

EAORC BULLETIN 1,083 – 17 March 2024

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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.

ACADEMIA.EDU – From Pan to Homo sapiens

Mind & Society 19, 121-161 (2020).

DWIGHT READ – From Pan to Homo sapiens: evolution from individual based to group based forms of social cognition

The evolution from pre-human primates to modern Homo sapiens is a complex one involving many domains, ranging from the material to the social to the cognitive, both at the individual and the community levels. This article focuses on a critical qualitative transition that took place during this evolution involving both the social and the cognitive domains. For the social domain, the transition is from the face-to-face forms of social interaction and organization that characterize the non-human primates that reached, with Pan, a hiatus due to the centripetal effects that highly individualized behavior has on a social system. The transition is to the relation-based forms of social organization that evolved in the hominins ancestral to Homo sapiens and are universal in human societies today. For the cognitive domain, this transition involves going from behavior responding mainly to phenomenal level sensory inputs to behavior formed in accordance with the concept of a relation, initially abstracted from behavior patterns, then extending the concept of a relation beyond abstraction from behavior patterns to the concept of a relation generated recursively through constructing the relation of a relation. This extension made possible the construction of systems of relations; initially genealogical systems of relations constructed culturally using the logic of recursion, and subsequently, the symbolic, computational systems of kin term relations referred to by anthropologists as kinship terminologies. The latter are “constructed realities” in the sense this term is used by cultural anthropologists. It follows that the evolution of relation-based systems of social interaction is not adequately accounted for

through population model evolutionary accounts such as the Dual Inheritance Theory of human evolution since “constructed realities” constitute collectively and publicly shared cultural knowledge rather than the individually and privately possessed knowledge that is assumed in the population model framework for human evolution.

https://www.academia.edu/74025273/From_Pan_to_Homo_sapiens_evolution_from_individual_based_to_group_based_forms_of_social_cognition

ACADEMIA.EDU – Conversations in Human Evolution: Volume 1

Archaeopress Archaeology (2020).

LUCY TIMBRELL – Conversations in Human Evolution: Volume 1

Conversations in Human Evolution is an ongoing science communication initiative seeking to explore the breadth and interdisciplinarity of human evolution studies. This volume reports twenty interviews (referred to as ‘conversations’ as they are informal in style) with scholars at the forefront of human evolution research, covering the broad scientific themes of quaternary and archaeological science, Palaeolithic archaeology, biological anthropology and palaeoanthropology, primatology and evolutionary anthropology and evolutionary genetics. This project features academics at various different stages in their careers and from all over the world; in this volume alone, researchers are based at institutions in seven different countries (namely the United Kingdom, Australia, the United States of America, Germany, Denmark, India, and China), covering four continents. Having arisen at the start of the COVID19 pandemic, Conversations in Human Evolution aims to encourage engagement with both human evolutionary studies and the broader socio-political issues that persist within academia, the latter of which is particularly pertinent during this time of global uncertainty. The conversations delve deeply into the study of our species’ evolutionary history through the lens of each sub-discipline, as well as detailing some of the most current advances in research, theory and methods. Overall, Conversations in Human Evolution seeks to bridge the gap between the research and researcher through contextualisation of the science with personal experience and historical reflection.

https://www.academia.edu/44633448/Conversations_in_Human_Evolution_Volume_1

RESEARCHGATE – Not so unusual Neanderthal bone tools

Archaeological and Anthropological Sciences 14, 200 (2022).

MALVINA BAUMANN et al – Not so unusual Neanderthal bone tools: new examples from Abri Lartet, France

Debates on the cognitive and technological capacities of hominins often focus on the production of artifacts from organic materials (Klein 1989; Mellars and Stringer 1989; D’Errico et al. 1998; McBrearty and Brooks 2000; Henshilwood et al. 2001; Henshilwood and Marean 2003). Among Neanderthals, retouching of shells (Douka and Spinapolice 2012; Romagnoli et al. 2016; Villa et al. 2020) or the transformation of plant materials (Aranguren et al. 2018; Niekus et al. 2019; Hardy et al. 2020), especially for the manufacture of composite weapons and tools, is regarded as evidence of complex technology (Langley et al. 2008; Wragg Sykes 2015; Hofecker 2018). When it comes to bone tools, however, opinions are mixed.

https://www.researchgate.net/publication/363780701_Not_so_unusual_Neanderthal_bone_tools_new_examples_from_Abri_Lartet_France

NEWS

NATURE BRIEFING – Fire farming began 11,000 years ago

Indigenous Australians have been using fire to shape the country’s northern ecosystems for thousands of years. Researchers analysed charcoal that was preserved in the sediment of a flooded sinkhole over the last 150,000 years. They discovered that, around 11,000 years ago, there was a shift to more frequent but less intense fires as a result of Indigenous fire-stick farming. European colonization mostly brought an end to the practice, which might have contributed to the return of more high-intensity wildfires.

<https://www.nature.com/articles/d41586-024-00693-6>

NATURE BRIEFING – Most male mammals aren’t larger

An analysis of more than 400 mammal species is overturning Charles Darwin’s assertion that in most, males are larger than females. In fact, this is only the case for 45% of species, with 39% showing no sexual size dimorphism and 16% having larger females than males. “There’s been this really strong inertia toward the larger male narrative, but it was just based on Darwin’s hand-wavy statement, and the evidence doesn’t really support it,” says evolutionary biologist and study co-author Kaia Tombak.

<https://www.scientificamerican.com/article/males-arent-larger-than-females-in-most-mammal-species/>

NATURE BRIEFING – Why menopause keeps evolving in whales

Comparing data on toothed whale species that do, and do not, experience menopause suggests that prolonged female postreproductive life allows whales to improve their offsprings’ and grand-offsprings’ survival chances. Older female whales such as killer whales (*Orcinus orca*) share food and become “repositories of long-term ecological knowledge”, explains

animal-behaviour researcher and study co-author Sam Ellis. Menopause also seems to reduce reproductive competition between mothers and daughters. The hormone changes killer whales go through are similar to those in menopausal humans, but “as to hot and cold flushes, we’ve got no way of telling yet”, Ellis says.

<https://www.nature.com/articles/d41586-024-00794-2>

SCIENCEADVISER – Scientists spot a key difference between ‘baby talk’ and ‘puppy talk’

If you think you talk to your fur baby in the same way you do to your real one, you’re missing a critical difference. Sure, the high-pitched words might be the same—“Who’s so cute? Yes, you are. You are so cute!”—but your face is not. When we baby talk our infants, our faces go all goo-goo-ga-ga. We widen our eyes, raise our eyebrows, and exaggerate our smiles. With dogs, we’re far more stoic.

To make the findings, scientists went into the homes of 23 Hungarian couples who had a baby between six and 18 months old as well as a pet dog and had them speak three short monologues individually to the dog, the baby, and the other parent. The parents’ faces were the most intensely expressive when talking to their babies—and the least expressive when speaking to their pooches, even though they seemed to be using a voice nearly identical to the one they used with their infants. The findings make sense, says lead author and evolutionary biologist Anna Gergely. Sound frequencies mean pretty much the same thing across the animal kingdom, but facial expressions do not. To canines, wide eyes and exposed gums can convey threats or signs of anxiety. “If I show my teeth and gums to you, it’s a social smile,” Gergely says. “But if I show my teeth to a wolf? I should be really, really scared.”

<https://www.science.org/content/article/we-baby-talk-our-dogs-so-why-don-t-we-baby-face-them>

SCIENCEADVISER – Is ‘sex’ a useful category for scientific research?

Ancient philosophers had some pretty quirky ideas about sex. Aristotle and Galen, often considered some of the classical world’s most brilliant minds, thought that a person’s internal heat—or lack thereof—determined whether they were male or female. This binary theory of sex, along with peculiar notions of “wandering wombs” and other explanations of “female hysteria,” usually served to cement the idea that women were “imperfect” versions of men.

One would think that modern scientists—with a wealth of knowledge about anatomy, hormones, and genetics at their disposal—would have a slightly more coherent understanding of biological sex. But what is the meaning of “sex,” exactly? In a Benchmark published this week in *Cell*, historian Beans Velocci explores the history of sex-based research and strives to answer a fundamental question: Is “sex” a useful category? The piece, part of a special issue on sex and gender in science, considers how multiple, conflicting meanings of sex have historically been used to uphold social systems—and often contribute to sloppy science. Ultimately, Velocci writes, “sex is an incoherent category, one that has perhaps outlived its use.”

That incoherence stems from the constant flux in its definition. Over the centuries, sex has “accumulated increasing numbers of conflicting yet coexistent meanings,” Velocci writes, making it now “not a singular and stable entity.”

According to Velocci, the oldest and most familiar model of sex is the anatomical model, which categorizes individuals as either male or female based on their external genitalia and so-called “secondary sex characteristics.” Even today, most infants are assigned a sex at birth based on whether they have a vulva or a penis. But many intersex people—and loads of nonhuman animal species—possess genitalia that don’t fall neatly into either of these two categories. Then, in the late 1800s, the gonadal model of sex rose to prominence instead, which uses the presence of internal testes or ovaries to define “true” sex. Around the turn of the century, scientists also came to see hormones and metabolism as defining features of sex. These models, Velocci points out, were often used to pathologize people who didn’t fit into strict gender roles and support racist ideologies.

More recently, the discovery of X and Y chromosomes seemed to support the idea that biological sex has been stable and binary all along. But even this seemingly decisive approach fails to capture the breadth of human variability. How, for example, do people with chromosome combinations other than XX or XY fit into this model? What about individuals whose chromosomal makeup doesn’t “match” their external genitalia, which are still consistently used to identify their sex?

“The answer to the question ‘What is sex?’ is, in both theory and practice, just about everything, and therefore also nearly nothing,” Velocci argues. The term “has collapsed entire constellations of traits and processes into one point. As a result, it functions as a nearly universally accepted research variable with little consistency in its conceptual definition, and less in its usage.” This murky definition of sex—which, they add, is consistently used to exclude trans and intersex people—“does not make for accurate or reproducible science.”

Solving this problem, they write, will require a cross-disciplinary approach. Historians, philosophers, and other social scientists have spent decades interrogating assumptions about sex and gender, and their approach could allow scientists to ask more rigorous, precise questions in the future. “A more contextual use of sex categories is vital to ensure that any sex-related findings are accurate, reproducible, and clinically relevant,” a team of scientists writes in a Perspective in the same issue. “This practice begins, first, with recognition of the key distinction between assigned categories and biologically relevant variables.”

But ultimately, the solution may be to eschew the idea of sexes, Velocci suggests. “Imagine what we might find out if we were to let go of a category that hundreds of years of history demonstrate to be more useful for maintaining social hierarchies than for generating scientific knowledge,” they conclude.

[https://www.cell.com/cell/fulltext/S0092-8674\(24\)00122-3](https://www.cell.com/cell/fulltext/S0092-8674(24)00122-3)

SCIENCEADVISER – Why babies forget, and how fear lingers in the brain (podcast)

This week we have two neuroscience stories. First up, freelance science journalist Sara Reardon looks at why infants' memories fade. She joins host Sarah Crespi to discuss ongoing experiments that aim to determine when the forgetting stops and why it happens in the first place.

Next on the show, Hui-Quan Li, a senior scientist at Neurocrine Biosciences, talks with Sarah about how the brain encodes generalized fear, a symptom of some anxiety disorders such as social anxiety and post-traumatic stress disorder.

<https://www.science.org/content/podcast/why-babies-forget-and-how-fear-lingers-brain>

SCIENCE.ORG NEWS – Toothed whales—like humans—may go through menopause

Analysis of 32 whale species shows the trait may have evolved to let older whales help take care of younger ones.

<https://www.science.org/content/article/toothed-whales-humans-may-go-through-menopause-and-it-may-help-them-live-longer>

SCIENCE.ORG NEWS – Are your earliest childhood memories still lurking in your mind—or gone forever?

Studies of “infantile amnesia” find that memory works differently in the developing brain.

<https://www.science.org/content/article/are-your-earliest-childhood-memories-still-lurking-your-mind-or-gone-forever>

PUBLICATIONS

American Journal of Biological Anthropology

PAPERS

HUGO HAUTAVOINE et al – Quantifying hominin morphological diversity at the end of the middle Pleistocene: Implications for the origin of *Homo sapiens*

The Middle Pleistocene (MP) saw the emergence of new species of hominins: *Homo sapiens* in Africa, *H. neanderthalensis*, and possibly Denisovans in Eurasia, whose most recent common ancestor is thought to have lived in Africa around 600 ka ago. However, hominin remains from this period present a wide range of morphological variation making it difficult to securely determine their taxonomic attribution and their phylogenetic position within the *Homo* genus. This study proposes to reconsider the phenetic relationships between MP hominin fossils in order to clarify evolutionary trends and contacts between the populations they represent.

We used a Geometric Morphometrics approach to quantify the morphological variation of the calvarium of controversial MP specimens from Africa and Eurasia by using a comparative sample that can be divided into 5 groups: *H. ergaster*, *H. erectus*, *H. neanderthalensis*, and *H. sapiens*, as well as individuals from current modern human populations. We performed a Generalized Procrustes Analysis, a Principal Component Analysis, and Multinomial Principal Component Logistic Regressions to determine the phenetic affinities of the controversial Middle Pleistocene specimens with the other groups.

MP African and Eurasian specimens represent several populations, some of which show strong affinities with *H. neanderthalensis* in Europe or *H. sapiens* in Africa, others presenting multiple affinities.

These MP populations might have contributed to the emergence of these two species in different proportions. This study proposes a new framework for the human evolutionary history during the MP.

<https://onlinelibrary.wiley.com/doi/full/10.1002/ajpa.24915>

Animal Behaviour

PAPERS

JAMES A.R. MARSHALL & ANDREAGIOVANNI REINA – On aims and methods of collective animal behaviour

Collective animal behaviour is a subfield of behavioural ecology, making extensive use of its tools of observation, experimental manipulation and model building. However, a fundamental behavioural ecology approach, the application of optimality theory, has been comparatively neglected in collective animal behaviour. This article seeks to address this imbalance, by outlining an evolutionary theory framework for the discipline. The application of optimality theory to collective animal behaviour requires a number of questions to be addressed. First, what is the correct quantity to optimize? This can be achieved via a combination of considering the organisms' life history, alongside tools such as statistical decision theory and stochastic dynamic programming. Second, what mechanism is appropriate for optimal behaviour? This involves ensuring that models are self-consistent rather than assuming parameter values. Third, at what level of selection does optimization act? Selection acts on the individual except in very particular circumstances, yet collective animal behaviour phenomena are group level, thus introducing a risk of confusing at what level adaptive properties emerge. This article presents examples under each of the three questions, as well as discussing mismatches between theory and observation. In doing so, it is hoped that collective animal behaviour fully inherits the tools and philosophy of its parent discipline of behavioural ecology.

<https://www.sciencedirect.com/science/article/pii/S0003347224000381>

KATARZYNA KWIATKOWSKA & PAWEŁ RĘK – Can an acoustic communication network be used for spatial orientation?

In conditions of poor visibility, animals can determine their location using sounds. If there are sound sources with a relatively fixed location in their environment, these might be used as landmarks with respect to which the individual could locate new sound sources. However, unlike visual orientation, surprisingly little is known about the use of acoustic landmarks. We studied the use of calling neighbours for orientation in the corncrake, *Crex crex*, a highly territorial species that calls in long sequences in loose and stable groups at night and in tall grass. In two experiments with remote multichannel playback, we mimicked artificial interactive networks. In the first experiment, we tested whether the number of neighbours affects the accuracy of locating an intruder and we showed that males are more efficient at locating new intruders when there are more vocally active neighbours in their vicinity. In the second experiment, we tested the influence of the amplitude of neighbours' calls on the assessment of the distance to the intruder. We showed that the response to an intruder depends on the ratio of the amplitude of the intruder's calls to the amplitude of the neighbours' calls. Our results therefore indicate that corncrakes orient themselves in the environment using calling neighbours as landmarks and we suggest that the use of the communication network as a network of acoustic landmarks can be an alternative mechanism of orienting using sounds in conditions of limited visibility.

<https://www.sciencedirect.com/science/article/abs/pii/S0003347224000320>

VINCENZO PENTERIANI et al – Livin' on the edge: reducing infanticide risk by maintaining proximity to potentially less infanticidal males

Infanticide is a significant evolutionary force influencing carnivore behaviours, as it is one of the primary contributors to offspring mortality. Female multimale mating, which creates paternal uncertainty, is known to reduce infanticide. We propose that two crucial steps are needed for this strategy to work in solitary species like brown bears, *Ursus arctos*. First, after mating, females should choose dens within their mating area (step 1), boosting the chances of encountering potential fathers of cub(s) after den emergence in spring. However, the efficacy of this strategy hinges on males' fidelity to the same mating areas from one year to the next (step 2). Our study confirmed that pregnant females consistently selected dens within their mating areas, with significant overlap (around 90%) between areas used by females with cubs and their mating zones. Males also demonstrated fidelity (over 65%) to mating areas over 2 consecutive years. Infanticide significantly shapes the sociospatial ecology of female brown bears, a phenomenon that can carry nutritional costs for females with cubs, and influence settlement patterns near human shields to increase reproductive success. Additionally, in hunted populations, removing resident males can trigger an influx of potentially infanticidal bears from elsewhere.

<https://www.sciencedirect.com/science/article/pii/S0003347224000356>

MASANORI YAMAKAWA, KYOKO MIURA & NOBUYUKI KITSUKAKE – Helping syndrome is partially confirmed in the eusocial naked mole-rat

In highly organized animal societies, behavioural heterogeneity of the members can be crucial for group success. In contrast to eusocial insects, in which task specialization is common, a clear division of labour is often absent in cooperatively breeding species. In these species, contributions to different tasks are sometimes positively correlated across individuals; this phenomenon is called helping syndrome. Previously, eusocial naked mole-rats, *Heterocephalus glaber*, were thought to display a helping syndrome consisting of burrowing, food carrying and nest building. However, previous studies combined different burrowing tasks in which the locomotive patterns varied widely, possibly missing substantial variation in the behavioural types of individuals. Therefore, it is necessary to reexamine the relations between task contributions among naked mole-rats in more detail. This study analysed six types of activities including four tasks in captive naked mole-rats, and partially confirmed the presence of a helping syndrome in nonbreeding individuals. Frequencies of different activities were significantly positively correlated across individuals in some combinations, but were not significantly correlated in other combinations. Also, individual behavioural types did not simply depend on activity time. Although age- or size-based polyethisms were found in different trends across task types, the results of the correlations between tasks remained mostly unchanged after controlling for the effects of age or body mass. This suggests large interindividual variation that could not be sufficiently explained by age- or size-based polyethisms. The partial support of a helping syndrome suggested that the task allocation system among these eusocial mammals may be more complex than previously assumed.

<https://www.sciencedirect.com/science/article/abs/pii/S0003347224000162>

MATTHEW H. BABB, LAURENT PRÉTÔT, REDOUAN BSHARY & SARAH F. BROSANAN – Capuchin monkeys' ability to choose beneficial options is inhibited by added complexity

How does ecological complexity influence decision making? To facilitate interpretation, laboratory studies often focus on decision tasks with limited options, but animals presumably face more variety in the wild. For example, sometimes species must choose between ephemeral and permanent options, as with choosing between mobile prey and stationary food. The optimal choice is to prioritize the ephemeral option, because it will disappear if not selected first, whereas the permanent option will always be available. In experimental tasks with just these two choices, capuchin monkeys (*Sapajus (Cebus) apella*) learn to maximize their rewards. However, in the wild, animals presumably face additional sets of choices, for instance two ephemeral or two permanent options, which may make it more difficult to learn the best way to maximize their payouts. Here we show that adding configurations during learning lowers the capuchins' preference for choosing the ephemeral

option first. Because recent theoretical work suggests that this more complex version could be solved by grouping the elements through configural learning, half of our subjects underwent training proposed to aid in the configural learning process prior to experiencing the added complexity. This training did not improve the capuchins' ability to pick the ephemeral option first. We consider both what this means for capuchins' and other species' decision making in more complex environments and how we use experimental results to understand animals' cognition and behaviour.

<https://www.sciencedirect.com/science/article/abs/pii/S0003347224000186>

AKASH DUTTA et al – Left or right: handedness in free-ranging Hanuman langurs, *Semnopithecus entellus*, residing in an urban ecosystem

Examining manual lateralization (handedness) in nonhuman primates might be an interesting approach to gaining insight into the evolution of asymmetry in humans. Moreover, handedness could also reflect the effect of environmental alterations on the free-ranging animals that are forced to live with anthropogenic interferences. Despite addressing the handedness among monkeys and apes, only a few studies have focused on these free-ranging urban-adapted nonhuman primates, which could challenge our perception of habitat loss and deforestation. Here, we conducted experimental trials with two tasks, one unimanual (simple reaching) and one bimanual (tube task) to explore manual lateralization in a highly human-provisioned group of free-ranging Hanuman langurs. Experimental outcomes revealed an asymmetrical hand use distribution, with a bias towards the left hand. As bimanual tasks elicited a higher degree of lateralization, these tasks seem to be more suited to study manual laterality, and our results also highlight the significance of experimental tasks in establishing hand preference in langurs. This study also reveals that such lateralization developed with age as adults distinctly displayed their preference towards left-hand usage in contrast to juveniles and subadults which used both hands comparably. Mostly considered to be arboreal, the langurs of our study group spend a considerable amount of time with humans on the ground, thereby showing a terrestrial tendency. Postural origin theory states that terrestrial animals tend to use their right hand and arboreal ones their left. Therefore, the presence of a group level left-hand bias in the adult langurs of Dakshineswar creates a dilemma for this theory.

<https://www.sciencedirect.com/science/article/abs/pii/S0003347224000319>

Cell

PAPERS

BEANS VELOCCI – The history of sex research: Is “sex” a useful category?

The history of sex research demonstrates an ongoing coexistence of multiple, conflicting meanings of sex. This history raises questions for scientists about the deployment of a research variable that lacks precision. Cross-disciplinary collaboration between scientists and science and technology studies (STS) scholars offers a way to find solutions to this problem.

[https://www.cell.com/cell/fulltext/S0092-8674\(24\)00122-3](https://www.cell.com/cell/fulltext/S0092-8674(24)00122-3)

Cell Reports

PAPERS

MARIE E. BELLET et al with STANISLAS DEHAENE – Spontaneously emerging internal models of visual sequences combine abstract and event-specific information in the prefrontal cortex

When exposed to sensory sequences, do macaque monkeys spontaneously form abstract internal models that generalize to novel experiences? Here, we show that neuronal populations in macaque ventrolateral prefrontal cortex jointly encode visual sequences by separate codes for the specific pictures presented and for their abstract sequential structure. We recorded prefrontal neurons while macaque monkeys passively viewed visual sequences and sequence mismatches in the local-global paradigm. Even without any overt task or response requirements, prefrontal populations spontaneously form representations of sequence structure, serial order, and image identity within distinct but superimposed neuronal subspaces. Representations of sequence structure rapidly update following single exposure to a mismatch sequence, while distinct populations represent mismatches for sequences of different complexity. Finally, those representations generalize across sequences following the same repetition structure but comprising different images. These results suggest that prefrontal populations spontaneously encode rich internal models of visual sequences reflecting both content-specific and abstract information.

[https://www.cell.com/cell-reports/fulltext/S2211-1247\(24\)00280-8](https://www.cell.com/cell-reports/fulltext/S2211-1247(24)00280-8)

Current Biology

ARTICLES

DENA JANE CLINK – Isochronous rhythms: Facilitating song coordination across taxa?

The biological expression of isochronous rhythms — rhythms like those produced by a metronome — was once thought to be unique to humans. A new study reports that faster and more isochronous rhythms lead to more successful duets in singing gibbons: isochronous rhythms might be an important component of song coordination across taxa.

[https://www.cell.com/current-biology/abstract/S0960-9822\(24\)00020-4](https://www.cell.com/current-biology/abstract/S0960-9822(24)00020-4)

PAPERS**HAIGANG MA et al – Small apes adjust rhythms to facilitate song coordination**

Song coordination is a universal characteristic of human music. Many animals also produce well-coordinated duets or choruses that resemble human music. However, the mechanism and evolution of song coordination have only recently been studied in animals. Here, we studied the mechanism of song coordination in three closely related species of wild *Nomascus gibbons* that live in polygynous groups. In each species, song bouts were dominated by male solo sequences (referred to hereafter as male sequence), and females contributed stereotyped great calls to coordinate with males. Considering the function of rhythm in facilitating song coordination in human music and animal vocalizations, we predicted that adult males adjust their song rhythm to facilitate song coordination with females. In support of this prediction, we found that adult males produced significantly more isochronous rhythms with a faster tempo in male sequences that were followed by successful female great calls (a complete sequence with “introductory” and “wa” notes). The difference in isochrony and tempos between successful great call sequences and male sequences was smaller in *N. concolor* compared with the other two species, which may make it difficult for females to predict a male’s precise temporal pattern. Consequently, adult females of *N. concolor* produced more failed great call (an incomplete sequence with only introductory notes) sequences. We propose that the high degree of rhythm change functions as an unambiguous signal that can be easily perceived by receivers. In this regard, gibbon vocalizations offer an instructive model to understand the origins and evolution of human music.

[https://www.cell.com/current-biology/abstract/S0960-9822\(23\)01771-2](https://www.cell.com/current-biology/abstract/S0960-9822(23)01771-2)

ANNA HADJITOFI & BARBARA WEBB – Dynamic antennal positioning allows honeybee followers to decode the dance

The honeybee waggle dance has been widely studied as a communication system, yet we know little about how nestmates assimilate the information needed to navigate toward the signaled resource. They are required to detect the dancer’s orientation relative to gravity and duration of the waggle phase and translate this into a flight vector with a direction relative to the sun¹ and distance from the hive.^{2,3} Moreover, they appear capable of doing so from varied, dynamically changing positions around the dancer. Using high-speed, high-resolution video, we have uncovered a previously unremarked correlation between antennal position and the relative body axes of dancer and follower bees. Combined with new information about antennal inputs^{4,5} and spatial encoding in the insect central complex,^{6,7} we show how a neural circuit first proposed to underlie path integration could be adapted to decoding the dance and acquiring the signaled information as a flight vector that can be followed to the resource. This provides the first plausible account of how the bee brain could support the interpretation of its dance language.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(24\)00220-3](https://www.cell.com/current-biology/fulltext/S0960-9822(24)00220-3)

KRIS H. SABBI et al with RICHARD W. WRANGHAM – Ecological variation in adult social play reveals a hidden cost of motherhood for wild chimpanzees

Though common among humans, social play by adults is an uncommon occurrence in most animals, even between parents and offspring. The most common explanation for why adult play is so rare is that its function and benefits are largely limited to development, so that social play has little value later in life. Here, we draw from 10 years of behavioral data collected by the Kibale Chimpanzee Project to consider an alternative hypothesis: that despite its benefits, adult play in non-humans is ecologically constrained by energy shortage or time limitations. We further hypothesized that, since they may be the only available partners for their young offspring, mother chimpanzees pay greater costs of play than other adults. Our analysis of nearly 4,000 adult play bouts revealed that adult chimpanzees played both among themselves and with immature partners. Social play was infrequent when diet quality was low but increased with the proportion of high-quality fruits in the diet. This suggests that adults engage in play facultatively when they have more energy and/or time to do so. However, when diet quality was low and most adult play fell to near zero, play persisted between mothers and offspring. Increased use of play by adult chimpanzees during periods of resource abundance suggests that play retains value as a social currency beyond development but that its costs constrain its use. At the same time, when ecological conditions constrain opportunities for young to play, play by mothers fills a critical role to promote healthy offspring development.

[https://www.cell.com/current-biology/abstract/S0960-9822\(24\)00168-4](https://www.cell.com/current-biology/abstract/S0960-9822(24)00168-4)

eLife**PAPERS****BINGJIANG LYU et al with WILLIAM D. MARSLEN-WILSON – Finding structure during incremental speech comprehension**

A core aspect of human speech comprehension is the ability to incrementally integrate consecutive words into a structured and coherent interpretation, aligning with the speaker’s intended meaning. This rapid process is subject to multi-dimensional probabilistic constraints, including both linguistic knowledge and non-linguistic information within specific contexts, and it is their interpretative coherence that drives successful comprehension. To study the neural substrates of this process, we extract word-by-word measures of sentential structure from BERT, a deep language model, which effectively approximates the coherent outcomes of the dynamic interplay among various types of constraints. Using representational similarity analysis, we tested BERT parse depths and relevant corpus-based measures against the spatiotemporally resolved brain activity recorded by electro/magnetoencephalography when participants were listening to the same sentences. Our results

provide a detailed picture of the neurobiological processes involved in the incremental construction of structured interpretations. These findings show when and where coherent interpretations emerge through the evaluation and integration of multifaceted constraints in the brain, which engages bilateral brain regions extending beyond the classical fronto-temporal language system. Furthermore, this study provides empirical evidence supporting the use artificial neural networks as computational models for revealing the neural dynamics underpinning complex cognitive processes in the brain.
<https://elifesciences.org/reviewed-preprints/89311>

Frontiers for Young Minds

PAPERS

YORAM VODOVOTZ et al – The Cycle of Stress: From Individuals to the World and Back

Stress is a feeling of being worried, scared, or overwhelmed, caused by challenging situations or big life changes. Not all stress is bad, and some kinds of stress, like exercise, can even be good for us. However, when stress is severe or lasts a long time, it can harm our health. Severe stress causes inflammation, which is the body's way of protecting itself. Inflammation helps the body heal, but long-lasting inflammation can lead to health problems. Stress can also affect the brain, making it hard to think clearly or make good decisions. In our work, we linked all these stress-related factors together (using math) to explain our hypothesis that stress can spread from person to person through our actions, words, and body language—and even over social media—until it affects whole societies and eventually the entire planet! This is a dangerous cycle that can lead to even more stress and inflammation, making problems worse. To break the cycle, we each need to focus on reducing stress in our own lives.

<https://kids.frontiersin.org/articles/10.3389/frym.2023.1229085>

Frontiers in Behavioral Economics

PAPERS

MADS NORDMO ARNESTAD, MATS GLAMBEK & MARCUS SELART – With a little profitable help from my friends: the relational incongruence of benefiting financially from prosocially motivated favors

To improve our understanding of how people engage in altruistic behavior, it is important to investigate the motives provided by help recipients and how these motives influence givers' helping behaviors.

In the present study we conduct three experiments (total N = 606), exploring how the financial motivation of help recipients can affect givers' helping behaviors.

We find that people like to help others but resent helping those motivated by immediate financial gains. Study 1 shows that the recipient of help influenced the responses of the helpers depending on whether the recipient was making a sales profit from this help or not. An influencing factor was whether the recipient could provide an excuse for making such a profit. Study 2 replicated these findings also in conditions in which other kinds of profits were applied. Study 3 confirmed the results in conditions in which helpers were informed about recipients' financial motives before deciding whether to help.

<https://www.frontiersin.org/articles/10.3389/frbhe.2024.1297601/full>

Frontiers in Complex Systems

PAPERS

QUENTIN FELTGEN – Is language change chiefly a social diffusion affair? The role of entrenchment in frequency increase and in the emergence of complex structural patterns

Complex systems research has chiefly investigated language change from a social dynamics perspective, with undeniable success. However, there is more to language change than social diffusion, i.e., a one-off adoption of an innovative variant by language users. Language use indeed factors in, besides prevalence (the percentage of adopters of the form in the community), lexical diversity (the number of different lexical items a conventionalized pattern combines with), and entrenchment (the average rate at which speakers choose the form in suitable pragmatic environments). Changes in token frequency may reflect changes in any of these three variables. To sort them out, we defined proxies to factor entrenchment out of empirical measures of prevalence and lexical diversity. From a French corpus, we analyzed 25 schematic constructions, featuring an open slot that hosts a variety of fillers. We show that their rise of token frequency across a change episode is mostly explained by entrenchment; however, the magnitude of the change is uniquely explained by the final extent of its lexical diversity. Furthermore, the fillers obey a construction-specific Zipf-Mandelbrot organization, that robustly holds throughout the change episode. We also show that in some cases, the fillers arise simultaneously, hinting at the possibility that such a complex organization emerges all at once, highlighting the role of structural features in language change.

<https://www.frontiersin.org/articles/10.3389/fcpxs.2024.1327425/full>

Frontiers in Ecology and Evolution

PAPERS

LAUREN SARRINGHAUS, RYAN SRIVASTAVA & LAURA MACLATCHY – The influence of multiple variables on bipedal context in wild chimpanzees: Implications for the evolution of bipedality in hominins

Investigations into the role of selection in the origin of human bipedalism using ape models have relied heavily on behavioral frequency data. However, analysis of video of wild apes has the advantage of capturing the details of the entirety of each rare, brief bipedal bout witnessed, not just the moment detected in observational studies. We used video to explore the behavioral context and effects of several variables on bipedalism across all ages in wild forest-dwelling chimpanzees from Ngogo, Uganda. We found, as in earlier studies, that adult chimpanzees used bipedalism in the context of foraging; however, unlike earlier studies, we found that while foraging was the predominant behavioral context during arboreal bipedalism, terrestrial bipedalism was more varied in contextual composition. We also found that these different behavioral contexts of bipedalism were associated with different variables. Specifically, foraging was associated with arboreality, hand assistance, and adulthood; antagonism was associated with adulthood, locomotion, and males; play was associated with terrestriality and subadulthood; and travel was associated with locomotion and females. Given that several variables influence bipedalism across multiple behavioral contexts in chimpanzees, it is likely that the early evolution of human bipedalism occurred under the influence of numerous factors. This exploratory study thus suggests that more comprehensive models should be used when reconstructing the transition to bipedalism from the Last Common Ancestor of humans and chimpanzees.

<https://www.frontiersin.org/articles/10.3389/fevo.2024.1321115/full>

Frontiers in Psychology

PAPERS

SOPHIE LEMONNIER et al – Monolingual and bilingual infants' attention to talking faces: evidence from eye-tracking and Bayesian modeling

A substantial amount of research from the last two decades suggests that infants' attention to the eyes and mouth regions of talking faces could be a supporting mechanism by which they acquire their native(s) language(s). Importantly, attentional strategies seem to be sensitive to three types of constraints: the properties of the stimulus, the infants' attentional control skills (which improve with age and brain maturation) and their previous linguistic and non-linguistic knowledge. The goal of the present paper is to present a probabilistic model to simulate infants' visual attention control to talking faces as a function of their language learning environment (monolingual vs. bilingual), attention maturation (i.e., age) and their increasing knowledge concerning the task at stake (detecting and learning to anticipate information displayed in the eyes or the mouth region of the speaker).

To test the model, we first considered experimental eye-tracking data from monolingual and bilingual infants (aged between 12 and 18 months; in part already published) exploring a face speaking in their native language. In each of these conditions, we compared the proportion of total looking time on each of the two areas of interest (eyes vs. mouth of the speaker). In line with previous studies, our experimental results show a strong bias for the mouth (over the eyes) region of the speaker, regardless of age. Furthermore, monolingual and bilingual infants appear to have different developmental trajectories, which is consistent with and extends previous results observed in the first year. Comparison of model simulations with experimental data shows that the model successfully captures patterns of visuo-attentional orientation through the three parameters that effectively modulate the simulated visuo-attentional behavior.

We interpret parameter values, and find that they adequately reflect evolution of strength and speed of anticipatory learning; we further discuss their descriptive and explanatory power.

<https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1373191/full>

MARLENE BÖTTCHER & MARGARET ZELLERS – Do you say uh or uhm? A cross-linguistic approach to filler particle use in heritage and majority speakers across three languages

Filler particles like uhm in English or ähm in German show subtle language-specific differences and their variation in form is related to socio-linguistic variables like gender. The use of fillers in a second language has been shown to differ from monolinguals' filler particle use in both frequency and form in different language contexts. This study investigates the language-specific use of filler particles by bilingual heritage speakers in both their languages, looking at the dominant majority language in the society and their minority heritage language spoken at home. This is done based on heritage Russian and German data and majority German and English data from the RUEG corpus. Language-specific fillers were extracted from the corpus and analyzed for their occurrence and segmental form. The frequency analysis suggests an influence of bilingualism, age group, and formality of the situation on the filler frequency across all languages. The number of filler particles is higher in formal, older, and bilingual speech. The form analysis reveals an effect of language and gender on the type of filler particle. The vocalic-nasal filler particles (e.g., uhm) are more frequently found in German and English and in female speech of these languages. Heritage speakers of Russian in contact with German and English show higher use of vocalic-nasal forms also in their Russian while producing similar gender related patterns to monolingual speakers in both their languages. The higher frequency of filler particles in formal situations, older speakers and in bilingual speech, is discussed related to cognitive load which is assumed to be higher in these contexts while speech style which differs between situations and social groups is also considered as explanation. The higher use of vocalic-nasal filler particles in German and

English suggests language specific filler particle preferences also related to the socio-linguistic variable gender in these languages. The results from heritage speakers suggest and influence on filler particle form in their heritage language, while also revealing socio-linguistic usage patterns related to gender which are produced by heritage speakers similarly to monolinguals in their respective language.

<https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1305862/full>

Heliyon

PAPERS

AFSOON ASADZADEH et al – Serious educational games for children: A comprehensive framework

Serious educational games are digital games designed to support teaching or learning objectives that have become popular among children. However, a set of principles is needed to develop a successful educational game. Therefore, this study aimed to provide a comprehensive and valid framework for designing children's serious educational games.

The conceptual framework is developed in two phases. First, a scoping review was conducted in PubMed, Ovid (APA PsycInfo), EMBASE, Scopus, Web of Science, ProQuest, and gray literature on August 1, 2022. Papers in English that reported the serious educational games' principles for children were included. Second, the extracted data from the previous step was reviewed and discussed by the research team to develop the initial framework. Then, it was distributed to 20 experts with relevant knowledge and experience in two rounds to validate and apply their comments within the framework.

Of the 12916 papers identified, 15 were included in this study. In the proposed framework named CoDHP, the results were classified into four topics, including (a) content aspects, (b) design requirements, (c) highlighted attributes, and (d) children's preferences. Content aspects comprise four classes (goals and limits, child learning content, learning context, and a long-term program) with 16 principles. Design requirements contain 11 classes (stories and storylines, player characters, game mechanics, interactivity, game challenge, game rules, game help, entertaining games, user interface, accessibility, and setting) with 47 principles, of which 15 are highlighted. Regarding children's preferences for the game elements, various similarities and differences were extracted. For instance, both girls and boys prefer fun and popular games. Based on experts' comments, 21 supplementary principles were recommended to complete the content and design requirements.

Game designers or researchers can use the proposed framework as a formative guide to design successful serious games or evaluate children's digital games.

[https://www.cell.com/heliyon/fulltext/S2405-8440\(24\)04139-2](https://www.cell.com/heliyon/fulltext/S2405-8440(24)04139-2)

Interface: Journal of the Royal Society

PAPERS

VALERIO CAPRARO et al – Language-based game theory in the age of artificial intelligence

Understanding human behaviour in decision problems and strategic interactions has wide-ranging applications in economics, psychology and artificial intelligence. Game theory offers a robust foundation for this understanding, based on the idea that individuals aim to maximize a utility function. However, the exact factors influencing strategy choices remain elusive. While traditional models try to explain human behaviour as a function of the outcomes of available actions, recent experimental research reveals that linguistic content significantly impacts decision-making, thus prompting a paradigm shift from outcome-based to language-based utility functions. This shift is more urgent than ever, given the advancement of generative AI, which has the potential to support humans in making critical decisions through language-based interactions. We propose sentiment analysis as a fundamental tool for this shift and take an initial step by analysing 61 experimental instructions from the dictator game, an economic game capturing the balance between self-interest and the interest of others, which is at the core of many social interactions. Our meta-analysis shows that sentiment analysis can explain human behaviour beyond economic outcomes. We discuss future research directions. We hope this work sets the stage for a novel game-theoretical approach that emphasizes the importance of language in human decisions.

<https://royalsocietypublishing.org/doi/10.1098/rsif.2023.0720>

CHEN SHEN et al – Prosocial punishment bots breed social punishment in human players

Prosocial punishment, an important factor to stabilize cooperation in social dilemma games, often faces challenges like second-order free-riders—who cooperate but avoid punishing to save costs—and antisocial punishers, who defect and retaliate against cooperators. Addressing these challenges, our study introduces prosocial punishment bots that consistently cooperate and punish free-riders. Our findings reveal that these bots significantly promote the emergence of prosocial punishment among normal players due to their 'sticky effect'—an unwavering commitment to cooperation and punishment that magnetically attracts their opponents to emulate this strategy. Additionally, we observe that the prevalence of prosocial punishment is greatly enhanced when normal players exhibit a tendency to follow a 'copying the majority' strategy, or when bots are strategically placed in high-degree nodes within scale-free networks. Conversely, bots designed for defection or antisocial punishment diminish overall cooperation levels. This stark contrast underscores the critical role of strategic bot design in enhancing cooperative behaviours in human/AI interactions. Our findings open new avenues in evolutionary game theory, demonstrating the potential of human-machine collaboration in solving the conundrum of punishment.

<https://royalsocietypublishing.org/doi/10.1098/rsif.2024.0019>

HIROAKI CHIBA-OKABE & JOSHUA B. PLOTKIN – Can institutions foster cooperation by wealth redistribution?

Theoretical models prescribe how institutions can promote cooperation in a population by imposing appropriate punishments or rewards on individuals. However, many real-world institutions are not sophisticated or responsive enough to ensure cooperation by calibrating their policies. Or, worse yet, an institution might selfishly exploit the population it governs for its own benefit. Here, we study the evolution of cooperation in the presence of an institution that is autonomous, in the sense that it has its own interests that may or may not align with those of the population. The institution imposes a tax on the population and redistributes a portion of the tax revenue to cooperators, withholding the remaining revenue for itself. The institution adjusts its rates of taxation and redistribution to optimize its own long-term, discounted utility. We consider three types of institutions with different goals, embodied in their utility functions. We show that a prosocial institution, whose goal is to maximize the average payoff of the population, can indeed promote cooperation—but only if it is sufficiently forward-looking. On the other hand, an institution that seeks to maximize welfare among cooperators alone will successfully promote collective cooperation even if it is myopic. Remarkably, even a selfish institution, which seeks to maximize the revenue it withholds for itself, can nonetheless promote cooperation. The average payoff of the population increases when a selfish institution is more forward-looking, so that a population under a selfish regime can sometimes fare better than under anarchy. Our analysis highlights the potential benefits of institutional wealth redistribution, even when an institution does not share the interests of the population it governs.

<https://royalsocietypublishing.org/doi/10.1098/rsif.2023.0698>

FANG CHEN, LEI ZHOU & LONG WANG – Cooperation among unequal players with aspiration-driven learning

Direct reciprocity promotes the evolution of cooperation when players are sufficiently equal, such that they have similar influence on each other. In the light of ubiquitous inequality, this raises the question of how reciprocity evolves among unequal players. Existing studies on inequality mainly focus on payoff-driven learning rules, which rely on the knowledge of others' strategies. However, inferring one's strategy is a difficult task even if the whole interaction history is known. Here, we consider aspiration-driven learning rules, where players seek strategies that satisfy their aspirations based on their own information. Under aspiration-driven learning rules, we explore the evolutionary dynamics among players with inequality in endowments and productivity. We model the interactions among unequal players with asymmetric games and characterize the condition where cooperation is feasible. Remarkably, we find that aspiration-driven learning rules lead to a higher level of cooperation than payoff-driven ones over a wide range of inequality. Moreover, our results show that high aspiration levels are conducive to the evolution of cooperation when more productive players are equipped with higher endowments. Our work highlights the advantages of aspiration-driven learning for promoting cooperation among unequal players and suggests that aspiration-based decision-making may be more beneficial for the collective.

<https://royalsocietypublishing.org/doi/10.1098/rsif.2023.0723>

Nature**PAPERS****SAMUEL ELLIS et al – The evolution of menopause in toothed whales**

Understanding how and why menopause has evolved is a long-standing challenge across disciplines. Females can typically maximize their reproductive success by reproducing for the whole of their adult life. In humans, however, women cease reproduction several decades before the end of their natural lifespan^{1,2}. Although progress has been made in understanding the adaptive value of menopause in humans^{3,4}, the generality of these findings remains unclear. Toothed whales are the only mammal taxon in which menopause has evolved several times⁵, providing a unique opportunity to test the theories of how and why menopause evolves in a comparative context. Here, we assemble and analyse a comparative database to test competing evolutionary hypotheses. We find that menopause evolved in toothed whales by females extending their lifespan without increasing their reproductive lifespan, as predicted by the 'live-long' hypotheses. We further show that menopause results in females increasing their opportunity for intergenerational help by increasing their lifespan overlap with their grandoffspring and offspring without increasing their reproductive overlap with their daughters. Our results provide an informative comparison for the evolution of human life history and demonstrate that the same pathway that led to menopause in humans can also explain the evolution of menopause in toothed whales.

<https://www.nature.com/articles/s41586-024-07159-9>

CAMILLE TESTARD et al – Neural signatures of natural behaviour in socializing macaques

Our understanding of the neurobiology of primate behaviour largely derives from artificial tasks in highly controlled laboratory settings, overlooking most natural behaviours that primate brains evolved to produce^{1,2,3}. How primates navigate the multidimensional social relationships that structure daily life⁴ and shape survival and reproductive success⁵ remains largely unclear at the single-neuron level. Here we combine ethological analysis, computer vision and wireless recording technologies to identify neural signatures of natural behaviour in unrestrained, socially interacting pairs of rhesus macaques. Single-neuron and population activity in the prefrontal and temporal cortex robustly encoded 24 species-typical behaviours, as well as social context. Male–female partners demonstrated near-perfect reciprocity in grooming, a key behavioural mechanism supporting friendships and alliances⁶, and neural activity maintained a running account of these

social investments. Confronted with an aggressive intruder, behavioural and neural population responses reflected empathy and were buffered by the presence of a partner. Our findings reveal a highly distributed neurophysiological ledger of social dynamics, a potential computational foundation supporting communal life in primate societies, including our own.

<https://www.nature.com/articles/s41586-024-07178-6>

Nature Communications

PAPERS

KAIA J. TOMBAK, SEVERINE B.S.W. HEX & DANIEL I. RUBENSTEIN – New estimates indicate that males are not larger than females in most mammal species

Sexual size dimorphism has motivated a large body of research on mammalian mating strategies and sexual selection. Despite some contrary evidence, the narrative that larger males are the norm in mammals—upheld since Darwin’s *Descent of Man*—still dominates today, supported by meta-analyses that use coarse measures of dimorphism and taxonomically-biased sampling. With newly-available datasets and primary sources reporting sex-segregated means and variances in adult body mass, we estimate statistically-determined rates of sexual size dimorphism in mammals, sampling taxa by their species richness at the family level. Our analyses of wild, non-provisioned populations representing >400 species indicate that although males tend to be larger than females when dimorphism occurs, males are not larger in most mammal species, suggesting a need to revisit other assumptions in sexual selection research.

<https://www.nature.com/articles/s41467-024-45739-5>

DARDO TOMASI & NORA D. VOLKOW – Associations between handedness and brain functional connectivity patterns in children

Handedness develops early in life, but the structural and functional brain connectivity patterns associated with it remains unknown. Here we investigate associations between handedness and the asymmetry of brain connectivity in 9- to 10-years old children from the Adolescent Brain Cognitive Development (ABCD) study. Compared to right-handers, left-handers had increased global functional connectivity density in the left-hand motor area and decreased it in the right-hand motor area. A connectivity-based index of handedness provided a sharper differentiation between right- and left-handers. The laterality of hand-motor connectivity varied as a function of handedness in unimodal sensorimotor cortices, heteromodal areas, and cerebellum ($P < 0.001$) and reproduced across all regions of interest in Discovery and Replication subsamples. Here we show a strong association between handedness and the laterality of the functional connectivity patterns in the absence of differences in structural connectivity, brain morphometrics, and cortical myelin between left, right, and mixed handed children.

<https://www.nature.com/articles/s41467-024-46690-1>

Nature Communications Biology

PAPERS

AUDREY DUREUX, ALESSANDRO ZANINI & STEFAN EVERLING – Mapping of facial and vocal processing in common marmosets with ultra-high field fMRI

Primate communication relies on multimodal cues, such as vision and audition, to facilitate the exchange of intentions, enable social interactions, avoid predators, and foster group cohesion during daily activities. Understanding the integration of facial and vocal signals is pivotal to comprehend social interaction. In this study, we acquire whole-brain ultra-high field (9.4 T) fMRI data from awake marmosets (*Callithrix jacchus*) to explore brain responses to unimodal and combined facial and vocal stimuli. Our findings reveal that the multisensory condition not only intensifies activations in the occipito-temporal face patches and auditory voice patches but also engages a more extensive network that includes additional parietal, prefrontal and cingulate areas, compared to the summed responses of the unimodal conditions. By uncovering the neural network underlying multisensory audiovisual integration in marmosets, this study highlights the efficiency and adaptability of the marmoset brain in processing facial and vocal social signals, providing significant insights into primate social communication.

<https://www.nature.com/articles/s42003-024-06002-1>

Nature Communications Psychology

PAPERS

SARAH YING ZHENG, LIRON ROZENKRANTZ & TAL SHAROT – Poor lie detection related to an under-reliance on statistical cues and overreliance on own behaviour

The surge of online scams is taking a considerable financial and emotional toll. This is partially because humans are poor at detecting lies. In a series of three online experiments (Nexp1 = 102, Nexp2 = 108, Nexp3 = 100) where participants are given the opportunity to lie as well as to assess the potential lies of others, we show that poor lie detection is related to the suboptimal computations people engage in when assessing lies. Participants used their own lying behaviour to predict whether other people lied, despite this cue being uninformative, while under-using more predictive statistical cues. This was observed by comparing the weights participants assigned to different cues, to those of a model trained on the ground truth. Moreover, across individuals, reliance on statistical cues was associated with better discernment, while reliance on one’s

own behaviour was not. These findings suggest scam detection may be improved by using tools that augment relevant statistical cues.

<https://www.nature.com/articles/s44271-024-00068-7>

Nature Humanities & Social Sciences Communications

PAPERS

EVA ARIÑO-MATEO et al – Your humanity depends on mine: the role of organizational dehumanization in the context of university studies

Infrahumanization means considering the other or the outgroup as less human than oneself or the ingroup. However, little attention has been given to the variables that determine the selection of which outgroups may be subjected to infrahumanization and the variables that might be moderating this process. This research aims to analyze the role that the relationship with the outgroup plays in the attribution of secondary emotions and the moderator role of organizational dehumanization. Participants (N = 338 students) completed a structured questionnaire that took 15 min. The results show that there is an attribution of humanity to the outgroup when the relationship between ingroup and outgroup is closer. Furthermore, organizational dehumanization had a moderator role between the relationship with the outgroup and the infrahumanization, which shows that when the ingroup perceives that it is being dehumanized by its organization, it attributes less humanity to the outgroup. Our research extends the theoretical understanding of infrahumanization and suggests that the relationship between the outgroup and the organizational dehumanization impacts the attribution of humanity.

<https://www.nature.com/articles/s41599-024-02880-2>

Nature Physics

ARTICLES

MARK BUCHANAN – Honesty is being put through the mill

Most scientists feel a certain comfort in opening a scientific journal and beginning to read a potentially interesting research paper. The culture is familiar; we expect to encounter arguments and evidence that will, for the most part, reflect our shared norms of the culture of science. The paper might turn out to be well constructed, logical and convincing, or it might be a disappointment, lacking any surprising insight. Even so, almost always, readers of scientific papers encounter arguments presented by authors who genuinely believe they are trying to push our understanding of some field a little further. There's an honesty involved.

<https://www.nature.com/articles/s41567-024-02430-2>

Nature Scientific Reports

PAPERS

YUZHU LIANG, KE XU & QIBIN RAN – Shared structure of fundamental human experience revealed by polysemy network of basic vocabularies across languages

How are concepts related to fundamental human experiences organized within the human mind? Our insights are drawn from a semantic network created using the Cross-Linguistic Database of Polysemous Basic Vocabulary, which focuses on a broad range of senses extracted from dictionary entries. The database covers 60 basic vocabularies in 61 languages, providing 11,841 senses from 3736 entries, revealing cross-linguistic semantic connections through automatically generated weighted semantic maps. The network comprises 2941 nodes connected by 3573 edges. The nodes representing body parts, motions, and features closely related to human experience occupy wide fields or serve as crucial bridges across semantic domains in the network. The polysemous network of basic vocabularies across languages represents a shared cognitive network of fundamental human experiences, as these semantic connections should be conceived as generally independent of any specific language and are driven by universal characteristics of the real world as perceived by the human mind. The database holds the potential to contribute to research aimed at unraveling the nature of cognitive proximity.

<https://www.nature.com/articles/s41598-024-56571-8>

MAYTE MARTÍNEZ et al with SARAH F. BROSNAN – The Joint Simon task is not joint for capuchin monkeys

Human cooperation can be facilitated by the ability to create a mental representation of one's own actions, as well as the actions of a partner, known as action co-representation. Even though other species also cooperate extensively, it is still unclear whether they have similar capacities. The Joint Simon task is a two-player task developed to investigate this action co-representation. We tested brown capuchin monkeys (*Sapajus [Cebus] apella*), a highly cooperative species, on a computerized Joint Simon task and found that, in line with previous research, the capuchins' performance was compatible with co-representation. However, a deeper exploration of the monkeys' responses showed that they, and potentially monkeys in previous studies, did not understand the control conditions, which precludes the interpretation of the results as a social phenomenon. Indeed, further testing to investigate alternative explanations demonstrated that our results were due to low-level cues, rather than action co-representation. This suggests that the Joint Simon task, at least in its current form, cannot determine whether non-human species co-represent their partner's role in joint tasks.

<https://www.nature.com/articles/s41598-024-55885-x>

ALESSANDRO RIGA et al – The Middle Pleistocene human metatarsal from Sedia del Diavolo (Rome, Italy)

The peopling of Europe during the Middle Pleistocene is a debated topic among paleoanthropologists. Some authors suggest the coexistence of multiple human lineages in this period, while others propose a single evolving lineage from *Homo heidelbergensis* to *Homo neanderthalensis*. The recent reassessment of the stratigraphy at the Sedia del Diavolo (SdD) site (Latium, Italy), now dated to the beginning of marine isotope stage (MIS) 8, calls for a revision of the human fossils from the site. In this paper, we present the morphometric, biomechanical and palaeopathological study of the second right metatarsal SdD2, to both re-evaluate its taxonomical affinities and possibly determine the levels of physical activity experienced by the individual during lifetime. Results demonstrate the persistence of archaic features in SdD2 suggesting new insights into the technology and hunting strategies adopted by Homo between MIS 9 and MIS 8.

<https://www.nature.com/articles/s41598-024-55045-1>

V. FERNÁNDEZ NAVARRO et al – Exploring the utility of Geometric Morphometrics to analyse prehistoric hand stencils

Hand stencils are a remarkable graphic expression in Prehistoric rock art, dating back to 42 ka BP. Although these stencils provide direct impressions of the artists' hands, the characterization of their biological profile (i.e., biological sex and age) is very challenging. Previous studies have attempted this analysis with traditional morphometrics (TM), whereas little research has been undertaken using Geometric Morphometrics (GM), a method widely used in other disciplines but only tentatively employed in rock art studies. However, the large variation in relative finger position in archaeological hands poses the question of whether these representations can be examined through GM, or, in contrast, if this creates an unmanageable error in the results. To address this issue, a 2D hand scans sample of 70 living individuals (F = 35; M = 35) has been collected in three standardized positions (n = 210) and digitized with 32 2D conventional landmarks. Results show that the intra-individual distance (mean Procrustes distance between Pos. 1–2 = 0.132; 2–3 = 0.191; 1–3 = 0.292) is larger than the inter-individual distance (mean in 1 = 0.122; 2 = 0.142; 3 = 0.165). Finally, it has been demonstrated that the relative finger positions, as well as the inclusion of all hand parts in the analysis, have an overshadowing effect on other variables potentially involved in the morphometric variability of the hand, such as biological sex.

<https://www.nature.com/articles/s41598-024-56889-3>

New Scientist

NEWS

Ukraine may have been first part of Europe colonised by early humans

Korolevo, a site in Ukraine where early humans made stone tools, has been dated to 1.4 million years ago, suggesting early humans moved from Ukraine into the rest of Europe.

<https://www.newscientist.com/article/2420679-ukraine-may-have-been-first-part-of-europe-colonised-by-early-humans/>

AI chatbot models 'think' in English even when using other languages

When answering questions posed in Chinese, French, German or Russian, large language models seem to process the queries in English, which could create cultural issues.

<https://www.newscientist.com/article/2420973-ai-chatbot-models-think-in-english-even-when-using-other-languages/>

Bumblebees show each other how to solve complex puzzles

Puzzles that bumblebees cannot solve on their own can be cracked with help from another bee, adding to research on the transmission of culture among insects.

<https://www.newscientist.com/article/2420960-bumblebees-show-each-other-how-to-solve-complex-puzzles/>

REVIEWS

HELEN PHILLIPS – Why We Remember review: A surprising and expert guide to memory

Are memories ever really true or false? Is social media disrupting how we remember? Does memory shape creativity? Find out in an essential new guide to memory by leading researcher Charan Ranganath.

Review of 'Why We Remember: The Science of Memory and How it Shapes Us' by Charan Ranganath, Faber (2024).

<https://www.newscientist.com/article/mg26134821-300-why-we-remember-review-a-surprising-and-expert-guide-to-memory/>

PLoS One

PAPERS

JIŘÍ MILIČKA et al – Large language models are able to downplay their cognitive abilities to fit the persona they simulate

This study explores the capabilities of large language models to replicate the behavior of individuals with underdeveloped cognitive and language skills. Specifically, we investigate whether these models can simulate child-like language and cognitive

development while solving false-belief tasks, namely, change-of-location and unexpected-content tasks. GPT-3.5-turbo and GPT-4 models by OpenAI were prompted to simulate children (N = 1296) aged one to six years. This simulation was instantiated through three types of prompts: plain zero-shot, chain-of-thoughts, and primed-by-corpus. We evaluated the correctness of responses to assess the models' capacity to mimic the cognitive skills of the simulated children. Both models displayed a pattern of increasing correctness in their responses and rising language complexity. That is in correspondence with a gradual enhancement in linguistic and cognitive abilities during child development, which is described in the vast body of research literature on child development. GPT-4 generally exhibited a closer alignment with the developmental curve observed in 'real' children. However, it displayed hyper-accuracy under certain conditions, notably in the primed-by-corpus prompt type. Task type, prompt type, and the choice of language model influenced developmental patterns, while temperature and the gender of the simulated parent and child did not consistently impact results. We conducted analyses of linguistic complexity, examining utterance length and Kolmogorov complexity. These analyses revealed a gradual increase in linguistic complexity corresponding to the age of the simulated children, regardless of other variables. These findings show that the language models are capable of downplaying their abilities to achieve a faithful simulation of prompted personas.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0298522>

FELIX RIEDE et al – A quantitative analysis of Final Palaeolithic/earliest Mesolithic cultural taxonomy and evolution in Europe

Archaeological systematics, together with spatial and chronological information, are commonly used to infer cultural evolutionary dynamics in the past. For the study of the Palaeolithic, and particularly the European Final Palaeolithic and earliest Mesolithic, proposed changes in material culture are often interpreted as reflecting historical processes, migration, or cultural adaptation to climate change and resource availability. Yet, cultural taxonomic practice is known to be variable across research history and academic traditions, and few large-scale replicable analyses across such traditions have been undertaken. Drawing on recent developments in computational archaeology, we here present a data-driven assessment of the existing Final Palaeolithic/earliest Mesolithic cultural taxonomy in Europe. Our dataset consists of a large expert-sourced compendium of key sites, lithic toolkit composition, blade and bladelet production technology, as well as lithic armatures. The dataset comprises 16 regions and 86 individually named archaeological taxa ('cultures'), covering the period between ca. 15,000 and 11,000 years ago (cal BP). Using these data, we use geometric morphometric and multivariate statistical techniques to explore to what extent the dynamics observed in different lithic data domains (toolkits, technologies, armature shapes) correspond to each other and to the culture-historical relations of taxonomic units implied by traditional naming practice. Our analyses support the widespread conception that some dimensions of material culture became more diverse towards the end of the Pleistocene and the very beginning of the Holocene. At the same time, cultural taxonomic unit coherence and efficacy appear variable, leading us to explore potential biases introduced by regional research traditions, inter-analyst variation, and the role of disjunct macroevolutionary processes. In discussing the implications of these findings for narratives of cultural change and diversification across the Pleistocene-Holocene transition, we emphasize the increasing need for cooperative research and systematic archaeological analyses that reach across research traditions.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0299512>

Proceedings of the Royal Society B

PAPERS

HENRY ARENAS-CASTRO et mul – Academic publishing requires linguistically inclusive policies

Scientific knowledge is produced in multiple languages but is predominantly published in English. This practice creates a language barrier to generate and transfer scientific knowledge between communities with diverse linguistic backgrounds, hindering the ability of scholars and communities to address global challenges and achieve diversity and equity in science, technology, engineering and mathematics (STEM). To overcome those barriers, publishers and journals should provide a fair system that supports non-native English speakers and disseminates knowledge across the globe. We surveyed policies of 736 journals in biological sciences to assess their linguistic inclusivity, identify predictors of inclusivity, and propose actions to overcome language barriers in academic publishing. Our assessment revealed a grim landscape where most journals were making minimal efforts to overcome language barriers. The impact factor of journals was negatively associated with adopting a number of inclusive policies whereas ownership by a scientific society tended to have a positive association. Contrary to our expectations, the proportion of both open access articles and editors based in non-English speaking countries did not have a major positive association with the adoption of linguistically inclusive policies. We proposed a set of actions to overcome language barriers in academic publishing, including the renegotiation of power dynamics between publishers and editorial boards.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2023.2840>

BAPTISTE SADOUGHI et al – Social network shrinking is explained by active and passive effects but not increasing selectivity with age in wild macaques

Evidence of social disengagement, network narrowing and social selectivity with advancing age in several non-human animals challenges our understanding of the causes of social ageing. Natural animal populations are needed to test whether social ageing and selectivity occur under natural predation and extrinsic mortality pressures, and longitudinal studies are

particularly valuable to disentangle the contribution of within-individual ageing from the demographic processes that shape social ageing at the population level. Data on wild Assamese macaques (*Macaca assamensis*) were collected between 2013 and 2020 at the Phu Khieo Wildlife Sanctuary, Thailand. We investigated the social behaviour of 61 adult females observed for 13 270 h to test several mechanistic hypotheses of social ageing and evaluated the consistency between patterns from mixed-longitudinal and within-individual analyses. With advancing age, females reduced the size of their social network, which could not be explained by an overall increase in the time spent alone, but by an age-related decline in mostly active, but also passive, behaviour, best demonstrated by within-individual analyses. A selective tendency to approach preferred partners was maintained into old age but did not increase. Our results contribute to our understanding of the driver of social ageing in natural animal populations and suggest that social disengagement and selectivity follow independent trajectories during ageing.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2023.2736>

MAGNUS ENQUIST et al – Cultural traits operating in senders are driving forces of cultural evolution

We introduce a mathematical model of cultural evolution to study cultural traits that shape how individuals exchange information. Current theory focuses on traits that influence the reception of information (receiver traits), such as evaluating whether information represents the majority or stems from a trusted source. Our model shifts the focus from the receiver to the sender of cultural information and emphasizes the role of sender traits, such as communicability or persuasiveness. Here, we show that sender traits are probably a stronger driving force in cultural evolution than receiver traits. While receiver traits evolve to curb cultural transmission, sender traits can amplify it and fuel the self-organization of systems of mutually supporting cultural traits, including traits that cannot be maintained on their own. Such systems can reach arbitrary complexity, potentially explaining uniquely human practical and mental skills, goals, knowledge and creativity, independent of innate factors. Our model incorporates social and individual learning throughout the lifespan, thus connecting cultural evolutionary theory with developmental psychology. This approach provides fresh insights into the trait-individual duality, that is, how cultural transmission of single traits is influenced by individuals, who are each represented as an acquired system of cultural traits.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2023.2110>

KARL GRIESHOP, EDDIE K. H. HO AND KATJA R. KASIMATIS – Dominance reversals: the resolution of genetic conflict and maintenance of genetic variation

Beneficial reversals of dominance reduce the costs of genetic trade-offs and can enable selection to maintain genetic variation for fitness. Beneficial dominance reversals are characterized by the beneficial allele for a given context (e.g. habitat, developmental stage, trait or sex) being dominant in that context but recessive where deleterious. This context dependence at least partially mitigates the fitness consequence of heterozygotes carrying one non-beneficial allele for their context and can result in balancing selection that maintains alternative alleles. Dominance reversals are theoretically plausible and are supported by mounting empirical evidence. Here, we highlight the importance of beneficial dominance reversals as a mechanism for the mitigation of genetic conflict and review the theory and empirical evidence for them. We identify some areas in need of further research and development and outline three methods that could facilitate the identification of antagonistic genetic variation (dominance ordination, allele-specific expression and allele-specific ATAC-Seq (assay for transposase-accessible chromatin with sequencing)). There is ample scope for the development of new empirical methods as well as reanalysis of existing data through the lens of dominance reversals. A greater focus on this topic will expand our understanding of the mechanisms that resolve genetic conflict and whether they maintain genetic variation.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2023.2816>

Royal Society Open Science

PAPERS

ELIZABETH M. SPEECHLEY et al – Heritability of cognitive performance in wild Western Australian magpies

Individual differences in cognitive performance can have genetic, social and environmental components. Most research on the heritability of cognitive traits comes from humans or captive non-human animals, while less attention has been given to wild populations. Western Australian magpies (*Gymnorhina tibicen dorsalis*, hereafter magpies) show phenotypic variation in cognitive performance, which affects reproductive success. Despite high levels of individual repeatability, we do not know whether cognitive performance is heritable in this species. Here, we quantify the broad-sense heritability of associative learning ability in a wild population of Western Australian magpies. Specifically, we explore whether offspring associative learning performance is predicted by maternal associative learning performance or by the social environment (group size) when tested at three time points during the first year of life. We found little evidence that offspring associative learning performance is heritable, with an estimated broad-sense heritability of just -0.046 ± 0.084 (confidence interval: $-0.234/0.140$). However, complementing previous findings, we find that at 300 days post-fledging, individuals raised in larger groups passed the test in fewer trials compared with individuals from small groups. Our results highlight the pivotal influence of the social environment on cognitive development.

<https://royalsocietypublishing.org/doi/10.1098/rsos.231399>

JULIA M. ZEH et al – Caller identification and characterization of individual humpback whale acoustic behaviour

Acoustic recording tags provide fine-scale data linking acoustic signalling with individual behaviour; however, when an animal is in a group, it is challenging to tease apart calls of conspecifics and identify which individuals produce each call. This, in turn, prohibits a robust assessment of individual acoustic behaviour including call rates and silent periods, call bout production within and between individuals, and caller location. To overcome this challenge, we simultaneously instrumented small groups of humpback whales on a western North Atlantic feeding ground with sound and movement recording tags. This approach enabled a comparison of the relative amplitude of each call across individuals to infer caller identity for 97% of calls. We recorded variable call rates across individuals (mean = 23 calls/h) and groups (mean = 55 calls/h). Calls were produced throughout dives, and most calls were produced in bouts with short inter-call intervals of 2.2 s. Most calls received a likely response from a conspecific within 100 s. This caller identification (ID) method facilitates studying both individual- and group-level acoustic behaviour, yielding novel results about the nature of sequence production and vocal exchanges in humpback whale social calls. Future studies can expand on these caller ID methods for understanding intra-group communication across taxa.

<https://royalsocietypublishing.org/doi/10.1098/rsos.231608>

Science

NEWS

The Fading Memories of Youth

The mystery of “infantile amnesia” suggests memory works differently in the developing brain.

<https://www.science.org/content/article/are-your-earliest-childhood-memories-still-lurking-your-mind-or-gone-forever>

Trends in Cognitive Sciences

PAPERS

TIM BAYNE et al with ANIL K. SETH, MARCELLO MASSIMINI & AXEL CLEEREMANS – Tests for consciousness in humans and beyond

Which systems/organisms are conscious? New tests for consciousness (‘C-tests’) are urgently needed. There is persisting uncertainty about when consciousness arises in human development, when it is lost due to neurological disorders and brain injury, and how it is distributed in nonhuman species. This need is amplified by recent and rapid developments in artificial intelligence (AI), neural organoids, and xenobot technology. Although a number of C-tests have been proposed in recent years, most are of limited use, and currently we have no C-tests for many of the populations for which they are most critical. Here, we identify challenges facing any attempt to develop C-tests, propose a multidimensional classification of such tests, and identify strategies that might be used to validate them.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(24\)00010-X](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(24)00010-X)

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