environmental variability—considerably broadened the human intergroup behavioral repertoire, thereby producing the distinctive combination of conflictual and peaceful intergroup relations that characterizes our species. To substantiate this argument, the article synthesizes and integrates the findings from a variety of disciplines, leveraging evidence from evolutionary anthropology, primatology, archeology, paleo-genetics, and paleo-climatology.

https://onlinelibrary.wiley.com/doi/full/10.1002/evan.22027

Frontiers in Communication

PAPERS

BRIAN HUGHES – Oedipus and the cabal: conspiracy theories and the decline of symbolic efficiency

Conspiracy theories are a means by which people make sense of vastly complex webs of cause and effect, contingency, and random chance. Impersonal operations of a political economy thus become personified in the figure of sinister puppet masters controlling the world. Overdetermined historical events become narrativized as plots executed with clockwork timing and perfect secrecy. This study proposes a model for the motives and mechanisms by which complex and ambiguous systems are made fodder for paranoid interpretation in the form of a conspiracy theory. By employing an exegetical close-reading methodology and psychoanalytic interpretation, three meta-conspiracies are identified as symptoms of the process described above: antisemitic theories of globalization, the "Deep State" as seen from the political Left, and vulgar UFOlogy. This study will argue that the impenetrable complexity of our globalized, financialized, hypermediated world agitates our experience of the Symbolic order, that is, the realm of language, logic, law, which acts as the scaffolding to the individual's psychic sense of place in society. Lacan associates entry into the Symbolic order with the reconciliation of the Oedipal conflict and the Symbolic itself with the figure of the Father. However, the complexity and ambiguity of the Symbolic in our contemporary world produce a crisis in this dynamic, which some have described as a "decline in Symbolic efficiency." This is particularly acute around events, which give rise to conspiracy theories. The will of the Father becomes unknowable, and the order upon which he insists appears dark and chaotic. Conspiracy therefore refers to turning away from this chaotic order and a "dark return" to the pre-symbolic maternal state, via the recession of the Symbolic into the Real, as a chaotic totalized presence (the conspiracy) stretching to occupy every corner of reality.

https://www.frontiersin.org/articles/10.3389/fcomm.2024.1376085/full

Frontiers in Integrative Neuroscience

PAPERS

HIROAKI ISHIDA, LAURA CLARA GRANDI & LUCA FORNIA – Secondary somatosensory and posterior insular cortices: a somatomotor hub for object prehension and manipulation movements

The secondary somatosensory cortex (SII) and posterior insular cortex (pIC) are recognized for processing touch and movement information during hand manipulation in humans and non-human primates. However, their involvement in three-dimensional (3D) object manipulation remains unclear. To investigate neural activity related to hand manipulation in the SII/pIC, we trained two macaque monkeys to grasp three objects (a cone, a plate, and a ring) and engage in visual fixation on the object. Our results revealed that 19.4% (n = 50/257) of the task-related neurons in SII/pIC were active during hand manipulations, but did not respond to passive somatosensory stimuli. Among these neurons, 44% fired before hand-object contact (reaching to grasping neurons), 30% maintained tonic activity after contact (holding neurons), and 26% showed continuous discharge before and after contact (non-selective neurons). Object grasping-selectivity varied and was weak among these neurons, with only 24% responding to fixation of a 3D object (visuo-motor neurons). Even neurons unresponsive to passive visual stimuli showed responses to set-related activity before the onset of movement (42%, n = 21/50). Our findings suggest that somatomotor integration within SII/pIC is probably integral to all prehension sequences, including reaching, grasping, and object manipulation movements. Moreover, the existence of a set-related activity within SII/pIC may play a role in directing somatomotor attention during object prehension-manipulation in the absence of vision.

Overall, SII/pIC may play a role as a somatomotor hub within the lateral grasping network that supports the generation of intentional hand actions based on haptic information.
https://www.frontiersin.org/articles/10.3389/fnint.2024.1346968/full

Frontiers in Psychology

PAPERS

KATSUO TAMAOKA et al – Syntactic structures in motion: investigating word order variations in verb-final (Korean) and verb-initial (Tongan) languages

This study explored sentence processing in two typologically distinct languages: Korean, a verb-final language, and Tongan, a verb-initial language. The first experiment revealed that in Korean, sentences arranged in the scrambled OSV (Object, Subject, Verb) order were processed more slowly than those in the canonical SOV order, highlighting a scrambling effect. It also found that sentences with subject topicalization in the SOV order were processed as swiftly as those in the canonical form, whereas sentences with object topicalization in the OSV order were processed with speeds and accuracy comparable to scrambled sentences. However, since topicalization and scrambling in Korean use the same OSV order, independently distinguishing the effects of topicalization is challenging. In contrast, Tongan allows for a clear separation of word orders for topicalization and scrambling, facilitating an independent evaluation of topicalization effects. The second experiment, employing a maze task, confirmed that Tongan's canonical VSO order was processed more efficiently than the VOS scrambled order, thereby verifying a scrambling effect. The third experiment investigated the effects of both scrambling and topicalization in Tongan, finding that the canonical VSO order was processed most efficiently in terms of speed and accuracy, unlike the VOS scrambled and SVO topicalized orders. Notably, the OVS object-topicalized order was processed as efficiently as the VSO canonical order, while the SVO subject-topicalized order was slower than VSO but faster than VOS. By independently assessing the effects of topicalization apart from scrambling, this study demonstrates that both subject and object topicalization in Tongan facilitate sentence processing, contradicting the predictions based on movement-based anticipation.
https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1360191/full

Frontiers in Robotics and AI

PAPERS

KOSUKE SASAKI, JUMPEI NISHIKAWA & JUNYA MORITA – Evaluation of co-speech gestures grounded in word-distributed representation

The condition for artificial agents to possess perceivable intentions can be considered that they have resolved a form of the symbol grounding problem. Here, the symbol grounding is considered an achievement of the state where the language used by the agent is endowed with some quantitative meaning extracted from the physical world. To achieve this type of symbol grounding, we adopt a method for characterizing robot gestures with quantitative meaning calculated from word-distributed representations constructed from a large corpus of text. In this method, a "size image" of a word is generated by defining an axis (index) that discriminates the "size" of the word in the word-distributed vector space. The generated size images are converted into gestures generated by a physical artificial agent (robot). The robot's gesture can be set to reflect either the size of the word in terms of the amount of movement or in terms of its posture. To examine the perception of communicative intention in the robot that performs the gestures generated as described above, the authors examine human ratings on "the naturalness" obtained through an online survey, yielding results that partially validate our proposed method. Based on the results, the authors argue for the possibility of developing advanced artifacts that achieve human-like symbolic grounding.
https://www.frontiersin.org/articles/10.3389/frobt.2024.1362463/full

Language and Cognition

PAPERS

JORGE A. ALVARADO, CARLOS VELASCO & ALEJANDRO SALGADO – The organization of semantic associations between senses in language

Distributional semantic representations were used to investigate crossmodal correspondences within language, offering a comprehensive analysis of how sensory experiences interconnect in linguistic constructs. By computing semantic proximity between words from different sensory modalities, a crossmodal semantic network was constructed, providing a general view of crossmodal correspondences in the English language. Community detection techniques were applied to unveil domains of experience where crossmodal correspondences were likely to manifest, while also considering the role of affective dimensions in shaping these domains. The study revealed the existence of an architecture of structured domains of experience in language, whereby crossmodal correspondences are deeply embedded. The present research highlights the roles of emotion and statistical associations in the organization of sensory concepts across modalities in language. The domains identified, including food, the body, the physical world and emotions/values, underscored the intricate interplay between the senses, emotion and semantic patterns. These findings align with the embodied lexicon hypothesis and the semantic coding hypothesis, emphasizing the capacity of language to capture and reflect crossmodal correspondences'

emotional and perceptual subtleties in the form of networks, while also revealing opportunities for further perceptual research on crossmodal correspondences and multisensory integration.
https://www.cambridge.org/core/journals/language-and-cognition/article/organization-of-semantic-associations-between-senses-in-language/BE2D5A36C217A0C5A18AF552BB4E5825

Mind & Language

PAPERS

JIANGTIAN LI – Semantic minimalism and the continuous nature of polysemy
Polysemy has recently emerged as a popular topic in philosophy of language. While much existing research focuses on the relatedness among senses, this article introduces a novel perspective that emphasizes the continuity of sense individuation, sense regularity, and sense productivity. This new perspective has only recently gained traction, largely due to advancements in computational linguistics. It also poses a serious challenge to semantic minimalism, so I present three arguments against minimalism from the continuous perspective that touch on the minimal concept, the distinction from homonymy, and the quasi-rule-like nature of polysemy. Last, I provide an account of polysemy that incorporates this continuous perspective.
https://onlinelibrary.wiley.com/doi/full/10.1111/mila.12509

Nature Communications

PAPERS

TRISTAN SALLES et al – Physiography, foraging mobility, and the first peopling of Sahul
The route and speed of migration into Sahul by Homo sapiens remain a major research question in archaeology. Here, we introduce an approach which models the impact of the physical environment on human mobility by combining time-evolving landscapes with Lévy walk foraging patterns, this latter accounting for a combination of short-distance steps and occasional longer moves that hunter-gatherers likely utilised for efficient exploration of new environments. Our results suggest a wave of dispersal radiating across Sahul following riverine corridors and coastlines. Estimated migration speeds, based on archaeological sites and predicted travelled distances, fall within previously reported range from Sahul and other regions. From our mechanistic movement simulations, we then analyse the likelihood of archaeological sites and highlight areas in Australia that hold archaeological potential. Our approach complements existing methods and provides interesting perspectives on the Pleistocene archaeology of Sahul that could be applied to other regions around the world.
https://www.nature.com/articles/s41467-024-47662-1

LÉA GUYON et al – Patrilineal segmentary systems provide a peaceful explanation for the post-Neolithic Y-chromosome bottleneck
Studies have found a pronounced decline in male effective population sizes worldwide around 3000–5000 years ago. This bottleneck was not observed for female effective population sizes, which continued to increase over time. Until now, this remarkable genetic pattern was interpreted as the result of an ancient structuring of human populations into patrilineal groups (gathering closely related males) violently competing with each other. In this scenario, violence is responsible for the repeated extinctions of patrilineal groups, leading to a significant reduction in male effective population size. Here, we propose an alternative hypothesis by modelling a segmentary patrilineal system based on anthropological literature. We show that variance in reproductive success between patrilineal groups, combined with lineal fission (i.e., the splitting of a group into two new groups of patrilineally related individuals), can lead to a substantial reduction in the male effective population size without resorting to the violence hypothesis. Thus, a peaceful explanation involving ancient changes in social structures, linked to global changes in subsistence systems, may be sufficient to explain the reported decline in Y-chromosome diversity.
https://www.nature.com/articles/s41467-024-47618-5

LEI XING et al with SVANTE PÄÄBO – Functional synergy of a human-specific and an ape-specific metabolic regulator in human neocortex development
Metabolism has recently emerged as a major target of genes implicated in the evolutionary expansion of human neocortex. One such gene is the human-specific gene ARHGAP11B. During human neocortex development, ARHGAP11B increases the abundance of basal radial glia, key progenitors for neocortex expansion, by stimulating glutaminolysis (glutamine-to-glutamate-to-alpha-ketoglutarate) in mitochondria. Here we show that the ape-specific protein GLUD2 (glutamate dehydrogenase 2), which also operates in mitochondria and converts glutamate-to-αKG, enhances ARHGAP11B's ability to increase basal radial glia abundance. ARHGAP11B + GLUD2 double-transgenic bRG show increased production of aspartate, a metabolite essential for cell proliferation, from glutamate via alpha-ketoglutarate and the TCA cycle. Hence, during human evolution, a human-specific gene exploited the existence of another gene that emerged during ape evolution, to increase, via concerted changes in metabolism, progenitor abundance and neocortex size.
https://www.nature.com/articles/s41467-024-47437-8

Nature Computational Science

ARTICLES

VALERIO CAPRARO & MATJAŽ PERC – In search of the most cooperative network

Cooperation is crucial for human prosperity, and population structure fosters it through pairwise interactions and coordinated behavior in larger groups. A recent study explores the evolution of behavioral strategies in higher-order population structures, including pairwise and multi-way interactions to reveal that higher-order interactions promote cooperation across networks, especially when they are formed by conjoined communities.
https://www.nature.com/articles/s43588-024-00623-6

Nature Ecology & Evolution

PAPERS

LAURA A. VAN HOLSTEIN & ROBERT A. FOLEY – Diversity-dependent speciation and extinction in hominins

The search for drivers of hominin speciation and extinction has tended to focus on the impact of climate change. Far less attention has been paid to the role of interspecific competition. However, research across vertebrates more broadly has shown that both processes are often correlated with species diversity, suggesting an important role for interspecific competition. Here we ask whether hominin speciation and extinction conform to the expected patterns of negative and positive diversity dependence, respectively. We estimate speciation and extinction rates from fossil occurrence data with preservation variability priors in a validated Bayesian framework and test whether these rates are correlated with species diversity. We supplement these analyses with calculations of speciation rate across a phylogeny, again testing whether these are correlated with diversity. Our results are consistent with clade-wide diversity limits that governed speciation in hominins overall but that were not quite reached by the Australopithecus and Paranthropus subclade before its extinction. Extinction was not correlated with species diversity within the Australopithecus and Paranthropus subclade or within hominins overall; this is concordant with climate playing a greater part in hominin extinction than speciation. By contrast, Homo is characterized by positively diversity-dependent speciation and negatively diversity-dependent extinction—both exceedingly rare patterns across all forms of life. The genus Homo expands the set of reported associations between diversity and macroevolution in vertebrates, underscoring that the relationship between diversity and macroevolution is complex. These results indicate an important, previously underappreciated and comparatively unusual role of biotic interactions in Homo macroevolution, and speciation in particular. The unusual and unexpected patterns of diversity dependence in Homo speciation and extinction may be a consequence of repeated Homo range expansions driven by interspecific competition and made possible by recurrent innovations in ecological strategies. Exploring how hominin macroevolution fits into the general vertebrate macroevolutionary landscape has the potential to offer new perspectives on longstanding questions in vertebrate evolution and shed new light on evolutionary processes within our own lineage.
https://www.nature.com/articles/s41559-024-02390-z

Nature Reviews Psychology

PAPERS

MARIEL K. GODDU & ALISON GOPNIK – The development of human causal learning and reasoning

Causal understanding is a defining characteristic of human cognition. Like many animals, human children learn to control their bodily movements and act effectively in the environment. Like a smaller subset of animals, children intervene: they learn to change the environment in targeted ways. Unlike other animals, children grow into adults with the causal reasoning skills to develop abstract theories, invent sophisticated technologies and imagine alternate pasts, distant futures and fictional worlds. In this Review, we explore the development of human-unique causal learning and reasoning from evolutionary and ontogenetic perspectives. We frame our discussion using an 'interventionist' approach. First, we situate causal understanding in relation to cognitive abilities shared with non-human animals. We argue that human causal understanding is distinguished by its depersonalized (objective) and decontextualized (general) representations. Using this framework, we next review empirical findings on early human causal learning and reasoning and consider the naturalistic contexts that support its development. Then we explore connections to related abilities. We conclude with suggestions for ongoing collaboration between developmental, cross-cultural, computational, neural and evolutionary approaches to causal understanding.
https://www.nature.com/articles/s44159-024-00300-5

Nature Scientific Reports

PAPERS

ANASTASIA MALYSHEVSKAYA et al – Horizontal mapping of time-related words in first and second language

The existence of a consistent horizontal spatial-conceptual mapping for words denoting time is a well-established phenomenon. For example, words related to the past or future (e.g., yesterday/tomorrow) facilitate respective leftward/rightward attentional shifts and responses, suggesting the visual-spatial grounding of temporal semantics, at least in the native language (L1). To examine whether similar horizontal bias also accompanies access to time-related words in a second language (L2), we tested 53 Russian-English (Experiment 1) and 48 German-English (Experiment 2) bilinguals, who

classified randomly presented L1 and L2 time-related words as past- or future-related using left or right response keys. The predicted spatial congruency effect was registered in all tested languages and, furthermore, was positively associated with higher L2 proficiency in Experiment 2. Our findings (1) support the notion of horizontal spatial-conceptual mapping in diverse L1s, (2) demonstrate the existence of a similar spatial bias when processing temporal words in L2, and (3) show that the strength of time-space association in L2 may depend on individual L2 proficiency.
https://www.nature.com/articles/s41598-024-60062-1

ALEXANDROS HERACLIDES et al – Palaeogenomic insights into the origins of early settlers on the island of Cyprus
Archaeological evidence supports sporadic seafaring visits to the Eastern Mediterranean island of Cyprus by Epipaleolithic hunter-gatherers over 12,000 years ago, followed by permanent settlements during the early Neolithic. The geographical origins of these early seafarers have so far remained elusive. By systematically analysing all available genomes from the late Pleistocene to early Holocene Near East (c. 14,000–7000 cal BCE), we provide a comprehensive overview of the genetic landscape of the early Neolithic Fertile Crescent and Anatolia and infer the likely origins of three recently published genomes from Kissonerga-Mylouthkia (Cypriot Late Pre-Pottery Neolithic B, c. 7600–6800 cal BCE). These appear to derive roughly 80% of their ancestry from Aceramic Neolithic Central Anatolians residing in or near the Konya plain, and the remainder from a genetically basal Levantine population. Based on genome-wide weighted ancestry covariance analysis, we infer that this admixture event took place roughly between 14,000 and 10,000 BCE, coinciding with the transition from the Cypriot late Epipaleolithic to the Pre-Pottery Neolithic A (PPNA). Additionally, we identify strong genetic affinities between the examined Cypro-LPPNB individuals and later northwestern Anatolians and the earliest European Neolithic farmers. Our results inform archaeological evidence on prehistoric demographic processes in the Eastern Mediterranean, providing important insights into early seafaring, maritime connections, and insular settlement.
https://www.nature.com/articles/s41598-024-60161-z

ELLERY FRAHM et al – Increasing obsidian diversity during the Chalcolithic Period at Yeghegis-1 Rockshelter (Armenia) reveals shifts in land use and social networks
The newly excavated rockshelter of Yeghegis-1 in Armenia reflects an occupation of five centuries, as attested by radiocarbon dates from ~ 4100 to 4000 cal BCE in the lowest layer to ~ 3600–3500 cal BCE at the top. It is a partially collapsed cave in which pastoralists, we hypothesize, wintered with their herds. The stone tool assemblage is predominantly obsidian (92.1%), despite the shelter being > 60 km on foot from the nearest sources. We use obsidian sourcing to investigate two purported trends in the Southern Caucasus during the Chalcolithic Period: (1) occupation of more varied high-altitude environments and (2) more expansive social networks. Our data show both trends were dynamic phenomena. There was a greater balance in use of the nearest pasturelands over time, perhaps linked to risk management and/or resource sustainability. During later occupations, artifacts from distant sources reveal more extensive connections. This increase in connectivity likely played a central role in the shifts in societal complexity that gave rise to widely shared material culture throughout the Armenian Highlands around the start of the Early Bronze Age. In such a model, greater social connectivity becomes a key mechanism for, rather than a product of, the spread of cultural and/or technological innovations.
https://www.nature.com/articles/s41598-024-59661-9

New Scientist

NEWS

Early humans spread as far north as Siberia 400,000 years ago
A site in Siberia has evidence of human presence 417,000 years ago, raising the possibility that hominins could have reached North America much earlier than we thought.
https://www.newscientist.com/article/2427163-early-humans-spread-as-far-north-as-siberia-400000-years-ago/

Ancient humans lived inside a lava tube in the Arabian desert
Underground tunnels created by lava flows provided humans with shelter for thousands of years beneath the hot desert landscape of Saudi Arabia.
https://www.newscientist.com/article/2427222-ancient-humans-lived-inside-a-lava-tube-in-the-arabian-desert/

Philosophical Transactions of the Royal Society A

PAPERS

SOURAV ROY et al – The eco-evolutionary dynamics of strategic species
Much research has in recent years been devoted to better our understanding of the intricate relationships between ecology and the evolutionary success of species. These explorations have often focused on understanding the complex interplay among ecological factors and evolutionary rhythms of the species in various environments. Central to these studies is the concept of the survival of the fittest, proposed by Charles Darwin, where evolutionary circumstances, often portrayed as social dilemmas, favour the welfare of self-interested over others. To further advance this line of research, we here develop a theoretical framework that features three interconnected traits in an evolutionary setting, namely: prey, predator and

parasite, each adopting distinct strategies akin to a social dilemma and resembling a Rock-Paper-Scissors scenario. These traits, which we term strategic species, adhere to the eco-evolutionary game dynamics. We further extend our analysis by conducting a sensitivity assessment of the system's payoff parameters using the Sobol indices.
https://royalsocietypublishing.org/doi/10.1098/rspa.2024.0127

Philosophical Transactions of the Royal Society B

PAPERS

A. VATN et al – Incorporating diverse values of nature in decision-making—theory and practice
Values play a significant role in decision-making, especially regarding nature. Decisions impact people and nature in complex ways and understanding which values are prioritised, and which are left out is an important task for improving the equity and effectiveness of decision-making. Based on work done for the IPBES Values Assessment, this paper develops a framework to support analyses of how decision-making influences nature as well as whose values get prioritised. The framework is used to analyse key areas of environmental policy: a) the present model for nature protection in market economies, b) the role of valuation in bringing nature values into decisions, and c) values embedded in environmental policy instruments, exemplified by protected areas for nature conservation and payments for ecosystem services. The analyses show that environmental policies have been established as mere additions to decision-making structures that foster economic expansion, which undermines a wide range of nature's values. Moreover, environmental policies themselves are also focused on a limited set of nature's diverse values.
https://royalsocietypublishing.org/doi/10.1098/rstb.2022.0315

J. M. ANDERIES & C. FOLKE – Connecting human behaviour, meaning and nature
Much of the discourse around climate change and the situation of diverse human societies and cultures in the Anthropocene focuses on responding to scientific understanding of the dynamics of the biosphere by adjusting existing institutional and organizational structures. Our emerging scientific understanding of human behaviour and the mechanisms that enable groups to achieve large-scale coordination and cooperation suggests that incrementally adjusting existing institutions and organizations will not be sufficient to confront current global-scale challenges. Specifically, the transaction costs of operating institutions to induce selfish rational actors to consider social welfare in their decision-making are too high. Rather, we highlight the importance of networks of shared stories that become real—imagined orders—that create context, meaning and shared purpose for framing decisions and guiding action. We explore imagined orders that have contributed to bringing global societies to where they are and propose elements of a science-informed imagined order essential to enabling societies to flourish in the Anthropocene biosphere.
https://royalsocietypublishing.org/doi/full/10.1098/rstb.2022.0314

PNAS

ARTICLES

RAFAELA S. C. TAKESHITA – A life for a (shorter) life: The reproduction–longevity trade-off
No summary available.
https://www.pnas.org/doi/abs/10.1073/pnas.2405089121

Royal Society Open Science

PAPERS

SANTANU ACHARJEE & AMLANJYOTI OZA – Stability in social networks
Dunbar's number is the cognitive limit of human beings to maintain stable relationships with other individuals in their social networks, and it is found to be 150. It is based on the neocortex size of humans. Usually, Dunbar's number and related phenomena are studied from the perspective of an individual. Dunbar's number also plays a crucial role in evolutionary psychology and allied areas. However, no study done so far has considered a couple who are in a stable relationship as a system from the perspective of Dunbar's number and its hierarchy layers. In this paper, we study the impact of Dunbar's number and Dunbar's hierarchy from the perspective of a couple by studying mathematically the conjoint Dunbar graphs for a couple. The cost of romance is the loss of almost two people from one's support network when a human being enters into a new relationship. Thus, we obtain mathematically that there is no significant change in one's friendship if human beings spend negligible time with their partners. Also, along with marriage and friendship development, we attempt to assess how a person's social network structure holds up over the course of a romantic relationship. The stability of personal social networks is discussed through soft set theory and balance theoretic approach.
https://royalsocietypublishing.org/doi/full/10.1098/rsos.231500

MARTINA DE ECCHER, ROGER MUNDRY & NIVEDITA MANI – Children's subjective uncertainty-driven sampling behaviour
Are children and adults sensitive to gaps in their knowledge, and do they actively elicit information to resolve such knowledge gaps? In a cross-situational word learning task, we asked 5-year-olds, 6- to 9-year-olds and adults to estimate

their knowledge of newly learned word–object associations. We then examined whether participants preferentially sampled objects they reported not knowing the label in order to hear their labels again. We also examined whether such uncertainty-driven sampling behaviour led to improved learning. We found that all age groups were sensitive to gaps in their knowledge of the word–object associations, i.e. were more likely to say they had correctly indicated the label of an object when they were correct, relative to when they were incorrect. Furthermore, 6- to 9-year-olds and adults—but not 5-year-olds—were more likely to sample objects whose labels they reported not knowing. In other words, older children and adults displayed sampling behaviour directed at reducing knowledge gaps and uncertainty, while younger children did not. However, participants who displayed more uncertainty-driven sampling behaviour were not more accurate at test. Our findings underscore the role of uncertainty in driving 6- to 9-year-olds' and adults' sampling behaviour and speak to the mechanisms underlying previously reported performance boosts in active learning.
https://royalsocietypublishing.org/doi/full/10.1098/rsos.231283

Science

NEWS

A gene mutation turned these fish into intrepid explorers
That behavioral change could explain the remarkable diversity of cichlid fish in Africa's Lake Tanganyika.
https://www.science.org/content/article/gene-mutation-turned-fish-into-intrepid-explorers

PAPERS

CAROLIN SOMMER-TREMBO et al – The genetics of niche-specific behavioral tendencies in an adaptive radiation of cichlid fishes
Behavior is critical for animal survival and reproduction, and possibly for diversification and evolutionary radiation. However, the genetics behind adaptive variation in behavior are poorly understood. In this work, we examined a fundamental and widespread behavioral trait, exploratory behavior, in one of the largest adaptive radiations on Earth, the cichlid fishes of Lake Tanganyika. By integrating quantitative behavioral data from 57 cichlid species (702 wild-caught individuals) with high-resolution ecomorphological and genomic information, we show that exploratory behavior is linked to macrohabitat niche adaptations in Tanganyikan cichlids. Furthermore, we uncovered a correlation between the genotypes at a single-nucleotide polymorphism upstream of the AMPA glutamate-receptor regulatory gene cacng5b and variation in exploratory tendency. We validated this association using behavioral predictions with a neural network approach and CRISPR-Cas9 genome editing.
https://www.science.org/doi/10.1126/science.adj9228

OBITUARIES

SARAH F. BROSNAN – Frans de Waal (1948–2024)
Frans de Waal, groundbreaking primatologist, died on 14 March. He was 75. De Waal spent his career, as both a scientist and an award-winning science writer, shrinking the distance between humans and animals. He demonstrated through careful observations and experiments that animals exhibit complex thoughts and behaviors that had long been considered the exclusive domain of humans.
https://www.science.org/doi/10.1126/science.adp4966

Trends in Neurosciences

ARTICLES

CAROLYN L. PYTTE – Window into the songbird brain reveals superdiffusive migration of adult-born neurons
In a recent study, Shvedov and colleagues used live two-photon imaging in transgenic zebra finches to reveal migration patterns of neuroblasts through the complex environment of the postembryonic brain. This study highlights the value of ubiquitin C/green fluorescent protein (UBC-GFP) transgenic zebra finches in studying adult neurogenesis and advances our understanding of dispersed long-distance neuronal migration in the adult brain, shedding light on this understudied phenomenon.
https://www.cell.com/trends/neurosciences/abstract/S0166-2236(24)00059-6

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