EAORC BULLETIN 1,131 – 16 February 2025

CONTENTS

NOTICES

FORMATTED VERSION OF THIS BULLETIN

A pdf formatted version of this Bulletin is available for download at martinedwardes.me.uk/eaorc/eaorc_bulletins.htm.

PUBLICATION ALERTS

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

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

EDITORIAL INTERJECTIONS

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

ACADEMIA.EDU – The evolution of culture: From primate social learning to human culture

PNAS 101:27, 10235-10240 (2004).

LAUREANO CASTRO & MIGUEL A. TORO – The evolution of culture: From primate social learning to human culture

Cultural transmission in our species works most of the time as a cumulative inheritance system allowing members of a group to incorporate behavioral features not only with a positive biological value but sometimes also with a neutral, or even negative, biological value. Most of models of dual inheritance theory and gene-culture coevolution suggest that an increase, either qualitative or quantitative, in the efficiency of imitation is the key factor to explain the transformation of primate social learning in a cumulative cultural system of inheritance as it happens during hominization. We contend that more efficient imitation is necessary but not enough for this transformation to occur and that the key factor enabling such a transformation is that some hominids developed the capacity to approve or disapprove their offspring's learned behavior. This capacity to approve or disapprove offspring's behavior makes learning both less costly and more accurate, and it transformed the hominid culture into a system of cumulative cultural inheritance similar to that of humans, although the system was still prelinguistic in nature.

https://www.academia.edu/28323299/The_evolution_of_culture_from_primate_social_learning_to_human_culture_pdf

ACADEMIA.EDU – The Complex Picture of the Chibanian Hominin Record

In The Prehistoric Hunter-Gatherers of South-Eastern Europe. Proceedings of the British Academy 258, 36-59 (2023).

MIRJANA ROKSANDIC, PREDRAG RADOVIĆ & JOSHUA LINDAL – The Complex Picture of the Chibanian Hominin Record at the Crossroads of Europe and Asia

The Balkan fossil record could play a key role in providing answers to important questions about human evolution in Europe. Three major questions, in particular, remain unanswered, despite a 150-year-long tradition of research and important new methodological developments in the discipline over the past 20 years. These questions span the entire duration of the Pleistocene and represent the most pivotal points in the peopling of the continent: (1) When and how did the earliest hominin populations reach Europe in the Early Pleistocene? (2) Were European, Asian and African populations in contact during the Chibanian (formerly the Middle Pleistocene), and if so, how often? (3) Did the arrival of early modern humans precipitate the disappearance of Neanderthals, and if so, how? The critical evidence from this crossroads of migratory corridors and important glacial refugium is still largely missing from general discussions, despite the enormous strides that Palaeolithic research in the region has made in the past two decades. Far less often discussed, the eastward Neanderthal migrations – both towards the Caucasus and Central Asia, and Anatolia and Levant – must have, at least in the Chibanian, proceeded through the Balkan Peninsula, even if later routes included more northern parts of Eastern Europe (Picin et al. 2020). The Balkan Peninsula, at the crossroads of the main migratory corridors both into and out of Europe, with its varied landscapes and several climatic zones, represented an ideal setting for hominin migration, refuge and interaction throughout the Pleistocene.

https://www.academia.edu/114085121/The_Complex_Picture_of_the_Chibanian_Hominin_Record_at_the_Crossroads_of_Europe_and_Asia

ACADEMIA.EDU – Primate Culture and Social Learning

Cognitive Science 24:3, 477-508 (2000).

ANDREW WHITEN – Primate Culture and Social Learning

The human primate is a deeply cultural species, our cognition being shaped by culture, and cultural transmission amounting to an "epidemic of mental representations" (Sperber, 1996). The architecture of this aspect of human cognition has been shaped by our evolutionary past in ways that we can now begin to discern through comparative studies of other primates. Processes of social learning (learning from others) are important for cognitive science to understand because they are cognitively complex and take many interrelated forms; they shape traditions, cultures and nonsocial aspects of cognition; and in turn they may be shaped by their cultural context. The study of primate social learning and culture has in recent years enjoyed a renaissance, providing a wealth of new findings, key aspects of which are reviewed. The focus is on cognitive issues, including learning about the consequences, sequential structure and hierarchical organization of actions; relating stored knowledge to the assimilation of new social knowledge; feedback guiding the construction of imitations; conceptual grasp of imitation; and the reciprocal relationship between social learning and culture.

https://www.academia.edu/91639435/Primate_Culture_and_Social_Learning

NEWS

GUARDIAN SCIENCE – Cockatoos show appetite for dips when eating bland food, find scientists

Birds observed going to lengths to flavour food, with particular penchant for blueberry-flavoured soy yoghurt dip.
https://www.theguardian.com/environment/2025/feb/10/cockatoos-show-appetite-for-dips-when-eating-bland-food-find-scientists

NATURE BRIEFING – What 'Taung' teaches us about childhood

When anthropologist Raymond Dart described Australopithecus africanus — based on a fossil known as the Taung Child — he launched science toward the understanding that human ancestors evolved in Africa. A century on, the fossil is still prompting questions about human evolution. Dart judged Taung to be a six-year-old child who died around one million years ago. We now know that Taung was around 3.8 years old and lived some 2.58 million years ago — raising important questions about when, why and how an unusual lifestage — childhood — evolved.
https://www.nature.com/articles/d41586-025-00294-x

NATURE BRIEFING – Cockatoos like to flavour food with dip

When given the opportunity, Goffin's cockatoos (Cacatua goffiniana) dip bland food in a 'condiment' to make it tastier. In a trial, cockatoos were offered bowls of cooked pasta and cauliflower or potatoes and carrots with a spread of dips: fresh water, plain soy yoghurt and blueberry soy yoghurt. The birds didn't bother dipping carrots or cauliflower, but some would dunk pasta and potato in the blueberry yoghurt, often fully coating it, before eating. Their preference for the blueberry yoghurt suggests the decision was based on improving flavour rather than texture, a behaviour that has only been observed in macaques (and people).
https://www.theguardian.com/environment/2025/feb/10/cockatoos-show-appetite-for-dips-when-eating-bland-food-find-scientists

SAPIENS – What's Behind the Evolution of Neanderthal Portraits?

Since the 1800s, Neanderthal depictions have evolved not only with changing science but also due to social views. An archaeologist explains why visualizations of our evolutionary cousins matter.
https://www.sapiens.org/archaeology/neanderthal-art-paleolithic-archaeology/

SCIENCEADVISER – Male chimps ask for sex in different 'dialects'

Just like humans, chimpanzees have different "dialects"—in the gestures they use to communicate. A new study has found that males from different chimp communities in the Taï National Park in Ivory Coast use different gestures to signal to females that they're in the mood for sex.

Male chimps can make various moves to show they want some "sneaky copulation on the side," says evolutionary anthropologist Roman Wittig. When Wittig's team looked at records of 495 of these gestures in four neighboring chimp communities, they found clear differences. In two of the four groups, for example, males tore strips from leaves to request sex. Another gesture, the "knuckle knock"—repeatedly knocking knuckles onto a tree or another hard surface—occurred in only one.

But chimp dialects can change under human influence, the scientists say. Field assistant Honora Néné Kpazahi, who has worked with the chimp population for more than 30 years, remembered that the knuckle knock had once been common in another community too. That group dwindled in numbers in the 1990s due to an Ebola outbreak and a respiratory disease that spilled over from the human population, leaving only two adult males. When poachers shot an alpha-male named Marius in 2004, the knuckle knock was gone.

Primatologist Kathelijne Koops calls the paper "very exciting" because it's the first to so clearly document the disappearance of a specific cultural behavior as a result of human disturbance.
https://www.science.org/content/article/male-chimps-ask-sex-different-dialects

SCIENCEADVISER – The science—and duality—of satire

Comedy may not be an exact science, but that hasn't stopped researchers from investigating it. An analysis from 2019, for example, helped reveal what makes headlines from the satirical news site The Onion so funny. As the study authors told Science News, most of the publication's headlines follow a common "false analogy" structure, in which words switched between humorous and serious versions of the headline are similar but fundamentally opposed. The headline "BP ready to resume oil spilling," for instance, puts a satirical spin on the mundane "BP ready to resume oil drilling." This technique, the researchers explained, could potentially help computer programs distinguish between satire and misinformation.
https://www.apa.org/pubs/journals/releases/xge-xge0001729.pdf

SCIENCE DAILY – Birds have developed complex brains independently from mammals

New research has revealed that birds, reptiles, and mammals have developed complex brain circuits independently, despite sharing a common ancestor. These findings challenge the traditional view of brain evolution and demonstrate that, while comparable brain functions exist among these groups, embryonic formation mechanisms and cell types have followed divergent evolutionary trajectories.
https://www.sciencedaily.com/releases/2025/02/250213143301.htm

SCIENCE DAILY – ChatGPT for birdsong may shed light on how language is wired in the human brain

Just like ChatGPT and other generative language models train on human texts to create grammatically correct sentences, a new modeling method trains on recordings of birds to create accurate birdsongs. The results could improve understanding of the structure of birdsong and its underlying neurobiology, which could lend insight in the neural mechanisms of human language.
https://www.sciencedaily.com/releases/2025/02/250212192501.htm

SCIENCE DAILY – Evidence of cannibalism 18,000 years ago

An international research team has gained new insights into the burial rituals of Late Ice Age societies in Central Europe. Signs of human remains from the Maszycka Cave in southern Poland being manipulated indicate systematic dissection of the deceased, as well as cannibalism.
https://www.sciencedaily.com/releases/2025/02/250211134308.htm

SCIENCENEWS – Purple exists only in our brains

With apologies to Alice Walker, it turns out that the color purple isn't real. Well, the Pulitzer Prize-winning book is very real, but the actual color is just a trick invented by your brain to resolve an electromagnetic conundrum. In Science News Explores, our magazine for curious younger readers, Tammy Awtry deftly breaks down the science behind this perplexing phenomenon – and offers up one of the finest puns on the internet. Click here to discover the truth behind the puzzling presence of purple.
https://www.snexplores.org/article/color-purple-exists-only-in-brain

SCIENCE.ORG NEWS – In a cave in Poland, signs of prehistoric cannibalism

Practice may reflect violent competition for new territory 18,000 years ago.
https://www.science.org/content/article/cave-poland-signs-prehistoric-cannibalism

SCIENCE.ORG NEWS – Male chimps ask for sex in different 'dialects'

Gestures are in danger because of poaching and other human pressures.
https://www.science.org/content/article/male-chimps-ask-sex-different-dialects

SCIENCE.ORG NEWS – Why do so many retirement-age scientists keep working?

Survey reveals a desire to hold onto their professional identity keeps Ph.D.s working beyond their 60s.
{So that's why I keep saying yes to the can-you-just requests. Sounds about right to me.}
https://www.science.org/content/article/why-do-so-many-retirement-age-scientists-keep-working

PUBLICATIONS

Current Biology

PAPERS

JEROEN STEPHAN ZEWALD & ALICE MARIE ISABEL AUERSPERG – Innovative flavoring behavior in Goffin's cockatoos

Dunking behavior can be a foraging innovation in non-human animals in which food is dipped in a medium prior to consumption. Five functions of this behavior have previously been suggested (soaking, cleaning, flavoring, drowning, and transporting liquid). Although experimental reports exist, most dunking observations are anecdotal, making it hard to infer its function. Previously, we reported innovative dunking behavior in a group of Goffin's cockatoos (Cacatua goffiniana) with the apparent function of soaking dry food. Here, we report cockatoos dunking in soy yogurt with the likely function of flavoring their food, something thus far only observationally reported in Japanese macaques. In an experimental setup with two types of soy yogurt and water, 9 out of 18 cockatoos dragged food through yogurt, with an overall preference for blueberry-flavored yogurt over neutral yogurt, which could not be explained by color preference alone. Furthermore, the cockatoos showed an overall preference for the combination of yogurt and noodles in a separate food preference task. This combination of quantitative and qualitative results indicates that the cockatoos use yogurt to flavor their food, preferring this combination rather than the yogurt flavor alone. Considering that not all cockatoos dunk their food in yogurt, and little overlap in individuals dunking in a previous study, this suggests a second food preparation innovation in this species. Our

results thus provide experimental evidence of innovative food flavoring behavior outside the primate lineage, which may supplement our present understanding of the emergence of rare forms of food preparation behaviors in animals.
https://www.cell.com/current-biology/fulltext/S0960-9822(25)00002-8

OHAD PELED, GILI GREENBAUM & GUY BLOCH – Diversification of social complexity following a major evolutionary transition in bees

How social complexity evolved remains a long-standing enigma. In most animal groups, social complexity is typically classified into a few discrete classes. This approach is oversimplified and constrains our inference of social evolution to a narrow trajectory consisting of transitions between classes. Such categorical classifications also limit quantitative studies on the molecular and environmental drivers of social complexity. The recent accumulation of relevant quantitative data has set the stage to overcome these limitations. Here, we propose a data-driven, high-dimensional approach for studying the full diversity of social phenotypes. We curated and analyzed a comprehensive dataset encompassing 17 social traits across 80 species and studied the evolution of social complexity in bees. We found that honey bees, stingless bees, and bumble bees underwent a major evolutionary transition ~80 mya, inconsistent with the stepwise progression of the social ladder conceptual framework. This major evolutionary transition was followed by a phase of substantial phenotypic diversification of social complexity. Other bee lineages display a continuum of social complexity, ranging from solitary to simple societies, but do not reach the levels of social complexity seen in honey bees, stingless bees, and bumble bees. Bee evolution, therefore, provides a remarkable demonstration of a macroevolutionary process in which a major transition removed biological constraints and opened novel evolutionary opportunities, driving the exploration of the landscape of social phenotypes. Our approach can be extended to incorporate additional data types and readily applied to illuminate the evolution of social complexity in other animal groups.
https://www.cell.com/current-biology/abstract/S0960-9822(25)00009-0

Frontiers in Language Sciences

PAPERS

SINING TAO & WENJUAN QIN – "Feedback is communication between human beings": understanding adolescents' conception of written qualitative feedback

Research on feedback in writing has predominantly focused on its effectiveness in improving surface-level linguistic accuracy, with limited attention to how students perceive and engage with written qualitative feedback as an interactive tool for writing development. This study addresses this gap by emphasizing the role of written qualitative feedback, defined as descriptive comments that address both content and linguistic element, promoting deeper engagement and critical thinking in student writing. Using an explanatory sequential mixed-methods design, the study examines the conception of written qualitative feedback held by 107 English as a Foreign Language (EFL) learners in China. Over an academic semester, each learner produced three argumentative texts and received written qualitative feedback in three formats. Quantitative data from an adapted Conception of Written Feedback questionnaire reveals two predominant patterns in their conception of written qualitative feedback: (1) engaging with positive emotion and active use or (2) ignoring with defensiveness. To explore potential explanations for these patterns, a purposeful subsample of 10 learners participated in semi-structured interviews, conceptualizing the role of feedback in their writing practices. Qualitative findings indicate that learners perceive feedback along a continuum as an instructional tool, evaluative system, cognitive guide, dialogic conversation, and catalyst for personal change. By triangulating quantitative results and qualitative findings, the study demonstrates how personalized educational interaction in the form of written qualitative feedback facilitates adolescents' transition from competent language use to higher-order argumentative skills and agentic approaches to writing development. The study adds to a growing literature on adolescent writing development from the lens of interactive teaching and learning.
https://www.frontiersin.org/journals/language-sciences/articles/10.3389/flang.2025.1453230/full

JOHN H.G. SCOTT – Detargeting the target in phoneme detection: aiming the task at phonological representations rather than backgrounds

One challenge of learning a second or additional language (L2+) is learning to perceive and interpret its sounds. This includes acquiring the target language (TL) contrastive phonemic inventory, the sounds' systematic behavior in the TL phonology, and novel relationships between spelling and sound (GPCs; grapheme-phoneme correspondences). Many perception tasks require stipulation of written labels for target speech sounds (e.g., phoneme detection). Listening for this target is not necessarily, or even frequently, an equivalent cognitive task between participant groups. The incongruence of phonological and orthographic domains and their GPCs poses a methodological challenge for L2+ research. The author argues that phoneme detection tasks should avoid the phone of investigative interest (x) as the direct target of listener attention and redirect focus to an adjacent listening target (y). Ideally, this target should not trigger or otherwise be implicated in the phonological process or phonotactic constraint under investigation. The careful choice of listening target (y) with both a familiar sound and a congruent orthographic label for both (or all) language groups of the experiment yields an equivalent task and better indicates implicit knowledge of the phenomenon under study. This approach opens up potential choices of phonological objects of interest (x). The two phoneme detection experiments reported here employ this novel adjacent-congruent listening target approach, which the author calls the Persean approach. Experiment 1 establishes baseline

performance in two assimilation types and replicates processing inhibition in first-language (L1) German speakers in response to violations of regressive nasal assimilation. It also uses [t] as the Persean listening target to test sensitivity to preceding violations of progressive dorsal fricative assimilation (DFA). Experiment 2 investigates sensitivity to violations of DFA in both L1 German speakers and L1 English L2+ German learners. Experiment 2 also uses the Persean method for the first phoneme detection investigation demonstrating sensitivity to violation of a prosodic/phonotactic constraint banning /h/ in syllable codas. The study demonstrates that phoneme detection with Persean listening targets is a viable instrument for investigating regressive and progressive assimilation, prosodic/phonotactic constraints, and prelexical perceptual repair strategies in different language background groups and proposes statistical best practices for future phoneme detection research.
https://www.frontiersin.org/journals/language-sciences/articles/10.3389/flang.2024.1254956/full

iScience

PAPERS

BAPTISTE CAZIOT, SADRA FATHKHANI & FRANK BREMMER – Coding of egocentric distance in the macaque ventral intraparietal area

The encoding of three-dimensional visual information is of important in everyday life. Eye-movements challenge this spatial encoding: they shift the image of the outside world across the retina. In the macaque ventral intraparietal area (VIP), many neurons encode visual information irrespective of horizontal and vertical eye position. Does this gaze invariance of spatial encoding extend to egocentric distances? Such invariance would correspond to a shift of disparity-tuning curves by vergence angle. Here, monkeys fixated one of three distances (vergence), while a visual stimulus was shown at one of seven distances (disparity). Most neurons' activity was modulated independently by both disparity and eye vergence, and we did not observe shifts of disparity-tuning curves as expected from encoding egocentric distances at a single-cell level. By using population activity, however, we were able to decode egocentric distance. Our results provide further strong evidence for a role of area VIP in 3D space encoding.
https://www.cell.com/iscience/fulltext/S2589-0042(25)00253-6

YUANNAN LI, SHAN XU & JIA LIU – The neural correlates of logical-mathematical symbol systems processing resemble that of spatial cognition more than natural language processing

The ability to use logical-mathematical symbols (LMS), encompassing tasks such as calculation, reasoning, and programming, is special to humans with recent emergence. LMS processing was suggested to build upon fundamental cognitive systems through neuronal recycling, with natural language processing and spatial cognition as key candidates. This study used meta-analyses and synthesized neural maps of representative LMS tasks, including reasoning, calculation, and mental programming, to compare their neural correlates with those of the two systems. Our results revealed greater activation overlap and multivariate similarity between LMS and spatial cognition than with language processing. Hierarchical clustering further indicated that LMS tasks were indistinguishable from spatial tasks at the neural level, suggesting an inherent connection. Our findings support the hypothesis that spatial cognition is the basis of LMS processing, shedding light on the logical reasoning limitations of large language models, particularly those lacking explicit spatial representations.
https://www.cell.com/iscience/fulltext/S2589-0042(25)00276-7

JIAJIA ZHU et al – Neural Architecture of Social Punishment: Insights from a Queue-jumping Scenario

Punishment in social settings is crucial for maintaining collective interests, yet the underlying mechanisms remain unclear. To address this, we developed a paradigm, the queue-jumping task, where participants imagine experiencing a queue-jumping event through vivid pictorial scenarios. Behavioral findings revealed that individuals prioritized collective interests over personal ones when punishing, highlighting the altruistic nature of social punishment. Neuroimaging results demonstrated that social punishment activated multiple neural circuits associated with social norms (e.g., fusiform gyrus and posterior cingulate cortex), self-related processing (e.g., ventromedial prefrontal cortex and middle cingulate cortex), and punishment implementation (e.g., anterior dorsolateral prefrontal cortex and middle temporal gyrus). Brain network analyses uncovered a social punishment network whose efficacy in information transmission forecasts individuals' tendency to punish. This study provides valuable insights into the cognitive and neural mechanisms involved in social punishment. The current paradigm closely reflects real-life queue-jumping situations and daily punitive behaviors, demonstrating its generalizability and validity.
https://www.cell.com/iscience/fulltext/S2589-0042(25)00248-2

Journal of Experimental Psychology

PAPERS

HOORIA JAZAIERI & DEREK D. RUCKER – Softening the Blow or Sharpening the Blade: Examining the Reputational Effects of Satire

Criticism is foundational to the fabric of society and can directly impact people's reputations. Although criticism takes many forms, one prevalent form of criticism is satire—the coupling of criticism with humor. While the lighthearted and playful nature of satire has been argued to render it innocuous, the present research suggests that satire can in some cases be more incendiary than direct criticism. First, a naturalistic study examines nonpolitical satirical versus critical YouTube videos.

Participants (N = 1,311) evaluated a criticized individual more negatively following satire compared to direct criticism. Moreover, when conducting automated text analysis of the actual comments left by viewers on YouTube (N = 104,555), people used more dehumanizing language in response to satirical versus critical videos. In six subsequent lab experiments (N = 2,040) using memes and videos, causal evidence is provided that nonpolitical satire can cause greater damage to a target's reputation than direct criticism. Evidence that satire renders targets as less human, and thus more prone to more reputational damage is explored via both mediation and moderation.
https://www.apa.org/pubs/journals/releases/xge-xge0001729.pdf

Mind & Language

PAPERS

ALEXANDRE DUVAL – In defense of language-independent flexibility, or: What rodents and humans can do without language

There are two main approaches within classical cognitive science to explaining how humans can entertain mental states that integrate contents across domains. The language-based framework states that this ability arises from higher cognitive domain-specific systems that combine their outputs through the language faculty, whereas the language-independent framework holds that it comes from non-language-involving connections between such systems. This article turns on its head the most influential empirical argument for the language-based framework, an argument that originates from research on spatial reorientation. I make the case that neuroscientific findings about spatial reorientation in rodents and humans bolster the language-independent framework instead.
https://onlinelibrary.wiley.com/doi/full/10.1111/mila.12522

IGOR DOUVEN – The learnability of natural concepts

According to a recent proposal, natural concepts are represented in an optimally designed similarity space, adhering to principles a skilled engineer would use for creatures with our perceptual and cognitive capacities. One key principle is that natural concepts should be easily learnable. While evidence exists for parts of this optimal design proposal, there has been no direct evidence linking naturalness to learning until now. This article presents results from a computational study on perceptual color space, demonstrating that naturalness indeed facilitates learning.
https://onlinelibrary.wiley.com/doi/abs/10.1111/mila.12523

Nature Communications

PAPERS

CHARLOTTE S. L. ROSSETTI, OLIVER P. HAUSER & CHRISTIAN HILBE – Dynamics of cooperation in concurrent games

People frequently encounter situations where individually optimal decisions conflict with group interests. To navigate such social dilemmas, they often employ simple heuristics based on direct reciprocity: cooperate when others do and cease cooperation when partners defect. However, prior research typically assumes that individuals only interact in one game at a time. In reality, people engage in multiple games concurrently, and the outcome of one interaction can influence behavior in another. Here, we introduce a theoretical framework to study the resulting cross-over and spill-over effects. Participants repeatedly engage in two independent stage games, either with the same or different partners, adapting their strategies over time through an evolutionary learning process. Our findings indicate that individuals often link their behavior across games, particularly under cognitive constraints like imperfect recall. A behavioral experiment with 316 UK-based students suggests that concurrent games negatively affect cooperation, highlighting how strategic motives and spillovers impact reciprocity.
https://www.nature.com/articles/s41467-025-56083-7

Nature Communications Biology

PAPERS

MARIE-PIERRE MEURVILLE, DANIELE SILVESTRO & ADRIA C. LEBOEUF – Ecological change and conflict reduction led to a social circulatory system in ants

Behavioral innovations can be ecologically transformative for lineages that perform them and for their associated communities. Many ecologically dominant, superorganismal, and speciose ant lineages use mouth-to-mouth social regurgitation behavior – stomodeal trophallaxis – to share exogenous and endogenous materials within colonies. This behavior is less common in other species-poor, less cooperative ant lineages. How and why trophallaxis evolved and fixed in only some ant clades remains unclear, and whether this trait could be indicative of superorganismality has yet to be established. Here we show that trophallaxis evolved in two main events, in non-doryline formicoids around 130 Ma and in some ponerines around 90 Ma, lineages that today encompass 86% of all ant species. We found that trophallaxis evolved in lineages that began drinking sugary liquids and that had reduced intra-colonial conflict by constraining worker reproductive potential. Evolution of trophallaxis increased net diversification. Causal models indicate that trophallaxis required low reproductive conflict and contributed to the large colony sizes of the ants that use it. This suggests that the evolution of social regurgitation was enabled by both social conflict reduction and opportunistic inclusion of nectar and honeydew in the ant diet during the shifts in terrestrial ecosystems toward flowering plants.

https://www.nature.com/articles/s42003-025-07688-7

Nature Humanities & Social Sciences Communications

PAPERS

İSMAIL KARSANTIK & SEMIH ÇAYAK – Exploring the effect of altruism on social entrepreneurship characteristics: the mediating role of social intelligence

The study aims to investigate whether social intelligence had a mediating role in the relationship between altruism and social entrepreneurship characteristics of pre-service teachers. The participants of the research consisted of 385 pre-service teachers studying in four higher education institutions in the Eastern Black Sea region of Türkiye in the fall semester of the 2023–2024 academic year. The research data were collected by using altruism scale, Tromsø social intelligence scale, and social entrepreneurship characteristics of pre-service teachers scale. The study, which was designed in correlational survey model, employed structural equation analysis to test the mediating role of social intelligence in the relationship between altruism and social entrepreneurship characteristics. Sub-dimensions of social entrepreneurship characteristics of pre-service teachers scale had a significant and positive relationship with sub-dimensions of altruism scale, and Tromsø social intelligence scale. The structural equation model tested to determine the mediating role of social intelligence in the relationship between altruism and social entrepreneurship characteristics of pre-service teachers was found to be statistically significant and met compliance criteria.

https://www.nature.com/articles/s41599-025-04501-y

Nature Reviews Psychology

PAPERS

NAZBANOU NOZARI – Monitoring, control and repair in word production

Word production is the process of turning a thought into motor movements that produce a spoken word. This process has traditionally been studied using two approaches — the psycholinguistic approach and the motor speech approach — that focus on different stages of the production process. In this Perspective, I highlight the strengths of these two approaches and merge them with broader frameworks and theories of action and cognition to open new directions for language production research. I discuss proposed models for how speakers assess whether production is going smoothly (monitoring), adjust to difficulties (control) and fix errors (repair). Each proposal combines language production research with insights from other areas of cognition to demonstrate the utility and necessity of a closer integration of broader cognitive frameworks into models of word production.

https://www.nature.com/articles/s44159-025-00417-1

Nature Scientific Reports

PAPERS

CHOTIGA PATTAMADILOK et al – Learning to read transforms phonological into phonographic representations

Learning to read changes the nature of speech representations. One possible change consists in transforming phonological representations into phonographic ones. However, evidence for such transformation remains surprisingly scarce. Here, we used a novel word learning paradigm to address this issue. During the learning phase, participants learned unknown words in both spoken and written forms. Following this phase, the impact of spelling knowledge on the auditory perception of the novel words was assessed at two time points through an unattended oddball paradigm, while the Mismatch Negativity component was measured by high density EEG. Immediately after the learning phase, no influence of spelling knowledge on the perception of the spoken input was found. Interestingly, one week later, this influence emerged, making similar sounding words with different spellings more distinct than similar sounding words that also shared the same spelling. Our finding provides novel neurophysiological evidence of an integration of phonological and orthographic representations that occurs once newly acquired knowledge has been consolidated. The resulting 'phonographic' representations may characterize how known words are stored in literates' mental lexicon.

https://www.nature.com/articles/s41598-025-88650-9

JIM MCGETRICK et al – Pigs solve a cooperative task without showing a clear understanding of the need for a partner

Many animal species engage in cooperation, whereby they act together, typically to achieve a common goal. Domestic pigs were recently shown to lift a log together in pairs in the joint log-lift (JLL) task to access food treats. However, it is not yet clear whether pigs understand that they need a partner for this task. To investigate this, we applied a recruitment approach similar to that used for chimpanzees, coral trout, wolves and dogs. Pigs that were proficient with the JLL task were given access to the task on their own but could open a door to recruit a familiar partner from an adjacent enclosure. Pigs opened the door in all experimental conditions, allowing the partner to enter (if a partner was present). Comparing across conditions, latencies to open the door and to return to the box after opening the door generally did not suggest that subjects understood the need for the partner. As with many animal species in cooperative tasks, pigs may achieve a complex cooperative outcome in the JLL task without a full understanding of the need for a partner.

https://www.nature.com/articles/s41598-024-84529-3

New Scientist

NEWS

Bonobos can tell when they know something you don't
Recognising that someone lacks information you possess is key for effective communication and cooperation, and bonobos seem to share this skill with humans.
https://www.newscientist.com/article/2466616-bonobos-can-tell-when-they-know-something-you-dont/

Humpback whale songs have patterns that resemble human language
The sounds that make up humpback whale songs follow some of the same statistical rules seen in human languages, which may be because of how they are learned.
https://www.newscientist.com/article/2467170-humpback-whale-songs-have-patterns-that-resemble-human-language/

Enigmatic people who took over Europe millennia ago came from Ukraine
A huge study of ancient DNA reveals the origins of the Yamna, who spread across Eurasia around 5000 years ago, showing they came from a mixing of populations north of the Black Sea.
https://www.newscientist.com/article/2466972-enigmatic-people-who-took-over-europe-millennia-ago-came-from-ukraine/

ARTICLES

DAVID ROBSON – How studying babies' minds is prompting us to rethink consciousness
The debate over when consciousness arises has been revitalised by new tests of awareness in infants – raising the possibility that it emerges just before birth.
https://www.newscientist.com/article/mg26535300-800-how-studying-babies-minds-is-prompting-us-to-rethink-consciousness/

MICHAEL MARSHALL – Fossil proteins may soon reveal how we're related to Australopithecus
Australopithecus came before us, but that doesn't tell us which species is our ancestor. The fossil record is spotty in places, but the latest finds could give us enough clues to pin down how we are linked.
https://www.newscientist.com/article/2467513-fossil-proteins-may-soon-reveal-how-were-related-to-australopithecus/

PLoS One

PAPERS

ELIZABETH CABRERA-RUIZ et al – Monkeys can identify pictures from words
Humans learn and incorporate cross-modal associations between auditory and visual objects (e.g., between a spoken word and a picture) into language. However, whether nonhuman primates can learn cross-modal associations between words and pictures remains uncertain. We trained two rhesus macaques in a delayed cross-modal match-to-sample task to determine whether they could learn associations between sounds and pictures of different types. In each trial, the monkeys listened to a brief sound (e.g., a monkey vocalization or a human word), and retained information about the sound to match it with one of 2–4 pictures presented on a touchscreen after a 3-second delay. We found that the monkeys learned and performed proficiently in over a dozen associations. In addition, to test their ability to generalize, we exposed them to sounds uttered by different individuals. We found that their hit rate remained high but more variable, suggesting that they perceived the new sounds as equivalent, though not identical. We conclude that rhesus monkeys can learn cross-modal associations between objects of different types, retain information in working memory, and generalize the learned associations to new objects. These findings position rhesus monkeys as an ideal model for future research on the brain pathways of cross-modal associations between auditory and visual objects.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0317183

MIKI IKUTA & KOJI MIWA – Analogical reasoning in first and second languages
This study investigated how linguistic predictors such as word frequencies, the difficulty and creativity of problems, and the category of problems contribute to analogical reasoning in L1 and L2. This study also investigated how different types of similarities (i.e., perceptual and relational similarities) are processed in analogical reasoning. In Experiment 1, Japanese participants were asked to solve 100 multiple-choice A:B::C:D analogy problems (e.g., skeleton: bone:: tornado: wind) in their first language, Japanese (L1). In this experiment, participants also rated the difficulty and creativity of problems. In Experiment 2, Japanese participants completed the same tasks, but the problems were shown in their second language, English (L2). The results showed that problems presented in L1 elicited higher accuracies and faster response times than in L2. A significant interaction was found between languages (L1/L2) and the category of problems which indicates that finding a perceptual similarity (e.g., the shape image of word concepts) with verbal stimuli in L2 is more challenging than in L1. Moreover, our results on response times indicated that processing relations between words would be carried out in L1 without any specific instruction while it would not be completed in L2 possibly due to the cognitive demand related to lexical

processing. Considering these results, it is advisable in an educational setting to provide L2 learners with enough time and explicit instruction on understanding word relationships when forming analogies.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0318348

DANIEL HUETE-PÉREZ et al – Individual differences in associative/semantic priming: Spreading of activation in semantic memory and epistemically unwarranted beliefs

Starting from the enhanced spreading of activation through semantic memory (one of the explanatory mechanisms attempting to explain some manifestations observed in schizophrenia) and the psychosis continuum (a dimensional approach to psychotic disorders, where 'normality' and 'psychopathology' are not qualitatively different in nature but placed on varying levels of the same continuum), the main aim of the present research was to explore whether there are individual differences in associative/semantic priming in people with different levels of epistemically unwarranted beliefs (EUB). Participants varying in paranormal, pseudoscientific and conspiracy endorsement completed a primed lexical decision task containing related prime-target words (e.g., bulb-light) and unrelated prime-target words (e.g., sock-light). Bayesian linear mixed-effects models over response times (RTs) revealed a main direct priming effect (faster RTs in related pairs than in unrelated ones), a main facilitatory effect for some EUB scores (i.e., the higher the value for EUB score, the faster RTs), and an interactive effect between the experimental manipulation and some EUB scores (the higher the EUB score, the smaller the direct priming effect). These results are consistent with predictions made from the enhanced spreading of activation explanatory mechanism, but other alternative accounts are also discussed.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0313239

REIKI KISHIMOTO & KAZUHIDE HASHIYA – Recency and rarity effects in disambiguating the focus of utterance: A developmental study

While the communicator's intended referent in a conversation may not be immediately apparent, effective communication often overcomes this ambiguity. However, the specific mechanisms through which children use various cues to pinpoint the referent remain unclear. The communicator determines what is salient from the receiver's perspective. In return, the receiver identifies what the communicator identifies to be relevant for the receiver. The current study focused on two salient cues: rarity and recency, because rarity results in surprise and recency means a cue is more easily perceived and remembered. The current study investigated how adults and children aged 7–10 employ rarity and recency cues embedded in a series of events to clarify the referent intended by the communicator. Participants observed sequences comprising one rare and eight frequent events. An utterance, "Did you see that?" was presented at the end of each sequence, and participants identified the event(s) referred to by "that." Events that were rare and close to the utterance were more likely to be identified as the referents. Notably, the utilization of these cues differed between adults and children. For adults, the recency effect manifested gradually, with events closer to the utterance identified more frequently, and it exhibited an interaction with rarity. Among children, the recency effect was absolute, as the event closest to the utterance held a higher likelihood of being identified, and this effect was not influenced by rarity. Two additional conditions eliminated potential response biases and memory-related confounds. Our research suggests that school-age children are capable of disambiguating utterances by factoring in that the events they find salient are likely to be the communicator's focus. However, they are still in the process of developing reasoning skills similar to those of adults.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0317433

IVÁN BARREDA-TARRAZONA et al – Gender differences in dictator giving: A high-power laboratory test

We gather information from a large laboratory sample comprising 1,161 subjects and study gender differences in altruism using a dual-role dictator game. We control for factors potentially affecting the role of gender in dictator giving, such as the subject's age, cognitive ability, and personality traits, together with the dictator's self-reported emotions motivating the decision, and response time. We find that women behave in a significantly more generous way than men: after controlling for the factors mentioned above, females transfer 7.5 percentage points (about 40%) more of their endowment than males, on average. Moreover, we find that gender differences in giving are mediated by reasoning ability, personality traits and emotions.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0317886

Science

ARTICLES

GIACOMO GATTONI & MARIA ANTONIETTA TOSCHES – Constrained roads to complex brains: Neural development and brain circuit evolution converged in birds and mammals

During the arms race for survival on Earth, highly intelligent biological systems have emerged only a few times. Among vertebrates, mammals and birds can solve complex problems, use tools, and engage in elaborate social behaviors. These sophisticated tasks involve the pallium, the brain region most implicated in cognition, which includes the neocortex in mammals. However, it is unclear whether complex brains evolved multiples times through similar or different mechanisms. On pages 733, 734, and 732 of this issue, Zaremba et al., Hecker et al., and Rueda-Alaña et al., respectively, provide evidence

for the convergent development and evolution of neurons and their connections in the bird and mammalian pallia, highlighting the need for multiple perspectives in brain comparative studies.
https://www.science.org/doi/10.1126/science.adv2609

PAPERS

ENERITZ RUEDA-ALAÑA et al – Evolutionary convergence of sensory circuits in the pallium of amniotes

For decades, scientists have debated the homologies between the mammalian neocortex and the pallium of other vertebrates. Claims of homology are often based on gene expression patterns in embryonic brains or neuronal connectivity patterns in adult brains. We sought to understand pallial evolution because its homologies provide insights into the evolutionary and developmental pathways of brain structures across species.

We tackled this debate from alternative perspectives by investigating the developmental formation of pallial circuitry through neurogenic, transcriptional, and mathematical analyses in three selected species: chick, mouse, and gecko. By examining the development of their pallial circuits, we aimed to determine whether similarities in sensory processing circuits are due to conserved homology or convergent evolution.

Our study revealed that neurons that form the three stations of the pallial circuit are generated at different times and in distinct brain regions across species. The avian dorsal ventricular ridge (DVR) circuit develops in a different order than the neocortical circuit, whereas the avian hyperpallial circuit follows previously unknown neurogenic rules that are not seen in either the avian DVR or the mouse neocortex. Geckos exhibit a dual sequence: Their dorsal circuit forms like the mammalian neocortex, whereas their ventral circuit develops like the avian DVR. These findings indicate unexpected diversification in amniote pallial sensory circuit developmental programs.

On the molecular level, single-cell RNA sequencing depicted different evolutionary trends for equivalent cell types, produced in homologous pallial regions and at equivalent neurogenic times. Glutamatergic pallial neurons mature into divergent neuronal types in chick and mouse, whereas γ-aminobutyric acid–releasing (GABAergic) pallial neurons showed strong conservation, underscoring their fundamental role in pallial sensory circuits.

By means of spatially resolved transcriptomic analysis, we inferred the pallial location and transcriptional type of early neurons generated in the pallium of both chick and mouse. This analysis showed greater conservation of GABAergic cells and indicated that the only similarity in the glutamatergic class was mesopallial neurons of the chick brain and deep, lateral mammalian cortical neurons.

The developmental differences were also notable in progenitors and other cells. Whereas pallial radial glial cells displayed similarities between species, their neurogenic behaviors differed markedly. Additionally, the population of intermediate progenitor cells that expanded neuronal numbers in the mammalian neocortex had no clear homolog in the avian developing pallium. Cajal-Retzius cells were not found in the chick pallium. Furthermore, mathematical modeling suggests that components of sensory circuits in birds and mammals were shaped by similar functional constraints.

Our study demonstrates that high-order sensory processing circuits have evolved separately in different vertebrate taxa, converging into a functionally similar circuit. The differences in the developmental rules, progenitor cells, and transcriptomic profiles support a nonhomologous character of the amniote pallial circuits. The strong conservation of GABAergic neurons indicates their crucial role in pallial sensory circuits, whereas the divergent development of glutamatergic neurons suggests a flexible evolution of this neuronal class. Evolution tinkered with pallial circuit development, structure, and function. And likely, convergent evolution sculpted the formation of the components of the sensory circuits in amniote species.

{Somewhere, somehow, we seem to have lost our understanding of what an abstract is.}

https://www.science.org/doi/10.1126/science.adp3411

NIKOLAI HECKER et al – Enhancer-driven cell type comparison reveals similarities between the mammalian and bird pallium

The identity of cell types is governed by gene regulatory networks, which comprise cell type–specific combinations of transcription factors (TFs) that bind to genomic enhancer regions. The arrangements of TF binding sites form cell type–specific enhancer codes. Deep learning models trained on single-cell data provide the means to model and characterize enhancer codes at nucleotide resolution. Enhancer codes at such resolution have not yet been characterized for the mammalian telencephalon, which constitutes a major part of the forebrain, including the pallium. The pallium displays notable neuroanatomical differences between mammals and nonmammalian vertebrates. Most noticeable, the mammalian pallium contains a six-layered neocortex that is absent in all nonmammalian vertebrates, such as birds. Homologies between the mammalian and bird pallium are subject to a decades-long debate. It is currently unknown whether enhancer codes are conserved across vertebrate brains and whether they are informative to resolve homology relationships between species at the cell type level.

To characterize and compare the enhancer codes of brain cell types between the mammalian and bird pallium, we generated single-cell multiome (scMultiome) and spatially resolved transcriptomics data of the chicken telencephalon. As a baseline to map cell type similarities between species, we compared the transcriptomes of telencephalon cell types between human, mouse, and chicken. We then used variable chromatin accessibility as a proxy to identify potential genomic enhancer regions and to assess their cell type specificity. Next, we trained sequence-based deep learning models on these regions to infer cell

type–specific enhancer codes for the human, mouse, and chicken telencephalon. We implemented three metrics that exploit enhancer codes to compare cell types between species.
Excitatory neurons of the chicken telencephalon distinctly localize to pallial neuroanatomical regions, including the mesopallium, entopallium, hyperpallium, and nidopallium. Based on the transcriptomic and enhancer code comparisons, nonneuronal and γ-aminobutyric acid–mediated (GABAergic) cell types show a high degree of similarity across birds and mammals, which is reflected by conserved TF combinations for these cell types. On the other hand, the enhancer codes of excitatory neurons in the mammalian and avian pallium exhibit a higher degree of divergence. These matches only partially agree with existing evolutionary models for homologies between vertebrate pallial cell types based on developmental trajectories and brain circuitry. We found that the mammalian deep-layer excitatory neurons are most similar to mesopallial neurons, and mammalian neocortical upper-layer, piriform cortex, and amygdalar neurons are most similar to hyper- and nidopallial neurons. As a validation for the predicted correspondences between mammalian and bird cell types, we performed in vivo enhancer reporter assays. We show that chicken enhancer sequences exhibit activity in the corresponding mammalian telencephalic cell types when assayed in mouse brains.
Our study shows that enhancer codes can be exploited to infer cell type correspondences between species that are in line with transcriptomic comparisons. Joint comparisons of transcriptomes and deep learning–based enhancer codes reveal both expected and unexpected correspondences between cell types in the mammalian and avian telencephalon, indicating conserved regulatory programs that likely originated in the common amniote ancestor and have been co-opted or diversified. The proposed enhancer code–based approaches are generally applicable and can be used to characterize and compare cell types across species using the genomic regulatory code.
https://www.science.org/doi/10.1126/science.adp3957

BASTIENNE ZAREMBA et al – Developmental origins and evolution of pallial cell types and structures in birds
Some avian species have advanced cognitive abilities that rival those of great apes, likely facilitated by evolutionary innovations in the avian forebrain, including the pallium. The pallium, equivalent to the dorsal telencephalon, has undergone substantial morphological changes during amniote evolution since their last common ancestor ~320 million years ago. In mammals, the pallium primarily includes layered structures such as the isocortex, whereas in birds and reptiles, it mostly comprises the nuclear-organized dorsal ventricular ridge (DVR). Unlike other reptiles, birds lack a layered cortex and instead have another nuclear-organized region, the hyperpallium. Because of these extensive differences, diverse views on amniote pallium evolution exist, some assuming homology of cell types with similar roles in the neural circuitry, and others suggesting homologous developmental territories.
Recent single-cell molecular studies in adult reptiles and restricted areas of the pallium of songbirds have provided evidence for homology of specific pallial cell types, suggested to originate from shared embryonic regions but diverging considerably in their transcriptomic profiles across amniote lineages. However, cell type–level data for several key regions of the avian pallium, such as the hyperpallium, have been lacking. Moreover, despite the recognized importance of development in understanding evolutionary cell type relationships, the development of the pallium in nonavian reptiles and birds has never been studied at the single-cell level. To explore the developmental origins and evolution of pallial structures and cell types in birds, we generated spatially resolved cell type atlases of the entire adult chicken pallium and across in ovo development using single-nucleus RNA sequencing (snRNA-seq) and spatial transcriptomics technologies and compared them to corresponding atlases from mammals and nonavian reptiles.
We detected conserved expression patterns in inhibitory neurons across amniotes, with an expansion of one cell type in birds, which is predominantly located in the mammalian amygdala but present throughout the avian pallium. We also show evolutionary conservation of excitatory neuron types in the hippocampal regions of amniotes and identify homologs of excitatory neurons in the mammalian claustrum in the avian anterior DVR. Avian cell populations related to claustrum-like neurons resemble neurons in deep layers of the mammalian cortex, challenging current developmental and circuitry-focused hypotheses. Several excitatory neuron repertoires diverged substantially in birds, especially in the hyperpallium and ventral DVR (called the nidopallium). Our findings clarify the borders of the hyperpallium and reveal that only a fraction of cells in this region are homologous to neurons in the mammalian isocortex. Whereas adult comparisons support the functional equivalence of the DVR to the mammalian isocortex, developmental data reveal correspondences of cell types in ventral pallial areas between birds and mammals, illustrating the pronounced gene expression divergences of adult cell types in these regions. We also identify an extensive developmental convergence of gene expression programs between excitatory cell populations from the hyperpallium and nidopallium, accounting for their previously observed similarity in adults. This functional convergence occurs during late developmental stages, suggesting that, in birds, the topological location within the pallium is not always a determinant factor for adult gene expression programs underlying functional properties.
Our study provides key insights into the anatomy and development of the avian pallium, paving the way for research on the molecular mechanisms underlying advanced avian behaviors. We elucidate the evolutionary history of the amniote pallium, confirming previous notions and findings, such as the transcriptomic conservation of inhibitory neurons or of excitatory neurons in the hippocampus, while also identifying novel relationships, for example, that of cell populations in the anterior DVR and deep layers of the mammalian isocortex. We also show that adult transcriptomic similarities within the avian pallium may result from developmental convergence rather than reflecting homology. Our work thus emphasizes the need for updated models of amniote pallial evolution and the importance of considering developmental data in evolutionary

comparisons. Overall, our study resolves long-standing debates on the amniote pallium, offering valuable insights into the evolutionary trajectory and diversification of neural cell types and structures crucial for advanced behaviors.
https://www.science.org/doi/10.1126/science.adp5182

Trends in Cognitive Sciences

PAPERS

BANGJIE WANG, AMANDA LEBEL & ANILA M. D'MELLO – Ignoring the cerebellum is hindering progress in neuroscience

Traditionally considered a motor structure, the cerebellum has been shown to play a key role in several cognitive functions. However, for decades, the cerebellum has been largely overlooked and even deliberately excluded from 'whole-brain' neuroimaging studies. Here, we propose that the continued exclusion of the cerebellum has limited our understanding of whole-brain function. We describe reasons – both warranted and unwarranted – behind its historical exclusion from the neuroimaging literature, review literature describing the importance of the cerebellum and its unique role in brain function, and outline the potential unintended negative consequences of exclusion of the cerebellum for our comprehensive understanding of brain function and clinical disorders.
https://www.cell.com/trends/cognitive-sciences/abstract/S1364-6613(25)00004-X

Trends in Neurosciences

PAPERS

JONAS OBLESER – Metacognition in the listening brain

How do you know you have heard right? Metacognition, the ability to assess and monitor one's own cognitive state, is key to understanding human communication in complex environments. However, the foundational role of metacognition in hearing and communication is only beginning to be explored, and the neuroscience behind it is an emerging field: how does confidence express in neural dynamics of the listening brain? What is known about auditory metaperceptual alterations as a hallmark phenomenon in psychosis, dementia, or hearing loss? Building on Bayesian ideas of auditory perception and auditory neuroscience, 'meta-listening' offers a framework for more comprehensive research into how metacognition in humans and non-humans shapes the listening brain.
https://www.cell.com/trends/neurosciences/fulltext/S0166-2236(24)00251-0

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