EAORC BULLETIN 1,063 – 29 October 2023

CONTENTS

NOTICES

PUBLICATION ALERTS

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

EDITORIAL INTERJECTIONS

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

ACADEMIA.EDU – Social Innovation and Hominin Evolution

Paleo Anthropology 2011, 111-129. (2011).

FIONA COWARD & MATT GROVE – Beyond the Tools: Social Innovation and Hominin Evolution

Archaeological interest in innovation traditionally focuses on creativity in material culture and, in the case of the Paleolithic, particularly on the changing morphology of stone tools. However, this is only one result of a constellation of innovative processes that occur both between and within hominin groups evolving towards the unique modern human lifeway. The adaptations scaffolding such innovative processes include not only the cognitive mechanisms and biological and skeletal adaptations that underpin technological innovation and cultural transmission, but also the behavioral strategies pursued by hominin groups and individuals. In this paper, we draw from a Social Brain approach to argue that it is hominins' innovative social and group-oriented behavioral strategies that drive technological developments and distinguish us from other primates. A variety of models and methodologies developed to investigate the interrelationships between the crucial ecological, social, and behavioral variables are reviewed here for an archaeological audience in order to stimulate research to test and refine these models with archaeological data.
https://www.academia.edu/800340/Coward_F_and_Grove_M_Beyond_the_tools_social_innovation_and_hominin_evolution

ACADEMIA.EDU – Exograms

Rock Art Research 31:1, 47-62 (2014).

R. G. BEDNARIK – Exograms

Palaeoart constitutes the entire surviving corpus of exograms available from the distant hominin past, providing a principal resource for accessing cognitive dimensions of early humans. The potential of exogrammatic review has remained largely unexplored so far in palaeoart research. The reasons for this are explored, and the role of exograms in the development of semiotic capacities and mental constructs is examined. It is shown that, among the classes of evidence available to reason about the cognitive evolution of hominins, exograms, although truncated taphonomically, are the most comprehensive and dependable source of information. However, it also emerges that this record needs to be considered in scientific rather than simplistic humanistic terms. Its potential in exploring neuroscientific aspects of hominin evolution is investigated.
https://www.academia.edu/7805470/Exograms

CONFERENCE ALERT – 30th annual conference 'The Science of Consciousness' ('TSC')

The 30th annual conference 'The Science of Consciousness' ('TSC'), 22-26 April 2024, will take place at the Loews Ventana Canyon Resort in the hills above Tucson, Arizona.
The conference is hosted and sponsored by the University of Arizona, Center for Consciousness Studies and co-sponsored by the University of Michigan, Center for Consciousness Science.

2024 TSC Conference Themes

Cortical Oscillations and Traveling Waves; Psychedelics and Psychoplastogens; Astrobiology and Astroconsciousness; Dual Aspect Monism; Megahertz EEG and DoDecoGraphy (DDG); Theories of Consciousness; Consciousness and Reality; Artificial Intelligence (AI) and Consciousness; Monitoring Consciousness in Altered States; Searching for Consciousness in Cerebral Organoids; Brain Symmetry; Microtubule Time Crystals – Virtual Reality Experience

Keynote Speakers

Earl K Miller; Susan Schneider; Dante Lauretta; Anirban Bandyopadhyay

Plenary Speakers

Tanya Luhrmann; Donald Hoffman; Steven Laureys; Brian Muraresku; George Mashour; Sir Roger Penrose; Caleb Scharf; Hartmut Neven; Pieter-Jan Maes; Deepak Chopra; Sawsan Wehbi; Stuart Hameroff; Harald Atmanspacher; Dinesh Pal; Alysson Muotri; Christof Koch; Dean Rickles; Santosh A. Helekar; Bill Seager; Zirui Huang; Aaron Schurger; Dimitris Pinotsis; Andre Bastos; Pulin Gong; Paavo Pylkkanen

History and Overview

The 1994 TSC conference was the world's first interdisciplinary gathering devoted to the study of consciousness. Prominent speakers addressed a packed auditorium at the University of Arizona hospital in Tucson, but it was then-unknown philosopher David Chalmers who captured the moment, describing the now-famous 'hard problem' of phenomenal conscious experience, distinguishing it from relatively easy problems like attention, memory and behavior. Bernard Baars presented his Global Workspace theory, Ben Libet described the timing of conscious experience, and Christof Koch argued that consciousness emerged from complex computation among simple brain neurons, signaling only via membrane surfaces and synapses. Stuart Hameroff discussed how microtubules inside neurons could help account for consciousness, and Roger Penrose spoke about consciousness as something other than computation, requiring a quantum connection to the most basic level of the universe.
These views have echoed for 30 years. Most continue to see consciousness as described by Baars, Koch and many others, an emergent property of complex computation among simple brain neurons, promoting the notion that AI will be conscious. But some ---consider consciousness a fundamental feature of the universe, e.g. subtly connected to the brain through quantum vibrations in microtubules inside neurons, as suggested by Penrose and Hameroff. Some consider consciousness to be an illusion, others believe reality to be the illusion.
Despite disparate views, we've learned a lot in 30 years, and have a lot more ahead.

Special Presentations

Symmetry in the Brain: Sir Roger Penrose
Microtubule Time Crystals – Virtual Reality Experience: Pieter-Jan Maes

Call for Workshop Proposals

TSC Workshops are 4 hour parallel sessions on particular topics Monday morning, afternoon and evening April 22, 2024. Attendance is included in registration, and Workshop presenters receive 2 free registrations. Please submit a brief abstract (500 words maximum) on the topic, speakers, and significance to consciousness studies by email to center@arizona.edu. Currently scheduled workshop topics include (There will be 10 workshops): Education in Consciousness Studies; Dual Aspect Monism; Meditation and Eastern spiritual practices; Psychedelics

Links

ABSTRACT SUBMISSIONS – Now Open (https://auth.oxfordabstracts.com/?redirect=/stages/6376/submitter)
Deadline December 15; Notifications December 30.
WORKSHOP SUBMISSIONS – Send proposals to center@arizona.edu
Deadline November 20; Notifications November 30.
GROUP HOTEL BLOCK (LOEWS) – Reservation Link Now Open (https://www.loewshotels.com/ventana-canyon/group-the-science-of-consciousness-2024)
Loews Ventana Canyon Resort – Tucson (Room Block closes March 29); $169 per night; Group Rates Available: April 17 through May 1, 2024
CONFERENCE REGISTRATION (Eventbrite) - Opens November 2023 (early reg: Standard $550; Student: $450)
link to be announced - via the CCS website (https://consciousness.arizona.edu/) and e-mail updates:
Optional Thurs. Dinner tba

Remote attendance for Plenary Sessions tba
Join our E-list for Conference Updates
https://visitor.r20.constantcontact.com/manage/optin?v=001FTqd7AYcAj1pLQAVYlLz3qPLdIKRXinUvtzWIVrwQIpogjMpf2qHotX2R-Q9SnSP_ZZtHnpX_AxCGDs1covjSa2vpB-SvxtujMwLO33EPCs%3D

FUNDING ALERT – Animal Behavior Society Student Research & Developing Nations Grants

APPLICATION SUBMISSION DEADLINE: December 15, 2023
CLICK HERE TO SUBMIT A GRANT: https://www.animalbehaviorsociety.org/web/awards-srg.php

The Animal Behavior Society offers the following grants to support graduate student research:
Student Research Grants
ABS Conservation Award
Justice Equity Diversity and Inclusion (JEDI) Award

The ABS also offers an Early Career Grant in Conservation Behavior and Developing Nations Grant to support students and other researchers from developing nations. Applicants for student grants must be enrolled in a graduate program and must be active members of the Animal Behavior Society. Research grants range from $500 to $2000 USD, depending on the category of the grant and evaluations. Individuals may receive only one ABS research grant during their lifetime.
More information and guidelines can be found here: https://www.animalbehaviorsociety.org/web/awards-srg.php

Student Research Grant Workshop
October 26, 2023
1:00 PM ET/10:00 AM PT
Join the ABS Members at Large for a workshop about the ABS Student and Developing Nations Research Grants. We will provide advice about writing student Research Grants and Diversity Equity and Inclusion Statements as well as information about the Grant Language Editing Program and the review process of the ABS Student Research Grants.
CLICK HERE TO REGISTER: https://spltrak.zoom.us/meeting/register/tZ0lde2rpjoqG9CCRtst1KotLvzglM8sBrIV#/registration

Grant Language Editing Program (GLEP)
Deadline: November 15, 2023
The Grant Language Editing Program (GLEP) aims to provide support for research grant applicants who are interested in editorial assistance with English. The consultants will be invited from among the students who received ABS Student Research Grants (SRG) in the past two years, who are confident in English grammar and have strong editing abilities. The consultants will restrict their comments to grammar and word choice only, feedback on scientific content and merit of the proposal will not be provided through the GLEP.
More information and guidelines can be found here: https://www.animalbehaviorsociety.org/web/awards-glep.php.

NEWS

NATURE BRIEFING – AI has human-like language ability

An artificial intelligence (AI) system mimics the human ability to quickly fold new words into an existing vocabulary and use them in fresh contexts. By being programmed to learn from its mistakes, the neural network outperformed the chatbot ChatGPT at making generalizations about language, scoring as well as — and sometimes even better than — human volunteers. This suggests that there are ways to reduce the gargantuan amount of necessary training data and make systems more efficient learners, says AI researcher Elia Bruni.
https://www.nature.com/articles/d41586-023-03272-3

NATURE BRIEFING – Chimpanzees experience menopause

The females in a group of wild chimpanzees (Pan troglodytes) are the first non-human primates to be documented experiencing menopause. Toothed whales, such as orcas (Orcinus orca), are the only other wild mammals in which females are known to live long beyond their reproductive years. In captive animals, this seems to be more common: females in 6 out of 20 mammalian orders for which there are data experience cessation of ovulation. This includes European badgers (Meles meles), house mice (Mus musculus) and horses (Equus caballus). Why only some animals experience menopause is still a mystery.
https://www.nature.com/articles/d41586-023-03308-8

NATURE BRIEFING – Meat-eating probably didn't make us human

Scientists are poking holes in the idea that meat-eating was key to human evolution. Meat was long considered to be essential for providing the energy needed for our large brains. But "proteins alone do not have a particularly high calorific

value", says evolution researcher Lutz Kindler. What makes us human might instead be our enormous metabolic adaptability. "Humans, unlike many other animals, are able to extract from different food sources in their environment what ensures their survival," explains nutritional-medicine specialist Hans Hauner.
https://www.scientificamerican.com/article/does-humanity-have-to-eat-meat/

SCIENCEADVISER – Chimps undergo menopause. Do most mammals?

Menopause is classically defined as when an animal stops menstruating. That this happens at all has long perplexed evolutionary biologists, especially because this cessation of reproduction only seemed to occur in a few select species—humans, of course, and some whales. But now, researchers have uncovered evidence that one of our closest relatives also undergoes menopause.
https://www.science.org/content/article/menopause-may-be-widespread-among-mammals-challenging-famed-hypothesis

SCIENCE.ORG NEWS – Menopause may be widespread among mammals, challenging famed hypothesis

Chimps, other species live past end of reproduction, pair of studies finds.
https://www.science.org/content/article/menopause-may-be-widespread-among-mammals-challenging-famed-hypothesis

PUBLICATIONS

Biolinguistics

COMMENTARIES

HANS-MARTIN GÄRTNER – Eademne Sunt?

This paper is a reaction to Watumull and Roberts (2023, https://doi.org/10.5964/bioling.12393).
In a recent squib (Gärtner, 2023), I pointed out that standard axiomatizations of the Leibnizian "real addition" operator ⊕ include associativity, (1), as one of its properties (cf. Lenzen, 2000, Section 4; Rescher, 1954, p. 11; Swoyer, 1994, p. 15): (1)Associativity: (A ⊕ B) ⊕ C = A ⊕ (B ⊕ C)It was further maintained that associativity does not hold for Chomskyan Merge and that therefore the suggestion by Roberts and Watumull (2015, p. 213) to "identi[fy]" the two operators, the former renamed "Lerge," was problematic. In their reply, Watumull and Roberts (2023) dismiss the associativity challenge on the basis of the idea that from a global perspective, for any (syntactic objects) X, Y, and Z, Merge generates all possible combinations, {{X,Y },Z } and {X,{Y,Z }} among them. And, importantly, it is assumed that "[t]he order of operations only matters when we seek to understand what parts of our knowledge we can use, factoring in third factors, etc." (p. 2). Effects of the structural differences are taken to be "external to the internal properties of Merge and the structures it generates" (p. 2f.)
https://bioling.psychopen.eu/index.php/bioling/article/view/12859/12859.pdf

Cell

PAPERS

IVANA WINKLER & ANGELA GONCALVES – Do mammals have menopause?

Semantics and lack of data have clouded our understanding about menopause in non-human mammals. The traditional definition of menopause based on the last menstrual bleed is limited and hinders cross-species comparison. Here, we redefine it as the permanent cessation of ovulation and show menopause to be widespread across mammalian orders.
https://www.cell.com/cell/fulltext/S0092-8674(23)01080-2

Current Biology

ARTICLES

FLORIAN MADERSPACHER – Thinking outside the shell

How did cephalopods come to evolve the complex cognition that sets them apart from other invertebrates? The reasons may be found not just in their brains, but also in their shells — or rather, their loss. Florian Maderspacher on a five-hundred-million-year evolutionary saga of less is more.
https://www.cell.com/current-biology/fulltext/S0960-9822(23)01302-7

PAPERS

CHRISTELLE JOZET-ALVES, ALEXANDRA K. SCHNELL & NICOLA S. CLAYTON – Cephalopod learning and memory

Cephalopod molluscs are renowned for their unique central nervous system — a donut-shaped brain organised around the oesophagus. This brain supports sophisticated learning and memory abilities. Between the 1950s and 1980s, these cognitive abilities were extensively studied in octopus (Figure 1A) — a now leading model for the study of memory and its neural substrates (approximately 200 papers during this period). The focus on octopus learning and memory was mainly due to their curious nature and the fact that they adapt to laboratory-controlled conditions, making them easy to test and maintain in captivity. Research on cephalopod cognition began to widen in the late 20th century, when scientists started focusing on

other coleoid cephalopods (i.e., cuttlefish and squid) (Figure 1B,C), and not just on associative learning and memory per se, but other more complex aspects of cognition such as episodic-like memory (the ability to remember the what, where, and when of a past event), source memory (the retrieval of contextual details from a memory), and self-control (the ability to inhibit an action in the present to gain a more valuable future reward). Attention broadened further over the last two decades to focus on the shelled cephalopods — the nautiloids (Figure 1D). The nautiloids have relatively primitive brains compared to their soft-bodied cousins (octopus, cuttlefish, and squid) but research shows that they are still able to comparatively succeed in some cognitive tasks. In this primer, we will provide a general description of the types of memory studied in cephalopods, and discuss learning and memory experiments that address the main challenges cephalopods face during their daily lives: navigation, timing, and food selection. Determining the type of information cephalopods learn and remember and whether they use such information to overcome ecological challenges will highlight why these invertebrates evolved large and sophisticated brains.
https://www.cell.com/current-biology/fulltext/S0960-9822(23)01056-4

BINYAMIN HOCHNER et al – Embodied mechanisms of motor control in the octopus
Achieving complex behavior in soft-bodied animals is a hard task, because their body morphology is not constrained by a fixed number of jointed elements, as in skeletal animals, and thus the control system has to deal with practically an infinite number of control variables (degrees of freedom). Almost 30 years of research on Octopus vulgaris motor control has revealed that octopuses efficiently control their body with strategies that emerged during the adaptive coevolution of their nervous system and body morphology. In this minireview, we highlight principles of embodied organization that were revealed by studying octopus motor control, and that are used as inspiration for soft robotics. We describe the evolved solutions to the problem, implemented from the lowest level, the muscular system, to the network organization in higher motor control centers of the octopus brain. We show how the higher motor control centers, where the sensory–motor interface lies, can control and coordinate limbs with large degrees of freedom without using body-part maps to represent sensory and motor information, as they do in vertebrates. We demonstrate how this unique control mechanism, which allows efficient control of the body in a large variety of behaviors, is embodied within the animal's body morphology.
https://www.cell.com/current-biology/fulltext/S0960-9822(23)01221-6

Frontiers in Human Neuroscience

PAPERS

ALEJANDRA M. HÜSSER et al – Brain language networks and cognitive outcomes in children with frontotemporal lobe epilepsy
Pediatric frontal and temporal lobe epilepsies (FLE, TLE) have been associated with language impairments and structural and functional brain alterations. However, there is no clear consensus regarding the specific patterns of cerebral reorganization of language networks in these patients. The current study aims at characterizing the cerebral language networks in children with FLE or TLE, and the association between brain network characteristics and cognitive abilities.
Twenty (20) children with FLE or TLE aged between 6 and 18 years and 29 age- and sex-matched healthy controls underwent a neuropsychological evaluation and a simultaneous functional near-infrared spectroscopy and electroencephalography (fNIRS-EEG) recording at rest and during a receptive language task. EEG was used to identify potential subclinical seizures in patients. We removed these time intervals from the fNIRS signal to investigate language brain networks and not epileptogenic networks. Functional connectivity matrices on fNIRS oxy-hemoglobin concentration changes were computed using cross-correlations between all channels.
Group comparisons of residual matrices (=individual task-based matrix minus individual resting-state matrix) revealed significantly reduced connectivity within the left and between hemispheres, increased connectivity within the right hemisphere and higher right hemispheric local efficiency for the epilepsy group compared to the control group. The epilepsy group had significantly lower cognitive performance in all domains compared to their healthy peers. Epilepsy patients' local network efficiency in the left hemisphere was negatively associated with the estimated IQ ($p = 0.014$), suggesting that brain reorganization in response to FLE and TLE does not allow for an optimal cognitive development.
https://www.frontiersin.org/articles/10.3389/fnhum.2023.1253529/full

ELENA SALILLAS, SILVIA BENAVIDES-VARELA & CARLO SEMENZA – The brain lateralization and development of math functions: progress since Sperry, 1974
In 1974, Roger Sperry, based on his seminal studies on the split-brain condition, concluded that math was almost exclusively sustained by the language dominant left hemisphere. The right hemisphere could perform additions up to sums less than 20, the only exception to a complete left hemisphere dominance. Studies on lateralized focal lesions came to a similar conclusion, except for written complex calculation, where spatial abilities are needed to display digits in the right location according to the specific requirements of calculation procedures. Fifty years later, the contribution of new theoretical and instrumental tools lead to a much more complex picture, whereby, while left hemisphere dominance for math in the right-handed is confirmed for most functions, several math related tasks seem to be carried out in the right hemisphere. The developmental trajectory in the lateralization of math functions has also been clarified. This corpus of knowledge is reviewed here. The right hemisphere does not simply offer its support when calculation requires generic space processing, but its role

can be very specific. For example, the right parietal lobe seems to store the operation-specific spatial layout required for complex arithmetical procedures and areas like the right insula are necessary in parsing complex numbers containing zero. Evidence is found for a complex orchestration between the two hemispheres even for simple tasks: each hemisphere has its specific role, concurring to the correct result. As for development, data point to right dominance for basic numerical processes. The picture that emerges at school age is a bilateral pattern with a significantly greater involvement of the right-hemisphere, particularly in non-symbolic tasks. The intraparietal sulcus shows a left hemisphere preponderance in response to symbolic stimuli at this age.
https://www.frontiersin.org/articles/10.3389/fnhum.2023.1288154/full

Frontiers in Psychology

PAPERS

MARTIN HASPELMATH – Coexpression and synexpression patterns across languages: comparative concepts and possible explanations

Meanings and linguistic shapes (or forms) do not always map onto each other in a unique way, and linguists have used all kinds of different terms for such situations: Ambiguity, polysemy, syncretism, lexicalization, semantic maps; portmanteau, cumulative exponence, feature bundling, underspecification, and so on. In the domain of lexical comparison, the term colexification has become generally established in recent years, and in the present paper, I extend this word-formation pattern in a regular way (cogrammification, coexpression; syllexification, syngrammification, synexpression). These novel terms allow us to chart the range of relevant phenomena in a systematic way across the grammar-lexicon continuum, and to ask whether highly general explanations of coexpression and synexpression patterns are possible. While there is no new proposal for explaining coexpression here, I will suggest that frequency of occurrence plays a crucial role in explaining synexpression patterns.
https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1236853/full

Heliyon

PAPERS

ANIS KOUBAA et al – Humans are still better than ChatGPT: Case of the IEEEXtreme competition

Since the release of ChatGPT, numerous studies have highlighted the remarkable performance of ChatGPT, which often rivals or even surpasses human capabilities in various tasks and domains. However, this paper presents a contrasting perspective by demonstrating an instance where human performance excels in typical tasks suited for ChatGPT, specifically in the domain of computer programming. We utilize the IEEExtreme Challenge competition as a benchmark—a prestigious, annual international programming contest encompassing a wide range of problems with different complexities. To conduct a thorough evaluation, we selected and executed a diverse set of 102 challenges, drawn from five distinct IEEExtreme editions, using three major programming languages: Python, Java, and C++. Our empirical analysis provides evidence that contrary to popular belief, human programmers maintain a competitive edge over ChatGPT in certain aspects of problem-solving within the programming context. In fact, we found that the average score obtained by ChatGPT on the set of IEEExtreme programming problems is 3.9 to 5.8 times lower than the average human score, depending on the programming language. This paper elaborates on these findings, offering critical insights into the limitations and potential areas of improvement for AI-based language models like ChatGPT.
https://www.cell.com/heliyon/fulltext/S2405-8440(23)08832-1

Interface: Journal of the Royal Society

PAPERS

CLAUS KADELKA et al – Modularity of biological systems: a link between structure and function

This paper addresses two topics in systems biology, the hypothesis that biological systems are modular and the problem of relating structure and function of biological systems. The focus here is on gene regulatory networks, represented by Boolean network models, a commonly used tool. Most of the research on gene regulatory network modularity has focused on network structure, typically represented through either directed or undirected graphs. But since gene regulation is a highly dynamic process as it determines the function of cells over time, it is natural to consider functional modularity as well. One of the main results is that the structural decomposition of a network into modules induces an analogous decomposition of the dynamic structure, exhibiting a strong relationship between network structure and function. An extensive simulation study provides evidence for the hypothesis that modularity might have evolved to increase phenotypic complexity while maintaining maximal dynamic robustness to external perturbations.
https://royalsocietypublishing.org/doi/10.1098/rsif.2023.0505

iScience

PAPERS

HELEN FEWLASS et al with JEAN-JACQUES HUBLIN – Chronological and genetic analysis of an Upper Palaeolithic female infant burial from Borsuka Cave, Poland

Six infant human teeth and 112 animal tooth pendants from Borsuka Cave were identified as the oldest burial in Poland. However, uncertainties around the dating and the association of the teeth to the pendants have precluded their association to an Upper Palaeolithic archaeological industry. Using <67 mg per tooth, we combined dating and genetic analyses of two human teeth and six herbivore tooth pendants to address these questions. Our interdisciplinary approach yielded informative results despite limited sampling material, and high levels of degradation and contamination. Our results confirm the Palaeolithic origin of the human remains and herbivore pendants, and permit us to identify the infant as female and discuss the association of the assemblage with different Palaeolithic industries. This study exemplifies the progress that has been made towards minimally destructive methods and the benefits of integrating methods to maximise data retrieval from precious but highly degraded and contaminated prehistoric material.
https://www.cell.com/iscience/fulltext/S2589-0042(23)02360-X

Language Sciences

PAPERS

JOHN COLLINS – Generative linguistics: 'Galilean style'

Generative linguistics is often claimed by Chomsky to have a 'Galilean style', which is intended to position linguistics as a science continuous with standard practise in the natural sciences. These claims, however, are more suggestive than explanatory. The paper will, first, explain just what a Galilean style is. It will then be argued that its application to two key notions in generative linguistics - the competence/performance distinction (with reference to centre-embedding) and the notion of computation - demands a departure from what we might expect of a Galilean style. In this sense, the epithet is misleading. It will also be shown, however, that the 'Galilean' label is appropriate once we factor in the difference between a science concerned with kinematics (the relations between objects in space and time) and one concerned with language.
https://www.sciencedirect.com/science/article/pii/S0388000123000505

FRED CUMMINS & LUCIANA LONGO – The empirical discovery of domains of assembly and communion

We consider chanting, or joint speech, which is ubiquitous, but not evenly distributed, in human activity. Taking an observational stance motivated by embodied cognitive science, we approach this topic without assumptions of the structure of persons, social formations, culture, or nature. This restrictive starting point motivates the use of a simple empirical definition of joint speech (the utterance by multiple persons of the same sounds at the same time) to allow us to induce four distinguished domains of assembly and communion among persons. These may be loosely indicated by the familiar terms of ritual, sports, protest and primary education. We use our empirical definition to induce these domains, and then consider how they might be regarded jointly. We are not aware of any social or psychological theory that would generate these four domains, and we suggest that our restricted mode of observation may be of use in the collective consideration of human patterning, without the common assumptions of cognitivism.
https://www.sciencedirect.com/science/article/pii/S0388000123000517

ABDUWALI RAHMAN & ZHENQIAN LIU – The cognitive psychological distinctions between levels of meaning

This study is an attempt to investigate the psychological reality and cognitive priority of three layers of linguistic meaning—what is said, impliciture, and implicature. According to the literal-first serial processing model, what is said is psychologically real and is required to draw an impliciture and/or implicature. By contrast, the impliciture-by-default processing model argues that there is psychological reality for impliciture and implicature but not for what is said, and that impliciture has cognitive priority over the other two levels. Finally, the parallel processing model does not make a strong assumption about the temporal order of interpretation. A mouse-tracking experiment in a listening comprehension task was designed to test the predictions of the three accounts. It examined how participants grasp the three levels of meaning in two tests, one in which a preferred interpretation of an utterance (either with what is said, impliciture or implicature) is confirmed and another where this interpretation is negated. Results show that participants were consciously aware of each of the three meanings in both tests. Their comprehension was more accurate and faster when they were prompted for what is said and implicitures compared to implicatures in the confirmation test. But they were delayed in processing time for implicitures in the negation test. Furthermore, they exhibited different comprehension patterns across different impliciture and implicature types. Thus, the current study provides mixed evidence for the existing theories of linguistic meaning by failing to find strong support for any of them. By showing how to integrate the three traditional models, this study suggests a way forward that what is said has psychological reality and impliciture has a special cognitive status depending on the context and yet that pragmatic inferences may vary in degree across utterance types.
https://www.sciencedirect.com/science/article/abs/pii/S0388000123000487

TAKUYA INOUE – Toward an ecological model of language: from cognitive linguistics to ecological semantics
The ecological perspective of language has gained prominence in linguistics over the past two decades. Since its anti-representationalist and anti-cognitivist stance, the ecological approach faces a challenge in reconciling with modern linguistic theories: While the ecological approach focuses on the dynamic aspects of language, it has been criticized for needing help to account for stable linguistic meaning. To address this issue, Cognitive Linguistics is the best candidate for giving an ecological account of static meaning. Also, I introduce the concept of design to establish the ecological model of language and demonstrate how this model can describe linguistic meaning within an ecological framework. Cognitive Linguistics develops into the ecological theory of meaning through these steps, namely ecological semantics.
https://www.sciencedirect.com/science/article/abs/pii/S0388000123000475

FRANCIS CORNISH – On the place and role of 'discourse' in the Functional Discourse Grammar model. The interface between language system and language use
Mackenzie (2020) is a defense of the position adopted by the architects of the standard model of Functional Discourse Grammar (FDG): namely that the model cannot (and even could never) be considered a 'grammar of discourse'. The article examines the arguments given for rejecting the 'discourse' dimension from the FDG model, proposes an independent account of discourse, and suggests a means of dovetailing it within a model of the wider utterance context. On the one hand, the author's arguments are in the main valid: for 'discourse', as characterized in section 3, is not a formal, clearly delineated object amenable to systematic treatment within a grammatical model of a given language. Yet on the other, it is arguable that even the presence of the term 'discourse' in the model's name is not in fine justified. Notwithstanding, in order to include the 'discourse dimension' (section 3), it is argued that the Core FDG model could be integrated with a broader model of the utterance context involved. This would enable it to account more adequately, for example, for the ways in which indexical reference, the lexicon and adjectival modification operate in actual texts. In turn, it would influence certain of the other characterizations independently assigned within the Core model.
https://www.sciencedirect.com/science/article/abs/pii/S0388000123000499

Nature

NEWS

This is the largest map of the human brain ever made
Researchers catalogue more than 3,000 different types of cell in our most complex organ.
https://www.nature.com/articles/d41586-023-03192-2

AI 'breakthrough': neural net has human-like ability to generalize language
A neural-network-based artificial intelligence outperforms ChatGPT at quickly folding new words into its lexicon, a key aspect of human intelligence.
https://www.nature.com/articles/d41586-023-03272-3

Menopausal chimpanzees deepen the mystery of why women stop reproducing
Some chimpanzees have been found to experience menopause. But are they the exception or the rule?
https://www.nature.com/articles/d41586-023-03308-8

Ancient DNA reveals traces of elusive first humans in Europe
Europe's earliest Homo sapiens seemed to have vanished without a genetic legacy — but genomic studies now show otherwise.
https://www.nature.com/articles/d41586-023-03278-x

PAPERS

ANA I. L. NAMBURETE et al – Normative spatiotemporal fetal brain maturation with satisfactory development at 2 years
Maturation of the human fetal brain should follow precisely scheduled structural growth and folding of the cerebral cortex for optimal postnatal function. We present a normative digital atlas of fetal brain maturation based on a prospective international cohort of healthy pregnant women, selected using World Health Organization recommendations for growth standards. Their fetuses were accurately dated in the first trimester, with satisfactory growth and neurodevelopment from early pregnancy to 2 years of age. The atlas was produced using 1,059 optimal quality, three-dimensional ultrasound brain volumes from 899 of the fetuses and an automated analysis pipeline. The atlas corresponds structurally to published magnetic resonance images, but with finer anatomical details in deep grey matter. The between-study site variability represented less than 8.0% of the total variance of all brain measures, supporting pooling data from the eight study sites to produce patterns of normative maturation. We have thereby generated an average representation of each cerebral hemisphere between 14 and 31 weeks' gestation with quantification of intracranial volume variability and growth patterns. Emergent asymmetries were detectable from as early as 14 weeks, with peak asymmetries in regions associated with language development and functional lateralization between 20 and 26 weeks' gestation. These patterns were validated in

1,487 three-dimensional brain volumes from 1,295 different fetuses in the same cohort. We provide a unique spatiotemporal benchmark of fetal brain maturation from a large cohort with normative postnatal growth and neurodevelopment.
https://www.nature.com/articles/s41586-023-06630-3

Nature Africa

ARTICLES

GILBERT NAKWEYA – Evidence of early human migration and tool-making challenges assumptions about evolution
Ancient ancestors adapted and thrived at high altitude and had surprising tool-making skills.
https://www.nature.com/articles/d44148-023-00295-w

Nature Communications

PAPERS

ELLIOT MURPHY et al – The spatiotemporal dynamics of semantic integration in the human brain
Language depends critically on the integration of lexical information across multiple words to derive semantic concepts. Limitations of spatiotemporal resolution have previously rendered it difficult to isolate processes involved in semantic integration. We utilized intracranial recordings in epilepsy patients (n = 58) who read written word definitions. Descriptions were either referential or non-referential to a common object. Semantically referential sentences enabled high frequency broadband gamma activation (70–150 Hz) of the inferior frontal sulcus (IFS), medial parietal cortex, orbitofrontal cortex (OFC) and medial temporal lobe in the left, language-dominant hemisphere. IFS, OFC and posterior middle temporal gyrus activity was modulated by the semantic coherence of non-referential sentences, exposing semantic effects that were independent of task-based referential status. Components of this network, alongside posterior superior temporal sulcus, were engaged for referential sentences that did not clearly reduce the lexical search space by the final word. These results indicate the existence of complementary cortical mosaics for semantic integration in posterior temporal and inferior frontal cortex.
https://www.nature.com/articles/s41467-023-42087-8

Nature Ecology & Evolution

PAPERS

E. ANDREW BENNETT et al – Genome sequences of 36,000- to 37,000-year-old modern humans at Buran-Kaya III in Crimea
Populations genetically related to present-day Europeans first appeared in Europe at some point after 38,000–40,000 years ago, following a cold period of severe climatic disruption. These new migrants would eventually replace the pre-existing modern human ancestries in Europe, but initial interactions between these groups are unclear due to the lack of genomic evidence from the earliest periods of the migration. Here we describe the genomes of two 36,000–37,000-year-old individuals from Buran-Kaya III in Crimea as belonging to this newer migration. Both genomes share the highest similarity to Gravettian-associated individuals found several thousand years later in southwestern Europe. These genomes also revealed that the population turnover in Europe after 40,000 years ago was accompanied by admixture with pre-existing modern human populations. European ancestry before 40,000 years ago persisted not only at Buran-Kaya III but is also found in later Gravettian-associated populations of western Europe and Mesolithic Caucasus populations.
https://www.nature.com/articles/s41559-023-02211-9

Nature Human Behaviour

ARTICLES

ANDREW PERFORS, STEVEN T. PIANTADOSI & CELESTE KIDD – Trans-inclusive gender categories are cognitively natural
On the basis of decades of cognitive science research into the nature of lexical concepts, we argue that gender categories that reflect the reality of the experiences of transgender people are more useful and cognitively natural than sex-based category definitions.
https://www.nature.com/articles/s41562-023-01657-y

WATARU TOYOKAWA – Collective cognition and behaviour
'Metacognition' refers to thinking about thinking, and its function in collective human behaviour remains largely unknown. Using a multiplayer online game and agent-based modelling, Hawkins et al. found distinctive patterns of collective intelligence that only emerge when using metacognitive social inference skills.
https://www.nature.com/articles/s41562-023-01683-w

KEVIN R. MCKEE & MATTHEW BOTVINICK – AI learns to encourage group cooperation by making new connections
We trained an artificial intelligence (AI) system to recommend different interactions and connections between humans playing a group game together. Through trial and error, the AI system learned to take an encouraging approach to uncooperative individuals, keeping them engaged with the group and boosting cooperation levels for everyone.
https://www.nature.com/articles/s41562-023-01699-2

PAPERS

KEVIN R. MCKEE et al – Scaffolding cooperation in human groups with deep reinforcement learning
Effective approaches to encouraging group cooperation are still an open challenge. Here we apply recent advances in deep learning to structure networks of human participants playing a group cooperation game. We leverage deep reinforcement learning and simulation methods to train a 'social planner' capable of making recommendations to create or break connections between group members. The strategy that it develops succeeds at encouraging pro-sociality in networks of human participants (N = 208 participants in 13 groups) playing for real monetary stakes. Under the social planner, groups finished the game with an average cooperation rate of 77.7%, compared with 42.8% in static networks (N = 176 in 11 groups). In contrast to prior strategies that separate defectors from cooperators (tested here with N = 384 in 24 groups), the social planner learns to take a conciliatory approach to defectors, encouraging them to act pro-socially by moving them to small highly cooperative neighbourhoods.
https://www.nature.com/articles/s41562-023-01686-7

STEPHAN C. MEYLAN et al – How adults understand what young children say
Children's early speech often bears little resemblance to that of adults, and yet parents and other caregivers are able to interpret that speech and react accordingly. Here we investigate how adult listeners' inferences reflect sophisticated beliefs about what children are trying to communicate, as well as how children are likely to pronounce words. Using a Bayesian framework for modelling spoken word recognition, we find that computational models can replicate adult interpretations of children's speech only when they include strong, context-specific prior expectations about the messages that children will want to communicate. This points to a critical role of adult cognitive processes in supporting early communication and reveals how children can actively prompt adults to take actions on their behalf even when they have only a nascent understanding of the adult language. We discuss the wide-ranging implications of the powerful listening capabilities of adults for theories of first language acquisition.
https://www.nature.com/articles/s41562-023-01698-3

Nature Italy

NEWS

Brain's language region seen in unprecedented detail
A new cellular atlas of Broca's area will help studying how speech is produced and understood.
https://www.nature.com/articles/d43978-023-00159-9

Nature Reviews Neuroscience

PAPERS

MOTOTAKA SUZUKI, CYRIEL M. A. PENNARTZ & JAAN ARU – How deep is the brain? The shallow brain hypothesis
Deep learning and predictive coding architectures commonly assume that inference in neural networks is hierarchical. However, largely neglected in deep learning and predictive coding architectures is the neurobiological evidence that all hierarchical cortical areas, higher or lower, project to and receive signals directly from subcortical areas. Given these neuroanatomical facts, today's dominance of cortico-centric, hierarchical architectures in deep learning and predictive coding networks is highly questionable; such architectures are likely to be missing essential computational principles the brain uses. In this Perspective, we present the shallow brain hypothesis: hierarchical cortical processing is integrated with a massively parallel process to which subcortical areas substantially contribute. This shallow architecture exploits the computational capacity of cortical microcircuits and thalamo-cortical loops that are not included in typical hierarchical deep learning and predictive coding networks. We argue that the shallow brain architecture provides several critical benefits over deep hierarchical structures and a more complete depiction of how mammalian brains achieve fast and flexible computational capabilities.
https://www.nature.com/articles/s41583-023-00756-z

Nature Scientific Reports

PAPERS

GRACE QIYUAN MIAO, RICK DALE & ALEXIA GALATI – (Mis)align: a simple dynamic framework for modeling interpersonal coordination
As people coordinate in daily interactions, they engage in different patterns of behavior to achieve successful outcomes. This includes both synchrony—the temporal coordination of the same behaviors at the same time—and complementarity—the

coordination of the same or different behaviors that may occur at different relative times. Using computational methods, we develop a simple framework to describe the interpersonal dynamics of behavioral synchrony and complementarity over time, and explore their task-dependence. A key feature of this framework is the inclusion of a task context that mediates interactions, and consists of active, inactive, and inhibitory constraints on communication. Initial simulation results show that these task constraints can be a robust predictor of simulated agents' behaviors over time. We also show that the framework can reproduce some general patterns observed in human interaction data. We describe preliminary theoretical implications from these results, and relate them to broader proposals of synergistic self-organization in communication.
https://www.nature.com/articles/s41598-023-41516-4

JUSTIN COPPE, NOORA TAIPALE & VEERLE ROTS – Terminal ballistic analysis of impact fractures reveals the use of spearthrower 31 ky ago at Maisières-Canal, Belgium
The emergence of hunting technology in the deep past fundamentally shaped the subsistence strategies of early human populations. Hence knowing when different weapons were first introduced is important for understanding our evolutionary trajectory. The timing of the adoption of long-range weaponry remains heavily debated because preserved organic weapon components are extremely rare in the Paleolithic record and stone points are difficult to attribute reliably to weapon delivery methods without supporting organic evidence. Here, we use a refined use-wear approach to demonstrate that spearthrower was used for launching projectiles armed with tanged flint points at Maisières-Canal (Belgium) 31,000 years ago. The novelty of our approach lies in the combination of impact fracture data with terminal ballistic analysis of the mechanical stress suffered by a stone armature on impact. This stress is distinct for each weapon and visible archaeologically as fracture proportions on assemblage scale. Our reference dataset derives from a sequential experimental program that addressed individually each key parameter affecting fracture formation and successfully reproduced the archaeological fracture signal. The close match between the archaeological sample and the experimental spearthrower set extends the timeline of spearthrower use by over 10,000 years and represents the earliest reliable trace-based evidence for the utilization of long-distance weaponry in prehistoric hunting.
https://www.nature.com/articles/s41598-023-45554-w

MARIA ROSARIA MARULLI et al – Digital twin models of replicative ground stones: insight into simulating usage of Upper Paleolithic tools
This work presents the first attempt to create a physics-based digital twin model for predictive analysis of damage evolution during the use of ground stone tools (GSTs) in transformative tasks, encompassing the processing of raw resources for nutritional and non-alimentary purposes. The proposed methodology introduces a digital twin of the GSTs developed from 3D models generated using a photogrammetric technique based on Structure-from-Motion and Multi-View Stereo reconstruction. These models serve as the foundation for the development of the finite element (FE)-based digital twin model of the GSTs that exploits a contact formulation and the phase-field approach to simulate tool damage during pounding and grinding tasks. Defining the initial relative positions of the stones, their mechanical behaviour, and controlling the movement of the active stone in a way as close as possible to the real one, the digital twin model has been devised to evaluate how the surface damage is affected by perturbations in the loading conditions. The simulated damage is compared with the surface traces observed from experiments. The developed digital twin model aims at demonstrating its potentials for the GSTs investigations, as a supporting tool for experiments and for simulated tests on the archaeological records.
https://www.nature.com/articles/s41598-023-45425-4

YUKAKO INOUE et al – Testosterone promotes dominance behaviors in the Ultimatum Game after players' status increases
Although testosterone is generally considered to promote dominance behaviors, in humans it fosters behaviors appropriate to achieving and maintaining social status, contingent upon the situation. Recent cross-sectional studies, such as Inoue et al. (Sci Rep 7:5335, 2017), have shown that dominance behaviors induced by testosterone are modulated by high status. Yet, it remains ambiguous whether a rise in social status within real-world social groups reshapes the relationship between testosterone and dominance behavior. To investigate this longitudinal question, we added a second wave to Inoue et al.'s study, collecting further data after an interval of 2 years. Members of a university rugby team that adheres to a rigid hierarchical order rooted in seniority played the Ultimatum Game with teammates and provided saliva for assays of testosterone and cortisol. Our analysis reveals that individuals with higher baseline salivary testosterone levels exhibited more dominance as their position in the hierarchy increased according to their seniority.
https://www.nature.com/articles/s41598-023-45247-4

PLoS One

PAPERS

SARAH HASHIM et al – Music listening evokes story-like visual imagery with both idiosyncratic and shared content
There is growing evidence that music can induce a wide range of visual imagery. To date, however, there have been few thorough investigations into the specific content of music-induced visual imagery, and whether listeners exhibit consistency within themselves and with one another regarding their visual imagery content. We recruited an online sample (N = 353)

who listened to three orchestral film music excerpts representing happy, tender, and fearful emotions. For each excerpt, listeners rated how much visual imagery they were experiencing and how vivid it was, their liking of and felt emotional intensity in response to the excerpt, and, finally, described the content of any visual imagery they may have been experiencing. Further, they completed items assessing a number of individual differences including musical training and general visual imagery ability. Of the initial sample, 254 respondents completed the survey again three weeks later. A thematic analysis of the content descriptions revealed three higher-order themes of prominent visual imagery experiences: Storytelling (imagined locations, characters, actions, etc.), Associations (emotional experiences, abstract thoughts, and memories), and References (origins of the visual imagery, e.g., film and TV). Although listeners demonstrated relatively low visual imagery consistency with each other, levels were higher when considering visual imagery content within individuals across timepoints. Our findings corroborate past literature regarding music's capacity to encourage narrative engagement. It, however, extends it (a) to show that such engagement is highly visual and contains other types of imagery to a lesser extent, (b) to indicate the idiosyncratic tendencies of listeners' imagery consistency, and (c) to reveal key factors influencing consistency levels (e.g., vividness of visual imagery and emotional intensity ratings in response to music). Further implications are discussed in relation to visual imagery's purported involvement in music-induced emotions and aesthetic appeal.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0293412

DANIELA ALVAREZ-VARGAS et al – Hedges, mottes, and baileys: Causally ambiguous statistical language can increase perceived study quality and policy relevance

There is a norm in psychology to use causally ambiguous statistical language, rather than straightforward causal language, when describing methods and results of nonexperimental studies. However, causally ambiguous language may inhibit a critical examination of the study's causal assumptions and lead to a greater acceptance of policy recommendations that rely on causal interpretations of nonexperimental findings. In a preregistered experiment, 142 psychology faculty, postdocs, and doctoral students (54% female), ages 22–67 (M = 33.20, SD = 8.96), rated the design and analysis from hypothetical studies with causally ambiguous statistical language as of higher quality (by .34-.80 SD) and as similarly or more supportive (by .16-.27 SD) of policy recommendations than studies described in straightforward causal language. Thus, using statistical rather than causal language to describe nonexperimental findings did not decrease, and may have increased, perceived support for implicitly causal conclusions.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0286403

SONJA HILLEMACHER et al – Roosters do not warn the bird in the mirror: The cognitive ecology of mirror self-recognition

Touching a mark on the own body when seeing this mark in a mirror is regarded as a correlate of self-awareness and seems confined to great apes and a few further species. However, this paradigm often produces false-negative results and possibly dichotomizes a gradual evolutionary transition of self-recognition. We hypothesized that this ability is more widespread if ecologically tested and developed such a procedure for a most unlikely candidate: chickens (Gallus gallus domesticus). Roosters warn conspecifics when seeing an aerial predator, but not when alone. Exploiting this natural behavior, we tested individual roosters alone, with another male, or with a mirror while a hawk's silhouette flew above them. Roosters mainly emitted alarm calls in the presence of another individual but not when alone or seeing themselves in the mirror. In contrast, our birds failed the classic mirror test. Thus, chickens possibly recognize their reflection as their own, strikingly showing how much cognition is ecologically embedded.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0291416

JENNA ONAGA & MASAYO SOMA – Eyes of love: Java sparrows increase eye ring conspicuousness when pair-bonded

Conspicuous facial features, such as blushing in primates, can communicate social/emotional/physiological states in animals. However, the role of bare facial features is less well studied in birds than in humans or primates. We investigate the Java sparrow, which is characterised by conspicuous rings of swollen and blushed bare skin around the eye. Eye rings show no clear sex difference, although the swelling is associated with breeding. Java sparrows are socially monogamous, with mutual courtships and long-term pair-bonding. Therefore, it is plausible that eye rings function in within-pair communication. Specifically, do eye rings reflect psychophysiological conditions after pair formation? We assessed variations in ring thickness in pair-bonded birds and compared them with single birds and pairs of non-bonded individuals. Over the 12-week experimental period, pair-bonded males and females had an increased ring thickness, unlike the controls. We suggest eye rings convey breeding motivations or serve as fertility signals. This would be of great importance for ensuring reproductive synchrony in tropical birds like the Java sparrow. Our results contribute to understanding the evolution of facial ornamentation in birds, which was often overlooked in the past studies.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0292074

LAURENT DAVIN, LUDOVIC BELLOT-GURLET & JULIEN NAVAS – Plant-based red colouration of shell beads 15,000 years ago in Kebara Cave, Mount Carmel (Israel)

Decorating the living space, objects, body and clothes with colour is a widespread human practice. While the habitual use of red mineral pigments (such as iron-oxide, e.g., ochre) by anatomically modern humans started in Africa about 140,000 years

ago, the earliest documentation of the use of organic plant or animal-based red pigments is known from only 6,000 years ago. Here, we report the oldest reliable evidence of organic red pigment use 15,000 years ago by the first sedentary hunter-gatherers in the Levant. SEM-EDS and Raman Spectroscopy analyses of 10 red-stained shell beads enabled us to detect and describe the use of a colourant made of Rubiaceae plants roots (Rubia spp., Asperula spp., Gallium spp.) to colour personal adornments from the Early Natufian of Kebara cave, Mount Carmel, Israel. This adds a previously unknown behavioural aspect of Natufian societies, namely a well-established tradition of non-dietary plant processing at the beginning of the sedentary lifestyle. Through a combined multidisciplinary approach, our study broadens the perspectives on the ornamental practices and the chaînes opératoires of pigmenting materials during a crucial period in human history.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0292264

Proceedings of the Royal Society A

PAPERS

A. VANHOYWEGHEN & V. GINIS – Human decision-making in a non-ergodic additive environment

Ergodicity Economics presents an intriguing perspective on the validity of the ergodic hypothesis within economic models and the influence of ergodicity breaking on human decision-making processes. Prior research has illuminated the impact of ergodicity breaking within multiplicative settings. However, the implications of ergodicity breaking within additive dynamics, especially in situations carrying a 'risk of ruin' or a complete loss, remain largely unexplored. In our research, we introduce the concept of 'risk of ruin' into our decision-making model to examine the effects of non-ergodicity in additive dynamics. Our theoretical framework and experiments show that human decision-makers are sensitive to non-ergodicity within purely additive dynamics. This sensitivity manifests itself in significantly different levels of risk aversion depending on the distance and associated likelihood of ruin. These findings underscore the critical role of time averages in human decision-making, suggesting that humans are less irrational than conventionally assumed in behavioural models rooted in expected values. Drawing on evidence from Ergodicity Economics, incorporating non-ergodicity has the potential to illuminate common trends in decision-making within compounding systems, like multiplicative growth dynamics. Our research underscores a similar potential for understanding decision-making patterns within additive dynamics when the risk of ruin is present.
https://royalsocietypublishing.org/doi/10.1098/rspa.2023.0544

Proceedings of the Royal Society B

PAPERS

ROBIN E. MORRISON et al – Multiple mechanisms for inbreeding avoidance used simultaneously in a wild ape

Mating with close kin can have considerable negative fitness consequences, which are expected to result in selective pressure for inbreeding avoidance mechanisms, such as dispersal, mate choice and post-copulatory biases. Captive studies have suggested that inbreeding avoidance through mate choice is far less widespread than expected and may be absent where other mechanisms already limit inbreeding. However, few studies have examined multiple mechanisms of inbreeding avoidance simultaneously, particularly in the wild. We use 13 years of detailed dispersal, copulation and paternity data from mountain gorillas to examine inbreeding avoidance. We find that partial dispersal of both sexes results in high kinship in multimale groups, but that copulations between close kin occur 40% less than expected. We find strong kin discrimination in mate choice, with significant avoidance of maternal kin but more limited avoidance of paternal kin. We find no evidence for post-copulatory inbreeding avoidance. Our analyses support familiarity-based mechanisms of kin identification and age-based avoidance that limits mating between fathers and daughters in their natal group. Our findings demonstrate that multiple complementary mechanisms for inbreeding avoidance can evolve in a single species and suggest that inbreeding avoidance through mate choice may enable more flexible dispersal systems to evolve.
https://royalsocietypublishing.org/doi/full/10.1098/rspb.2023.1808

ANIL YAMAN et al – The emergence of division of labour through decentralized social sanctioning

Human ecological success relies on our characteristic ability to flexibly self-organize into cooperative social groups, the most successful of which employ substantial specialization and division of labour. Unlike most other animals, humans learn by trial and error during their lives what role to take on. However, when some critical roles are more attractive than others, and individuals are self-interested, then there is a social dilemma: each individual would prefer others take on the critical but unremunerative roles so they may remain free to take one that pays better. But disaster occurs if all act thus and a critical role goes unfilled. In such situations learning an optimum role distribution may not be possible. Consequently, a fundamental question is: how can division of labour emerge in groups of self-interested lifetime-learning individuals? Here, we show that by introducing a model of social norms, which we regard as emergent patterns of decentralized social sanctioning, it becomes possible for groups of self-interested individuals to learn a productive division of labour involving all critical roles. Such social norms work by redistributing rewards within the population to disincentivize antisocial roles while incentivizing prosocial roles that do not intrinsically pay as well as others.
https://royalsocietypublishing.org/doi/10.1098/rspb.2023.1716

Royal Society Open Science

PAPERS

ESTER ORAS et al – Parallel worlds and mixed economies: multi-proxy analysis reveals complex subsistence systems at the dawn of early farming in the northeast Baltic

The transition from foraging to farming was a key turning point in ancient socio-economies. Yet, the complexities and regional variations of this transformation are still poorly understood. This multi-proxy study provides a new understanding of the introduction and spread of early farming, challenging the notions of hierarchical economies. The most extensive biological and biomolecular dietary overview, combining zooarchaeological, archaeobotanical, dietary stable isotope and pottery lipid residue analyses is presented, to unravel the nature and extent of early farming in the 3rd millennium cal BCE in the northeast Baltic. Farming was introduced by incoming Corded Ware cultural groups (CWC), but some dietary segregation existed within these communities, with some having more access to domesticates, others incorporating more wild resources into their diet. The CWC groups coexisted in parallel with local hunter–fisher–gatherers (HFG) without any indication of the adoption of domesticates. There was no transition from foraging to farming in the 3rd millennium cal BCE in the NE Baltic. Instead, we see a complex system of parallel worlds with local HFGs continuing forager lifeways, and incoming farmers practising mixed economies, with the continuation of these subsistence strategies for at least a millennium after the first encounter with domesticated animals.
https://royalsocietypublishing.org/doi/full/10.1098/rsos.230880

Science

ARTICLES

MICHAEL CANT – Menopause in chimpanzees

Signs of menopause in wild chimpanzees provide insights into human evolution.
https://www.science.org/doi/full/10.1126/science.adk7119

PAPERS

LONG MEI, TAKUYA OSAKADA & DAYU LIN – Hypothalamic control of innate social behaviors

Sexual, parental, and aggressive behaviors are central to the reproductive success of individuals and species survival and thus are supported by hardwired neural circuits. The reproductive behavior control column (RBCC), which comprises the medial preoptic nucleus (MPN), the ventrolateral part of the ventromedial hypothalamus (VMHvl), and the ventral premammillary nucleus (PMv), is essential for all social behaviors. The RBCC integrates diverse hormonal and metabolic cues and adjusts an animal's physical activity, hence the chance of social encounters. The RBCC further engages the mesolimbic dopamine system to maintain social interest and reinforces cues and actions that are time-locked with social behaviors. We propose that the RBCC and brainstem form a dual-control system for generating moment-to-moment social actions. This Review summarizes recent progress regarding the identities of RBCC cells and their pathways that drive different aspects of social behaviors.
https://www.science.org/doi/full/10.1126/science.adh8489

BRIAN M. WOOD et al with JOHN C. MITANI & KEVIN E. LANGERGRABER – Demographic and hormonal evidence for menopause in wild chimpanzees

Among mammals, post-reproductive life spans are currently documented only in humans and a few species of toothed whales. Here we show that a post-reproductive life span exists among wild chimpanzees in the Ngogo community of Kibale National Park, Uganda. Post-reproductive representation was 0.195, indicating that a female who reached adulthood could expect to live about one-fifth of her adult life in a post-reproductive state, around half as long as human hunter-gatherers. Post-reproductive females exhibited hormonal signatures of menopause, including sharply increasing gonadotropins after age 50. We discuss whether post-reproductive life spans in wild chimpanzees occur only rarely, as a short-term response to favorable ecological conditions, or instead are an evolved species-typical trait as well as the implications of these alternatives for our understanding of the evolution of post-reproductive life spans.
https://www.science.org/doi/10.1126/science.add5473

REVIEWS

ANDREW ROBINSON – Writing without words

A computational linguist probes the relationship between graphical symbol systems and language.
Review of 'Symbols: An Evolutionary History from the Stone Age to the Future' by Richard Sproat, Springer Cham (2023).
https://www.science.org/doi/full/10.1126/science.adk9395

Science Advances

PAPERS

ANTHONY FORMAUX et al with DAN SPERBER – Guinea baboons are strategic cooperators

Humans are strategic cooperators; we make decisions on the basis of costs and benefits to maintain high levels of cooperation, and this is thought to have played a key role in human evolution. In comparison, monkeys and apes might lack

the cognitive capacities necessary to develop flexible forms of cooperation. We show that Guinea baboons (Papio papio) can use direct reciprocity and partner choice to develop and maintain high levels of cooperation in a prosocial choice task. Our findings demonstrate that monkeys have the cognitive capacities to adjust their level of cooperation strategically using a combination of partner choice and partner control strategies. Such capacities were likely present in our common ancestor and would have provided the foundations for the evolution of typically human forms of cooperation.
https://www.science.org/doi/10.1126/sciadv.adi5282

Trends in Cognitive Sciences

PAPERS

NIR HALEVY & ALEXANDER P. LANDRY – Intergroup conflict as contest and disease

Intergroup conflict has been conceptualized as a strategic interaction (conflict-as-contest) and separately as a pathological condition (conflict-as-disease). We highlight how insights and tools from the former perspective can potentially inform the latter. Harnessing the science of strategic decision-making can facilitate the development of novel approaches for mitigating intergroup conflict.
https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00262-0

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