

EAORC BULLETIN 1,037 – 30 April 2023

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NOTICES

PUBLICATION ALERTS

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

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

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

EDITORIAL INTERJECTIONS

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

NEWS

NATURE BRIEFING – Parrots call each other to be less lonely

Giving pet parrots the opportunity to video call other birds helps to counter isolation and boredom in the intelligent animals. Researchers trained 18 pet parrots, ranging from macaws (*Ara*) to cockatiels (*Nymphicus hollandicus*), to phone a friend using Facebook Messenger. “All caretakers reported perceived benefits, some arguably life-transformative, such as learning to forage or even to fly by watching others,” write the authors in their paper, which includes some well-worth-watching video of parrots chatting.

<https://nature.us17.list-manage.com/track/click?u=2c6057c528fdc6f73fa196d9d&id=7c51dc51d6&e=1db4b9a19b>

SAPIENS – On Flores Island, Do Ape-Men Still Exist?

Flores Island, a part of the Indonesian archipelago, has been home to an array of fascinating animals—from the giant rat to the now-extinct pygmy Stegodon. Among the most famous of the island’s inhabitants was the small-statured hominin *Homo floresiensis*, aptly nicknamed “the Hobbit,” whose remains were first found in 2003. But there’s a humanlike creature that may still be roaming the forests of Flores. In this excerpt from his latest book, *Between Ape and Human: An Anthropologist on the Trail of a Hidden Hominoid*, anthropologist Gregory Forth documents accounts of the mysterious “ape-man”—what the local Lio people call *lai ho’a*.

<https://sapiens.us11.list-manage.com/track/click?u=80f6cf678900daf984bf763b7&id=b09e3efc97&e=dc0eff6180>

SCIENCE.ORG NEWS – Panel urges caution in tying sexual orientation, education levels to genes

Geneticists split on whether such work could help people or perpetuate discrimination.

<https://www.science.org/content/article/panel-urges-caution-tying-sexual-orientation-education-levels-genes>

SCIENCE.ORG NEWS – Oldest human remains from Puerto Rico contradict idea of simple island nomads

Ancient inhabitants ate a diverse diet and buried their dead in a communal spot over hundreds of years.

<https://www.science.org/content/article/oldest-human-remains-puerto-rico-contradict-idea-simple-island-nomads>

PUBLICATIONS

American Journal of Human Genetics

PAPERS

RYAN JOSEPH DANIELS et al – Genetic heritage of the Baphuthi highlights an over-ethnclized notion of “Bushman” in the Maloti-Drakensberg, southern Africa

Using contemporary people as proxies for ancient communities is a contentious but necessary practice in anthropology. In southern Africa, the distinction between the Cape KhoeSan and eastern KhoeSan remains unclear, as ethnicity labels have been changed through time and most communities were decimated if not extirpated. The eastern KhoeSan may have had genetic distinctions from neighboring communities who speak Bantu languages and KhoeSan further away; alternatively, the identity may not have been tied to any notion of biology, instead denoting communities with a nomadic “lifeway” distinct from African agro-pastoralism. The Baphuthi of the 1800s in the Maloti-Drakensberg, southern Africa had a substantial KhoeSan constituency and a lifeway of nomadism, cattle raiding, and horticulture. Baphuthi heritage could provide insights into the history of the eastern KhoeSan. We examine genetic affinities of 23 Baphuthi to discern whether the narrative of KhoeSan descent reflects distinct genetic ancestry. Genome-wide SNP data (Illumina GSA) were merged with 52 global populations, for 160,000 SNPs. Genetic analyses show no support for a unique eastern KhoeSan ancestry distinct from other KhoeSan or southern Bantu speakers. The Baphuthi have strong affinities with early-arriving southern Bantu-speaking (Nguni) communities, as the later-arriving non-Nguni show strong evidence of recent African admixture possibly related to late-Iron Age migrations. The references to communities as “San” and “Bushman” in historic literature has often been misconstrued as

notions of ethnic/biological distinctions. The terms may have reflected ambiguous references to non-sedentary polities instead, as seems to be the case for the eastern “Bushman” heritage of the Baphuthi.

[https://www.cell.com/ajhg/fulltext/S0002-9297\(23\)00102-7](https://www.cell.com/ajhg/fulltext/S0002-9297(23)00102-7)

American Journal of Biological Anthropology

PAPERS

TIAGO FALÓTICO & EDUARDO B. OTTONI – Greater tool use diversity is associated with increased terrestriality in wild capuchin monkeys

Terrestriality was an essential factor in human evolution. Hominins' extensive use of the ground allowed exploring a new range of environments and their objects, including new resources and potential tool raw materials. Capuchin monkeys are primarily arboreal primates but are also the most prolific tool users among platyrrhines, customarily using stone tools on the ground due to physical limitations and material availability.

Our goals were to (1) measure the terrestriality levels of a group of capuchin monkeys and (2) test the hypothesis that terrestriality has a positive effect on the stone tool use variability because the increased time on the ground would offer more opportunities to interact with the available stones, leading to more innovations of tool use behaviors. We predict a more diversified use of stone tools in the population with a higher degree of terrestriality.

This study was on a group of capuchin monkeys (*Sapajus libidinosus*) at Serra da Capivara National Park (SCNP), Brazil. Scan sampling was done for 23 months, recording the behavior and substrate used by the individuals.

The ground use rate was 41%, with no sex difference but an age difference: infants were less terrestrial than juveniles and adults.

Compared to a population with a more limited tool use repertoire (Fazenda Boa Vista), SCNP adult capuchins are more terrestrial (43% v. 27%). Stone tool use diversity and terrestriality in capuchins appear to be positively correlated. Our results support this hypothesis and provide terrestriality measurements of the wild capuchin population with the most complex stone tool kit.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24740>

Biology Letters

PAPERS

YOTAM BEN-OREN et al with ERELLA HOVERS – Modelling effects of inter-group contact on links between population size and cultural complexity

Human populations rely on cultural artefacts for their survival. Populations vary dramatically in the size of their tool repertoires, and the determinants of these cultural repertoire sizes have been the focus of extensive study. A prominent hypothesis, supported by computational models of cultural evolution, asserts that tool repertoire size increases with population size. However, not all empirical studies have found such a correlation, leading to a contentious and ongoing debate. As a possible resolution to this longstanding controversy, we suggest that accounting for even rare cultural migration events that allow sharing of knowledge between different-sized populations may help explain why a population's size might not always predict its cultural repertoire size. Using an agent-based model to test assumptions about the effects of population size and connectivity on tool repertoires, we find that cultural exchange between a focal population and others, particularly with large populations, may significantly boost its tool repertoire size. Thus, two populations of identical size may have drastically different tool repertoire sizes, hinging upon their access to other groups' knowledge. Intermittent contact between populations boosts cultural repertoire size and still allows for the development of unique tool repertoires that have limited overlap between populations.

<https://royalsocietypublishing.org/doi/full/10.1098/rsbl.2023.0020>

Cell Reports

PAPERS

ALIREZA ROUZITALAB et al – Ensembles code for associative learning in the primate lateral prefrontal cortex

The lateral prefrontal cortex (LPFC) of primates is thought to play a role in associative learning. However, it remains unclear how LPFC neuronal ensembles dynamically encode and store memories for arbitrary stimulus-response associations. We recorded the activity of neurons in LPFC of two macaques during an associative learning task using multielectrode arrays. During task trials, the color of a symbolic cue indicated the location of one of two possible targets for a saccade. During a trial block, multiple randomly chosen associations were learned by the subjects. A state-space analysis indicated that LPFC neuronal ensembles rapidly learn new stimulus-response associations mirroring the animals' learning. Multiple associations acquired during training are stored in a neuronal subspace and can be retrieved hours after learning. Finally, knowledge of old associations facilitates learning new, similar associations. These results indicate that neuronal ensembles in the primate LPFC provide a flexible and dynamic substrate for associative learning.

[https://www.cell.com/cell-reports/fulltext/S2211-1247\(23\)00460-6](https://www.cell.com/cell-reports/fulltext/S2211-1247(23)00460-6)

THOMAS E. COPE et al – Temporal lobe perceptual predictions for speech are instantiated in motor cortex and reconciled by inferior frontal cortex

Humans use predictions to improve speech perception, especially in noisy environments. Here we use 7-T functional MRI (fMRI) to decode brain representations of written phonological predictions and degraded speech signals in healthy humans and people with selective frontal neurodegeneration (non-fluent variant primary progressive aphasia [nfvPPA]). Multivariate analyses of item-specific patterns of neural activation indicate dissimilar representations of verified and violated predictions in left inferior frontal gyrus, suggestive of processing by distinct neural populations. In contrast, precentral gyrus represents a combination of phonological information and weighted prediction error. In the presence of intact temporal cortex, frontal neurodegeneration results in inflexible predictions. This manifests neurally as a failure to suppress incorrect predictions in anterior superior temporal gyrus and reduced stability of phonological representations in precentral gyrus. We propose a tripartite speech perception network in which inferior frontal gyrus supports prediction reconciliation in echoic memory, and precentral gyrus invokes a motor model to instantiate and refine perceptual predictions for speech.

[https://www.cell.com/cell-reports/fulltext/S2211-1247\(23\)00433-3](https://www.cell.com/cell-reports/fulltext/S2211-1247(23)00433-3)

Current Biology**PAPERS****LYDIA SMITH-OSBORNE et al – Female dominance hierarchies influence responses to psychosocial stressors**

Social species form dominance hierarchies to ensure survival and promote reproductive success. Traditionally studied in males, rodent hierarchies are considered despotic, and dominant social rank results from a history of winning agonistic encounters. By contrast, female hierarchies are thought to be less despotic, and rank is conferred by intrinsic traits. Both social buffering and elevated social status confer resilience to depression, anxiety, and other consequences of chronic stress. Here, we investigate whether female social hierarchies and individual traits related to social rank likewise influence stress resilience. We observe the formation of dyadic female hierarchies under varying conditions of ambient light and circadian phase and subject mice to two forms of chronic psychosocial stress: social isolation or social instability. We find that stable female hierarchies emerge rapidly in dyads. Individual behavioral and endocrinological traits are characteristic of rank, some of which are circadian phase dependent. Further, female social rank is predicted by behavior and stress status prior to social introduction. Other behavioral characteristics suggest that rank is motivation-based, indicating that female rank identity serves an evolutionarily relevant purpose. Rank is associated with alterations in behavior in response to social instability stress and prolonged social isolation, but the different forms of stress produce disparate rank responses in endocrine status. Histological examination of c-Fos protein expression identified brain regions that respond to social novelty or social reunion following chronic isolation in a rank-specific manner. Collectively, female rank is linked to neurobiology, and hierarchies exert context-specific influence upon stress outcomes.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00308-1](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00308-1)

MANUEL ANGLADA-TORT et al – Large-scale iterated singing experiments reveal oral transmission mechanisms underlying music evolution

Speech and song have been transmitted orally for countless human generations, changing over time under the influence of biological, cognitive, and cultural pressures. Cross-cultural regularities and diversities in human song are thought to emerge from this transmission process, but testing how underlying mechanisms contribute to musical structures remains a key challenge. Here, we introduce an automatic online pipeline that streamlines large-scale cultural transmission experiments using a sophisticated and naturalistic modality: singing. We quantify the evolution of 3,424 melodies orally transmitted across 1,797 participants in the United States and India. This approach produces a high-resolution characterization of how oral transmission shapes melody, revealing the emergence of structures that are consistent with widespread musical features observed cross-culturally (small pitch sets, small pitch intervals, and arch-shaped melodic contours). We show how the emergence of these structures is constrained by individual biases in our participants—vocal constraints, working memory, and cultural exposure—which determine the size, shape, and complexity of evolving melodies. However, their ultimate effect on population-level structures depends on social dynamics taking place during cultural transmission. When participants recursively imitate their own productions (individual transmission), musical structures evolve slowly and heterogeneously, reflecting idiosyncratic musical biases. When participants instead imitate others' productions (social transmission), melodies rapidly shift toward homogeneous structures, reflecting shared structural biases that may underpin cross-cultural variation. These results provide the first quantitative characterization of the rich collection of biases that oral transmission imposes on music evolution, giving us a new understanding of how human song structures emerge via cultural transmission.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00243-9](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00243-9)

JINGXUAN LIU et al – Language experience predicts music processing in a half-million speakers of fifty-four languages

Tonal languages differ from other languages in their use of pitch (tones) to distinguish words. Lifelong experience speaking and hearing tonal languages has been argued to shape auditory processing in ways that generalize beyond the perception of linguistic pitch to the perception of pitch in other domains like music. We conducted a meta-analysis of prior studies testing this idea, finding moderate evidence supporting it. But prior studies were limited by mostly small sample sizes representing a small number of languages and countries, making it challenging to disentangle the effects of linguistic experience from

variability in music training, cultural differences, and other potential confounds. To address these issues, we used web-based citizen science to assess music perception skill on a global scale in 34,034 native speakers of 19 tonal languages (e.g., Mandarin, Yoruba). We compared their performance to 459,066 native speakers of other languages, including 6 pitch-accented (e.g., Japanese) and 29 non-tonal languages (e.g., Hungarian). Whether or not participants had taken music lessons, native speakers of all 19 tonal languages had an improved ability to discriminate musical melodies on average, relative to speakers of non-tonal languages. But this improvement came with a trade-off: tonal language speakers were also worse at processing the musical beat. The results, which held across native speakers of many diverse languages and were robust to geographic and demographic variation, demonstrate that linguistic experience shapes music perception, with implications for relations between music, language, and culture in the human mind.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00387-1](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00387-1)

CALEB J. AXELROD, SWANNE P. GORDON & BRUCE A. CARLSON – Integrating neuroplasticity and evolution

Neuroplasticity and evolutionary biology have been prominent fields of study for well over a century. However, they have advanced largely independently, without consideration of the benefits of integration. We propose a new framework by which researchers can begin to examine the evolutionary causes and consequences of neuroplasticity. Neuroplasticity can be defined as changes to the structure, function or connections of the nervous system in response to individual experience. Evolution can alter levels of neuroplasticity if there is variation in neuroplasticity traits within and between populations. Neuroplasticity may be favored or disfavored by natural selection depending on the variability of the environment and the costs of neuroplasticity. Additionally, neuroplasticity may affect rates of genetic evolution in many ways: for example, decreasing rates of evolution by buffering against selection or increasing them via the Baldwin effect, by increasing genetic variation or by incorporating evolved peripheral changes to the nervous system. These mechanisms can be tested using comparative and experimental approaches and by examining patterns and consequences of variation in neuroplasticity among species, populations and individuals.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00269-5](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00269-5)

PIER FRANCESCO FERRARI, CARLOS ANDRÉS MÉNDEZ & GINO COUDÉ – Aggression: The dark side of mirror neurons sheds light on their functions

Mirror neurons have been found mainly in neocortical structures of primates and rodents; however, their functions are still debated. A new study has discovered mirror neurons for aggressive behaviors in the ventromedial hypothalamus of mice, an evolutionarily ancient structure, highlighting a new function key for survival.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00316-0](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00316-0)

eLife

PAPERS

ANDREAS BERGHÄNEL et al – Adolescent length growth spurts in bonobos and other primates: Mind the scale

Adolescent growth spurts (GS) in body length seem to be absent in non-human primates and are considered a distinct human trait. However, this distinction between present and absent length-GSs may reflect a mathematical artefact that makes it arbitrary. We first outline how scaling issues and inappropriate comparisons between length (linear) and weight (volume) growth rates result in misleading interpretations like the absence of length-GSs in non-human primates despite pronounced weight-GSs, or temporal delays between length- and weight-GSs. We then apply a scale-corrected approach to a comprehensive dataset on 258 zoo-housed bonobos that includes weight and length growth as well as several physiological markers related to growth and adolescence. We found pronounced GSs in body weight and length in both sexes. Weight and length growth trajectories corresponded with each other and with patterns of testosterone and IGFBP-3 levels, resembling adolescent GSs in humans. We further re-interpreted published data of non-human primates, which showed that aligned GSs in weight and length exist not only in bonobos. Altogether, our results emphasize the importance of considering scaling laws when interpreting growth curves in general, and further show that pronounced, human-like adolescent length-GSs exist in bonobos and probably also many other non-human primates.

<https://elifesciences.org/reviewed-preprints/86635>

SIÂN WILSON et al – Spatiotemporal tissue maturation of thalamocortical pathways in the human fetal brain

The development of connectivity between the thalamus and maturing cortex is a fundamental process in the second half of human gestation, establishing the neural circuits that are the basis for several important brain functions. In this study, we acquired high-resolution in utero diffusion magnetic resonance imaging (MRI) from 140 fetuses as part of the Developing Human Connectome Project, to examine the emergence of thalamocortical white matter over the second to third trimester. We delineate developing thalamocortical pathways and parcellate the fetal thalamus according to its cortical connectivity using diffusion tractography. We then quantify microstructural tissue components along the tracts in fetal compartments that are critical substrates for white matter maturation, such as the subplate and intermediate zone. We identify patterns of change in the diffusion metrics that reflect critical neurobiological transitions occurring in the second to third trimester, such as the disassembly of radial glial scaffolding and the lamination of the cortical plate. These maturational trajectories of MR

signal in transient fetal compartments provide a normative reference to complement histological knowledge, facilitating future studies to establish how developmental disruptions in these regions contribute to pathophysiology.

<https://elifesciences.org/articles/83727>

Evolutionary Anthropology

PAPERS

RAVEN GARVEY – Human consumption of large herbivore digesta and its implications for foraging theory

Vegetal matter undergoing digestion in herbivores' stomachs and intestines, digesta, can be an important source of dietary carbohydrates for human foragers. Digesta significantly increases large herbivores' total caloric yield and broadens their nutritional profile to include three key macronutrients (protein, fat, and carbohydrates) in amounts sufficient to sustain small foraging groups for multiple days without supplementation. Ethnographic reports of routine digesta consumption are limited to high latitudes, but the practice may have had a wider distribution prehistorically. Including this underappreciated resource in our foraging hypotheses and models can substantively change their predictions. Assessing the explanatory power of kilocalorie-centered models relative to ones that attend to humans' other nutritional requirements can help us better address major questions in evolutionary anthropology. This paper explores the foraging implications of digesta in two contexts—sex-divided subsistence labor and archaeologically observed increases in plant use and sedentism—using estimates of available protein and carbohydrates in the native tissues and digesta, respectively, of a large ruminant herbivore (*Bison bison*).

<https://onlinelibrary.wiley.com/doi/abs/10.1002/evan.21979>

Frontiers in Psychology

PAPERS

ELIZABETH QING ZHANG, EDWARD RUOYANG SHI & LLUÍS BARCELÓ-COBLIJN – Categorical perception and language evolution: a comparative and neurological perspective

Categorical Perception (CP) is a ubiquitous phenomenon in nature (Eimas et al., 1971; Goldstone and Hendrickson, 2010). Discreteness is a prominent feature of human language (Hockett, 1960). In this paper, we propose that CP could have played a foundational role for discreteness of language in evolution. We firstly approach discreteness from a domain general perspective and highlight how it is salient in language. Then by reviewing CP of sounds in non-human animals, we argue that CP has its phylogenetic roots in terms of evolution. Following this, we explain how CP could have been the basis for discreteness with neurological evidence focusing on the auditory cortex, (pre)motor cortex and the basal ganglia. At last, we suggest that clinical linguistics provides revealing insights on the role of CP in language. The current work discusses the role of perception in language evolution, which provides a new avenue to explore the evolution of human language from the sensory-motor system.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1110730/full>

MARIA TERESA GUASTI, ARTEMIS ALEXIADOU & ULI SAUERLAND – Undercompression errors as evidence for conceptual primitives

The Meaning First Approach offers a model of the relation between thought and language that includes a Generator and a Compressor. The Generator build non-linguistic thought structures and the Compressor is responsible for its articulation through three processes: structure-preserving linearization, lexification, and compression via non-articulation of concepts when licensed. One goal of this paper is to show that a range of phenomena in child language can be explained in a unified way within the Meaning First Approach by the assumption that children differ from adults with respect to compression and, specifically, that they may undercompress in production, an idea that sets a research agenda for the study of language acquisition. We focus on dependencies involving pronouns or gaps in relative clauses and wh-questions, multi-argument verbal concepts, and antonymic concepts involving negation or other opposites. We present extant evidence from the literature that children produce undercompression errors (a type of commission errors) that are predicted by the Meaning First Approach. We also summarize data that children's comprehension ability provides evidence for the Meaning First Approach prediction that decompression should be challenging, when there is no 1-to-1 correspondence.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1104930/full>

Frontiers in Psychiatry

PAPERS

JING-YI LI et al – Data-driven evolutionary game models for the spread of fairness and cooperation in heterogeneous networks

Unique large-scale cooperation and fairness norms are essential to human society, but the emergence of prosocial behaviors is elusive. The fact that heterogeneous social networks prevail raised a hypothesis that heterogeneous networks facilitate fairness and cooperation. However, the hypothesis has not been validated experimentally, and little is known about the evolutionary psychological basis of cooperation and fairness in human networks. Fortunately, research about oxytocin, a neuropeptide, may provide novel ideas for confirming the hypothesis. Recent oxytocin-modulated network game

experiments observed that intranasal administration of oxytocin to a few central individuals significantly increases global fairness and cooperation. Here, based on the experimental phenomena and data, we show a joint effect of social preference and network heterogeneity on promoting prosocial behaviors by building evolutionary game models. In the network ultimatum game and the prisoner's dilemma game with punishment, inequality aversion can lead to the spread of costly punishment for selfish and unfair behaviors. This effect is initiated by oxytocin, then amplified via influential nodes, and finally promotes global cooperation and fairness. In contrast, in the network trust game, oxytocin increases trust and altruism, but these effects are confined locally. These results uncover general oxytocin-initiated mechanisms underpinning fairness and cooperation in human networks.

<https://www.frontiersin.org/articles/10.3389/fpsy.2023.1131769/full>

Nature

NEWS

Huge cache of mammal genomes offers fresh insights on human evolution

The Zoonomia Project is helping to pinpoint genes responsible for animal-brain size and for human disease.

<https://www.nature.com/articles/d41586-023-01446-7>

Nature Ecology & Evolution

PAPERS

MANUEL BOHN et al with JOHANNA ECKERT – Great ape cognition is structured by stable cognitive abilities and predicted by developmental conditions

Great ape cognition is used as a reference point to specify the evolutionary origins of complex cognitive abilities, including in humans. This research often assumes that great ape cognition consists of cognitive abilities (traits) that account for stable differences between individuals, which change and develop in response to experience. Here, we test the validity of these assumptions by assessing repeatability of cognitive performance among captive great apes (Gorilla gorilla, Pongo abelii, Pan paniscus, Pan troglodytes) in five tasks covering a range of cognitive domains. We examine whether individual characteristics (age, group, test experience) or transient situational factors (life events, testing arrangements or sociality) influence cognitive performance. Our results show that task-level performance is generally stable over time; four of the five tasks were reliable measurement tools. Performance in the tasks was best explained by stable differences in cognitive abilities (traits) between individuals. Cognitive abilities were further correlated, suggesting shared cognitive processes. Finally, when predicting cognitive performance, we found stable individual characteristics to be more important than variables capturing transient experience. Taken together, this study shows that great ape cognition is structured by stable cognitive abilities that respond to different developmental conditions.

<https://www.nature.com/articles/s41559-023-02050-8>

Nature Human Behaviour

PAPERS

THE FORECASTING COLLABORATIVE – Insights into the accuracy of social scientists' forecasts of societal change

How well can social scientists predict societal change, and what processes underlie their predictions? To answer these questions, we ran two forecasting tournaments testing the accuracy of predictions of societal change in domains commonly studied in the social sciences: ideological preferences, political polarization, life satisfaction, sentiment on social media, and gender–career and racial bias. After we provided them with historical trend data on the relevant domain, social scientists submitted pre-registered monthly forecasts for a year (Tournament 1; N = 86 teams and 359 forecasts), with an opportunity to update forecasts on the basis of new data six months later (Tournament 2; N = 120 teams and 546 forecasts).

Benchmarking forecasting accuracy revealed that social scientists' forecasts were on average no more accurate than those of simple statistical models (historical means, random walks or linear regressions) or the aggregate forecasts of a sample from the general public (N = 802). However, scientists were more accurate if they had scientific expertise in a prediction domain, were interdisciplinary, used simpler models and based predictions on prior data.

<https://www.nature.com/articles/s41562-022-01517-1>

BASILE GARCIA et al – Experiential values are underweighted in decisions involving symbolic options

Standard models of decision-making assume each option is associated with subjective value, regardless of whether this value is inferred from experience (experiential) or explicitly instructed probabilistic outcomes (symbolic). In this study, we present results that challenge the assumption of unified representation of experiential and symbolic value. Across nine experiments, we presented participants with hybrid decisions between experiential and symbolic options. Participants' choices exhibited a pattern consistent with a systematic neglect of the experiential values. This normatively irrational decision strategy held after accounting for alternative explanations, and persisted even when it bore an economic cost. Overall, our results demonstrate that experiential and symbolic values are not symmetrically considered in hybrid decisions, suggesting they recruit different representational systems that may be assigned different priority levels in the decision process. These findings challenge the dominant models commonly used in value-based decision-making research.

<https://www.nature.com/articles/s41562-022-01496-3>

Nature Neuroscience

PAPERS

TAO HONG & WILLIAM R. STAUFFER – Computational complexity drives sustained deliberation

Economic deliberations are slow, effortful and intentional searches for solutions to difficult economic problems. Although such deliberations are critical for making sound decisions, the underlying reasoning strategies and neurobiological substrates remain poorly understood. Here two nonhuman primates performed a combinatorial optimization task to identify valuable subsets and satisfy predefined constraints. Their behavior revealed evidence of combinatorial reasoning—when low-complexity algorithms that consider items one at a time provided optimal solutions, the animals adopted low-complexity reasoning strategies. When greater computational resources were required, the animals approximated high-complexity algorithms that search for optimal combinations. The deliberation times reflected the demands created by computational complexity—high-complexity algorithms require more operations and, concomitantly, the animals deliberated for longer durations. Recurrent neural networks that mimicked low- and high-complexity algorithms also reflected the behavioral deliberation times and were used to reveal algorithm-specific computations that support economic deliberation. These findings reveal evidence for algorithm-based reasoning and establish a paradigm for studying the neurophysiological basis for sustained deliberation.

<https://www.nature.com/articles/s41593-023-01307-6>

Nature Scientific Data

PAPERS

JUNICHI HATA et al – Multi-modal brain magnetic resonance imaging database covering marmosets with a wide age range

Magnetic resonance imaging (MRI) is a non-invasive neuroimaging technique that is useful for identifying normal developmental and aging processes and for data sharing. Marmosets have a relatively shorter life expectancy than other primates, including humans, because they grow and age faster. Therefore, the common marmoset model is effective in aging research. The current study investigated the aging process of the marmoset brain and provided an open MRI database of marmosets across a wide age range. The Brain/MINDS Marmoset Brain MRI Dataset contains brain MRI information from 216 marmosets ranging in age from 1 and 10 years. At the time of its release, it is the largest public dataset in the world. It also includes multi-contrast MRI images. In addition, 91 of 216 animals have corresponding high-resolution ex vivo MRI datasets. Our MRI database, available at the Brain/MINDS Data Portal, might help to understand the effects of various factors, such as age, sex, body size, and fixation, on the brain. It can also contribute to and accelerate brain science studies worldwide.

<https://www.nature.com/articles/s41597-023-02121-2>

Nature Scientific Reports

PAPERS

P. TIESINGA et al – Uncovering the fast, directional signal flow through the human temporal pole during semantic processing

The temporal pole (TP) plays a central role in semantic memory, yet its neural machinery is unknown. Intracerebral recordings in patients discriminating visually the gender or actions of an actor, yielded gender discrimination responses in the ventrolateral (VL) and tip (T) regions of right TP. Granger causality revealed task-specific signals travelling first forward from VL to T, under control of orbitofrontal cortex (OFC) and neighboring prefrontal cortex, and then, strongly, backwards from T to VL. Many other cortical regions provided inputs to or received outputs from both TP regions, often with longer delays, with ventral temporal afferents to VL signaling the actor's physical appearance. The TP response timing reflected more that of the connections to VL, controlled by OFC, than that of the input leads themselves. Thus, visual evidence for gender categories, collected by VL, activates category labels in T, and consequently, category features in VL, indicating a two-stage representation of semantic categories in TP.

<https://www.nature.com/articles/s41598-023-33318-5>

IRIS BERENT – The illusion of the mind–body divide is attenuated in males

A large literature suggests that people are intuitive Dualists—they tend to perceive the mind as ethereal, distinct from the body. Here, we ask whether Dualism emanates from within the human psyche, guided, in part, by theory of mind (ToM). Past research has shown that males are poorer mind-readers than females. If ToM begets Dualism, then males should exhibit weaker Dualism, and instead, lean towards Physicalism (i.e., they should view bodies and minds alike). Experiments 1–2 show that males indeed perceive the psyche as more embodied—as more likely to emerge in a replica of one's body, and less likely to persist in its absence (after life). Experiment 3 further shows that males are less inclined towards Empiricism—a putative byproduct of Dualism. A final analysis confirms that males' ToM scores are lower, and ToM scores further correlate with embodiment intuitions (in Experiments 1–2). These observations (from Western participants) cannot establish universality,

but the association of Dualism with ToM suggests its roots are psychological. Thus, the illusory mind–body divide may arise from the very workings of the human mind.

<https://www.nature.com/articles/s41598-023-33079-1>

TAKUO NEGISHI & NAOMICHI OGIHARA – Functional significance of vertical free moment for generation of human bipedal walking

In human bipedal walking, the plantar surface of the foot is in contact with the floor surface, so that a vertical free moment (VFM), a torque about a vertical axis acting at the centre-of-pressure due to friction between the foot and the ground, is generated and applied to the foot. The present study investigated the functional significance of the VFM in the mechanics and evolution of human bipedal walking by analysing kinematics and kinetics of human walking when the VFM is selectively eliminated using point-contact shoes. When the VFM was selectively eliminated during walking, the thorax and pelvis axially rotated in-phase, as opposed to normal out-of-phase rotation. The amplitudes of the axial rotation also significantly increased, indicating that the VFM greatly contributes to stable and efficient bipedal walking. However, such changes in the trunk movement occurred only when arm swing was restricted, suggesting that the VFM is critical only when arm swing is restrained. Therefore, the human plantigrade foot capable of generating large VFM is possibly adaptive for bipedal walking with carrying food, corroborating with the so-called provisioning hypothesis that food carrying in the early hominins is a selective pressure for the evolution of human bipedalism.

<https://www.nature.com/articles/s41598-023-34153-4>

LUIS RÍOS et al – The aorta in humans and African great apes, and cardiac output and metabolic levels in human evolution

Humans have a larger energy budget than great apes, allowing the combination of the metabolically expensive traits that define our life history. This budget is ultimately related to the cardiac output, the product of the blood pumped from the ventricle and the number of heart beats per minute, a measure of the blood available for the whole organism physiological activity. To show the relationship between cardiac output and energy expenditure in hominid evolution, we study a surrogate measure of cardiac output, the aortic root diameter, in humans and great apes. When compared to gorillas and chimpanzees, humans present an increased body mass adjusted aortic root diameter. We also use data from the literature to show that over the human lifespan, cardiac output and total energy expenditure follow almost identical trajectories, with a marked increase during the period of brain growth, and a plateau during most of the adult life. The limited variation of adjusted cardiac output with sex, age and physical activity supports the compensation model of energy expenditure in humans. Finally, we present a first study of cardiac output in the skeleton through the study of the aortic impression in the vertebral bodies of the spine. It is absent in great apes, and present in humans and Neanderthals, large-brained hominins with an extended life cycle. An increased adjusted cardiac output, underlying higher total energy expenditure, would have been a key process in human evolution.

<https://www.nature.com/articles/s41598-023-33675-1>

YURI KAWAGUCHI et al – Revisiting the baby schema by a geometric morphometric analysis of infant facial characteristics across great apes

Infants across species are thought to exhibit specific facial features (termed the “baby schema”, such as a relatively bigger forehead and eyes, and protruding cheeks), with an adaptive function to induce caretaking behaviour from adults. There is abundant empirical evidence for this in humans, but, surprisingly, the existence of a baby schema in non-human animals has not been scientifically demonstrated. We investigated which facial characteristics are shared across infants in five species of great apes: humans, chimpanzees, bonobos, mountain gorillas, and Bornean orangutans. We analysed eight adult and infant faces for each species (80 images in total) using geometric morphometric analysis and machine learning. We found two principal components characterizing infant faces consistently observed across species. These included (1) relatively bigger eyes located lower in the face, (2) a rounder and vertically shorter face shape, and (3) an inverted triangular face shape. While these features are shared, human infant faces are unique in that the second characteristic (round face shape) is more pronounced, whereas the third (inverted triangular face shape) is less pronounced than other species. We also found some infantile features only found in some species. We discuss future directions to investigate the baby schema using an evolutionary approach.

<https://www.nature.com/articles/s41598-023-31731-4>

JIA GUO et al – A game theoretic approach to balance privacy risks and familial benefits

As recreational genomics continues to grow in its popularity, many people are afforded the opportunity to share their genomes in exchange for various services, including third-party interpretation (TPI) tools, to understand their predisposition to health problems and, based on genome similarity, to find extended family members. At the same time, these services have increasingly been reused by law enforcement to track down potential criminals through family members who disclose their genomic information. While it has been observed that many potential users shy away from such data sharing when they learn that their privacy cannot be assured, it remains unclear how potential users' valuations of the service will affect a population's behavior. In this paper, we present a game theoretic framework to model interdependent privacy challenges in

genomic data sharing online. Through simulations, we find that in addition to the boundary cases when (1) no player and (2) every player joins, there exist pure-strategy Nash equilibria when a relatively small portion of players choose to join the genomic database. The result is consistent under different parametric settings. We further examine the stability of Nash equilibria and illustrate that the only equilibrium that is resistant to a random dropping of players is when all players join the genomic database. Finally, we show that when players consider the impact that their data sharing may have on their relatives, the only pure strategy Nash equilibria are when either no player or every player shares their genomic data.

<https://www.nature.com/articles/s41598-023-33177-0>

Neuron

PAPERS

YULIA OGANIAN et al – Vowel and formant representation in the human auditory speech cortex

Vowels, a fundamental component of human speech across all languages, are cued acoustically by formants, resonance frequencies of the vocal tract shape during speaking. An outstanding question in neurolinguistics is how formants are processed neurally during speech perception. To address this, we collected high-density intracranial recordings from the human speech cortex on the superior temporal gyrus (STG) while participants listened to continuous speech. We found that two-dimensional receptive fields based on the first two formants provided the best characterization of vowel sound representation. Neural activity at single sites was highly selective for zones in this formant space. Furthermore, formant tuning is adjusted dynamically for speaker-specific spectral context. However, the entire population of formant-encoding sites was required to accurately decode single vowels. Overall, our results reveal that complex acoustic tuning in the two-dimensional formant space underlies local vowel representations in STG. As a population code, this gives rise to phonological vowel perception.

[https://www.cell.com/neuron/fulltext/S0896-6273\(23\)00266-0](https://www.cell.com/neuron/fulltext/S0896-6273(23)00266-0)

New Scientist

NEWS

Songbirds sing out of tune if they don't practise every day

If zebra finches are prevented from singing for two weeks, they sing at a lower pitch – but they soon recover once they resume daily practice.

<https://www.newscientist.com/article/2369634-songbirds-sing-out-of-tune-if-they-dont-practise-every-day/>

Updated brain map reveals how we control the movement of our bodies

Since the 1930s, the so-called homunculus map has shown how different parts of the brain's motor cortex may control movement to different parts of the body. But it may be missing an important network.

<https://www.newscientist.com/article/2369872-updated-brain-map-reveals-how-we-control-the-movement-of-our-bodies/>

PeerJ

PAPERS

ALEXANDER WEISS et al – Personality traits, rank attainment, and siring success throughout the lives of male chimpanzees of Gombe National Park

Personality traits in many taxa correlate with fitness. Several models have been developed to try to explain how variation in these traits is maintained. One model proposes that variation persists because it is linked to trade-offs between current and future adaptive benefits. Tests of this model's predictions, however, are scant in long-lived species. To test this model, we studied male chimpanzees living in Gombe National Park, Tanzania. We operationalized six personality traits using ratings on 19 items. We used 37 years of behavioral and genetic data to assemble (1) daily rank scores generated from submissive vocalizations and (2) records of male siring success. We tested whether the association between two personality traits, Dominance and Conscientiousness, and either rank or reproductive success, varied over the life course. Higher Dominance and lower Conscientiousness were associated with higher rank, but the size and direction of these relationships did not vary over the life course. In addition, independent of rank at the time of siring, higher Dominance and lower Conscientiousness were related to higher siring success. Again, the size and direction of these relationships did not vary over the life course. The trade-off model, therefore, may not hold in long-lived and/or slowly reproducing species. These findings also demonstrate that ratings are a valid way to measure animal personality; they are related to rank and reproductive success. These traits could therefore be used to test alternative models, including one that posits that personality variation is maintained by environmental heterogeneity, in studies of multiple chimpanzee communities.

<https://peerj.com/articles/15083/>

ERIN A. MCKENNEY et al – Hidden diversity: comparative functional morphology of humans and other species

Gastrointestinal (GI) morphology plays an important role in nutrition, health, and epidemiology; yet limited data on GI variation have been collected since 1885. Here we demonstrate that students can collect reliable data sets on gut morphology; when they do, they reveal greater morphological variation for some structures in the GI tract than has been

documented in the published literature. We discuss trait variability both within and among species, and the implications of that variability for evolution and epidemiology. Our results show that morphological variation in the GI tract is associated with each organ's role in food processing. For example, the length of many structures was found to vary significantly with feeding strategy. Within species, the variability illustrated by the coefficients of variation suggests that selective constraints may vary with function. Within humans, we detected significant Pearson correlations between the volume of the liver and the length of the appendix (t-value = 2.5278, df = 28, p = 0.0174, corr = 0.4311) and colon (t-value = 2.0991, df = 19, p = 0.0494, corr = 0.4339), as well as between the lengths of the small intestine and colon (t-value = 2.1699, df = 17, p = 0.0445, corr = 0.4657), which are arguably the most vital organs in the gut for nutrient absorption. Notably, intraspecific variation in the small intestine can be associated with life history traits. In humans, females demonstrated consistently and significantly longer small intestines than males (t-value = 2.245, p = 0.0403). This finding supports the female canalization hypothesis, specifically, increased female investment in the digestion and absorption of lipids.

<https://peerj.com/articles/15148/>

PLoS One

PAPERS

ELLYN B. PUESCHEL et al – Four-year-olds selectively transmit true information

Two experiments (N = 112) were conducted to examine preschoolers' concern for the truth when transmitting information. A first experiment (Pilot Experiment) revealed that 4-year-olds, but not 3-year-olds, selectively transmitted information marked as true versus information marked as false. The second experiment (Main Experiment) showed that 4-year-olds selectively transmitted true information regardless of whether their audience lacked knowledge (Missing Knowledge Context) or information (Missing Information Context) about the subject matter. Children selected more true information when choosing between true versus false information (Falsity Condition) and when choosing between true information versus information the truth of which was undetermined (Bullshit Condition). The Main Experiment also revealed that 4-year-olds shared information more spontaneously, i.e., before being prompted, when it was knowledge, rather than information, the audience was seeking. The findings add to the field's growing understanding of young children as benevolent sharers of knowledge.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0284694>

DANIEL MAJOR-SMITH et al – Cooperation and partner choice among Agta hunter-gatherer children: An evolutionary developmental perspective

Examining development is essential for a full understanding of behaviour, including how individuals acquire traits and how adaptive evolutionary forces shape these processes. The present study explores the development of cooperative behaviour among the Agta, a Filipino hunter-gatherer population. A simple resource allocation game assessing both levels of cooperation (how much children shared) and patterns of partner choice (who they shared with) was played with 179 children between the ages of 3 and 18. Children were given five resources (candies) and for each was asked whether to keep it for themselves or share with someone else, and if so, who this was. Between-camp variation in children's cooperative behaviour was substantial, and the only strong predictor of children's cooperation was the average level of cooperation among adults in camp; that is, children were more cooperative in camps where adults were more cooperative. Neither age, sex, relatedness or parental levels of cooperation were strongly associated with the amount children shared. Children preferentially shared with close kin (especially siblings), although older children increasingly shared with less-related individuals. Findings are discussed in terms of their implications for understanding cross-cultural patterns of children's cooperation, and broader links with human cooperative childcare and life history evolution.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0284360>

JONAS R. R. TORFS et al – Multi-group analysis of grooming network position in a highly social primate

Individual variation in complex social behavioral traits, like primate grooming, can be influenced by the characteristics of the individual and those of its social group. To better grasp this complexity, social network analysis can be used to quantify direct and indirect grooming relationships. However, multi-group social network studies remain rare, despite their importance to disentangle individual from group-level trait effects on grooming strategies. We applied social network analysis to grooming data of 22 groups of zoo-housed bonobos and investigated the impact of three individual (sex, age, and rearing-history) and two group-level traits (group size and sex ratio) on five social network measures (out-strength, in-strength, disparity, affinity, and eigenvector centrality). Our results showed age-effects on all investigated measures: for females, all measures except for affinity showed quadratic relationships with age, while in males, the effects of age were more variable depending on the network measure. Bonobos with atypical rearing histories showed lower out-strength and eigenvector centrality, while in-strength was only impacted by rearing history in males. Group size showed a negative association with disparity and eigenvector centrality, while sex ratio did not influence any of the investigated measures. Standardization for group size did not impact the effects of sex and age, indicating the robustness of these findings. Our study provides comprehensive insights into the complexity of grooming behavior in zoo-housed bonobos, and underlines the importance of multi-group analyses for the generalizability of social network analysis results for species as a whole.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0284361>

Proceedings of the Royal Society B

PAPERS

ADRIAN VARALLYAY, NATHALIA BELLER & FRANCYS SUBIAUL – Generative cultural learning in children and adults: the role of compositionality and generativity in cultural evolution

Are human cultures distinctively cumulative because they are uniquely compositional? We addressed this question using a summative learning paradigm where participants saw different models build different tower elements, consisting of discrete actions and objects: stacking cubes (tower base) and linking squares (tower apex). These elements could be combined to form a tower that was optimal in terms of height and structural soundness. In addition to measuring copying fidelity, we explored whether children and adults (i) extended the knowledge demonstrated to additional tower elements and (ii) productively combined them. Results showed that children and adults copied observed demonstrations and applied them to novel exemplars. However, only adults in the imitation condition combined the two newly derived base and apex, relative to adults in a control group. Nonetheless, there were remarkable similarities between children's and adults' performance across measures. Composite measures capturing errors and overall generativity in children's and adults' performance produced few population by condition interactions. Results suggest that early in development, humans possess a suite of cognitive skills—compositionality and generativity—that transforms phylogenetically widespread social learning competencies into something that may be unique to our species, cultural learning; allowing human cultures to evolve towards greater complexity.

<https://royalsocietypublishing.org/doi/abs/10.1098/rspb.2022.2418>

Royal Society Open Science

PAPERS

TAMAS DAVID-BARRETT – Clustering drives cooperation on reputation networks, all else fixed

Reputation-based cooperation on social networks offers a causal mechanism between graph properties and social trust. Using a simple model, this paper demonstrates the underlying mechanism in a way that is accessible to scientists not specializing in networks or mathematics. The paper shows that when the size and degree of the network is fixed (i.e. all graphs have the same number of agents, who all have the same number of connections), it is the clustering coefficient that drives differences in how cooperative social networks are.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.230046>

CHARLOTTE CHRISTENSEN et al – Quantifying allo-grooming in wild chacma baboons (*Papio ursinus*) using tri-axial acceleration data and machine learning

Quantification of activity budgets is pivotal for understanding how animals respond to changes in their environment. Social grooming is a key activity that underpins various social processes with consequences for health and fitness. Traditional methods use direct (focal) observations to calculate grooming rates, providing systematic but sparse data. Accelerometers, in contrast, can quantify activity budgets continuously but have not been used to quantify social grooming. We test whether grooming can be accurately identified using machine learning (random forest model) trained on labelled acceleration data from wild chacma baboons (*Papio ursinus*). We successfully identified giving and receiving grooming with high precision (81% and 91%) and recall (87% and 79%). Giving grooming was associated with a distinct rhythmical signal along the surge axis. Receiving grooming had similar acceleration signals to resting, and thus was more difficult to assign. We applied our machine learning model to $n = 680$ collar data days from $n = 12$ baboons and found that grooming rates obtained from accelerometers were significantly and positively correlated with direct observation rates for giving but not receiving grooming. The ability to collect continuous grooming data in wild populations will allow researchers to re-examine and expand upon long-standing questions regarding the formation and function of grooming bonds.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.221103>

Science

PAPERS

MATTHEW J. CHRISTMAS et al – Evolutionary constraint and innovation across hundreds of placental mammals

Zoonomia is the largest comparative genomics resource for mammals produced to date. By aligning genomes for 240 species, we identify bases that, when mutated, are likely to affect fitness and alter disease risk. At least 332 million bases (~10.7%) in the human genome are unusually conserved across species (evolutionarily constrained) relative to neutrally evolving repeats, and 4552 ultraconserved elements are nearly perfectly conserved. Of 101 million significantly constrained single bases, 80% are outside protein-coding exons and half have no functional annotations in the Encyclopedia of DNA Elements (ENCODE) resource. Changes in genes and regulatory elements are associated with exceptional mammalian traits, such as hibernation, that could inform therapeutic development. Earth's vast and imperiled biodiversity offers distinctive power for identifying genetic variants that affect genome function and organismal phenotypes.

<https://www.science.org/doi/10.1126/science.abn3943>

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