

## EAORC BULLETIN 1,075 – 21 January 2024

## CONTENTS

<b>NOTICES</b> .....	<b>3</b>
PUBLICATION ALERTS.....	3
EDITORIAL INTERJECTIONS.....	3
ACADEMIA.EDU – Claims for occupations at Melka Kunture not supported by robust age model .....	3
TEGENU GOSSA et al with ERELLA HOVERS – Claims for 1.9–2.0 Ma old early Acheulian and Oldowan occupations at Melka Kunture are not supported by a robust age model .....	3
ACADEMIA.EDU – The Nature of Culture: an eight-grade model .....	4
MIRIAM NOËL HAIDLE et al with NICHOLAS J. CONARD, MARLIZE LOMBARD, APRIL NOWELL, CLAUDIO TENNIE & ANDREW WHITEN – The Nature of Culture: an eight-grade model for the evolution and expansion of cultural capacities in hominins and other animals.....	4
ONLINE ARCHIVES – Emotional contagion and prosocial behavior.....	4
CHRISTIAN KEYSERS et al – Emotional contagion and prosocial behavior in rodents .....	4
CONFERENCE ALERT – Perspectives on Speciation .....	4
CONFERENCE ALERT – Euro Evo Devo 2024.....	4
<b>NEWS</b> .....	<b>5</b>
GUARDIAN SCIENCE – A groundbreaking study shows kids learn better on paper, not screens. Now what?.....	5
NATURE BRIEFING – The consciousness wars .....	5
NATURE BRIEFING – Science supergroup will battle paper mills .....	5
NATURE BRIEFING – Can scientists ever agree on how consciousness works? .....	5
NATURE BRIEFING – Huge ancient civilization discovered in the Amazon .....	5
SCIENCEADVISER – What’s in a tail wag?.....	5
THE CONVERSATION – Is our sense of fairness driven by selfishness? We’re studying the brain to find out .....	5
<b>PUBLICATIONS</b> .....	<b>6</b>
Biology Letters .....	6
<b>PAPERS</b> .....	6
SILVIA LEONETTI et al – Why do dogs wag their tails? .....	6
Current Biology .....	6
<b>PAPERS</b> .....	6
SUDHANSHU SRIVASTAVA, WILLIAM YANG WANG & MIGUEL P. ECKSTEIN – Emergent human-like covert attention in feedforward convolutional neural networks .....	6
eLife.....	6
<b>PAPERS</b> .....	6
SUNG WON HUR et al – Correlated signatures of social behavior in cerebellum and anterior cingulate cortex.....	6
AVANI KOPARKAR et al – Lesions in a songbird vocal circuit increase variability in song syntax .....	7
TOMMASO GHILARDI et al – Early roots of information-seeking: Infants predict and generalize the value of information.....	7
VIKTOR KEWENIG, GABRIELLA VIGLIOCCO & JEREMY I SKIPPER – When Abstract Becomes Concrete: Naturalistic Encoding of Concepts in the Brain .....	7
Evolutionary Anthropology .....	7
<b>PAPERS</b> .....	7
JESSE M. MARTIN et al – A lineage perspective on hominin taxonomy and evolution .....	7
ILARIA PRETELLI et al – Child and adolescent foraging: New directions in evolutionary research.....	8
Frontiers in Cognition.....	8
<b>PAPERS</b> .....	8
ALICE MADDO PROVERBIO et al – The key role of the right posterior fusiform gyrus in music reading: an electrical neuroimaging study on 90 readers.....	8
Frontiers in Language Sciences.....	8
<b>PAPERS</b> .....	8
ANTONIO BENÍTEZ-BURRACO, SIHAN CHEN & DAVID GIL – The absence of a trade-off between morphological and syntactic complexity .....	8
Frontiers in Psychology .....	8
<b>PAPERS</b> .....	8
JOSEPH JORDANIA – Music as aposematic signal: predator defense strategies in early human evolution .....	8

BAS VAN BOEKHOLT, RAY WILKINSON & SIMONE PIKA – Bodies at play: the role of intercorporeality and bodily affordances in coordinating social play in chimpanzees in the wild .....	9
KAZUKI SEKINE & ASLI ÖZYÜREK – Children benefit from gestures to understand degraded speech but to a lesser extent than adults .....	9
<b>iScience</b> .....	<b>9</b>
<b>PAPERS</b> .....	<b>9</b>
YUNMAN XIA et al – Development of Sensorimotor-Visual Connectome Gradient at Birth Predicts Neurocognitive Outcomes at 2 Years of Age ...	9
JULIA MÖRCHEN et al with CAROLINE SCHUPPLI – Orangutan males make increased use of social learning opportunities, when resource availability is high .....	9
CLEANTHE SPANAKI et al – Glutamate-specific Gene Linked to Human Brain Evolution Enhances Synaptic Plasticity and Cognitive Processes .....	10
<b>Nature</b> .....	<b>10</b>
<b>NEWS</b> .....	<b>10</b>
Science’s fake-paper problem: high-profile effort will tackle paper mills .....	10
The consciousness wars: can scientists ever agree on how the mind works? .....	10
<b>Nature Communications</b> .....	<b>10</b>
<b>PAPERS</b> .....	<b>10</b>
JAN WEBER et al – Ramping dynamics and theta oscillations reflect dissociable signatures during rule-guided human behavior .....	10
<b>Nature Communications Biology</b> .....	<b>10</b>
<b>PAPERS</b> .....	<b>10</b>
SHOVONLAL ROY, ÅKE BRÄNNSTRÖM & ULF DIECKMANN – Ecological determinants of Cope’s rule and its inverse .....	10
<b>Nature Ecology &amp; Evolution</b> .....	<b>11</b>
<b>ARTICLES</b> .....	<b>11</b>
CHRISTOPHER J. BAE – Modern humans in Northeast Asia .....	11
<b>PAPERS</b> .....	<b>11</b>
SHI-XIA YANG et al with FRANCESCO D’ERRICO & MICHAEL PETRAGLIA – Initial Upper Palaeolithic material culture by 45,000 years ago at Shiyu in northern China .....	11
NICHOLA A. STRANDBERG et al – Floristic homogenization of South Pacific islands commenced with human arrival .....	11
<b>Nature Human Behaviour</b> .....	<b>11</b>
<b>PAPERS</b> .....	<b>11</b>
ELEANOR SPENS & NEIL BURGESS – A generative model of memory construction and consolidation .....	11
<b>Nature Humanities &amp; Social Sciences Communications</b> .....	<b>12</b>
<b>PAPERS</b> .....	<b>12</b>
NISREEN N. AL-KHAWALDEH et al – Ideological representations of women in Jordanian folk proverbs from the perspective of cultural semiotics .....	12
LY THI PHUONG TRAN et al – Cultural schemas and folk-belief: an insight into the belief in worshipping the Mother Goddess in Vietnam .....	12
<b>Nature Reviews Psychology</b> .....	<b>12</b>
<b>ARTICLES</b> .....	<b>12</b>
JANE ARISTIA – Neural evidence of word prediction .....	12
<b>Nature Scientific Reports</b> .....	<b>12</b>
<b>PAPERS</b> .....	<b>12</b>
ASHLEY N. GILLIAM & ANGELA GUTCHESS – Influence of acculturation and cultural values on the self-reference effect .....	12
FEDERICA AMICI et al with KATJA LIEBAL – A longitudinal comparison of maternal behaviour in German urban humans ( <i>Homo sapiens</i> ) and captive chimpanzees ( <i>Pan troglodytes</i> ) .....	13
<b>Neuron</b> .....	<b>13</b>
<b>ARTICLES</b> .....	<b>13</b>
CHRISTIAN KEYSERS & FRÉDÉRIC MICHON – Can mirror self-recognition in mice unpack the neural underpinnings of self-awareness? .....	13
<b>PAPERS</b> .....	<b>13</b>
JUN YOKOSE, WILLIAM D. MARKS & TAKASHI KITAMURA – Visuo-tactile integration facilitates mirror-induced self-directed behavior through activation of hippocampal neuronal ensembles in mice .....	13
<b>New Scientist</b> .....	<b>13</b>
<b>NEWS</b> .....	<b>13</b>
Leave no stone unturned in search for an explanation of consciousness .....	13
Ancient cities discovered in the Amazon are the largest yet found .....	13
<b>ARTICLES</b> .....	<b>13</b>
GEORGE MUSSER – The intriguing experiments forcing a rethink on quantum consciousness .....	13
<b>PeerJ</b> .....	<b>14</b>
<b>PAPERS</b> .....	<b>14</b>
MASHAIL N. ALKHOMSAN, MALAK BASLYMAN & MOHAMMAD ALSHAYEB – Eliciting and modeling emotional requirements: a systematic mapping review .....	14
<b>Philosophical Transactions of the Royal Society B</b> .....	<b>14</b>
<b>PAPERS</b> .....	<b>14</b>

KRISTIN ANDREWS, SIMON FITZPATRICK & EVAN WESTRA – Human and nonhuman norms: a dimensional framework.....	14
SERGEY GAVRILETS, DENIS TVERSKOI & ANGEL SÁNCHEZ – Modelling social norms: an integration of the norm-utility approach with beliefs dynamics.....	14
JINYI KUANG & CRISTINA BICCHIERI – Language matters: how normative expressions shape norm perception and affect norm compliance .....	14
ANA MACANOVIC et al – Signals of belonging: emergence of signalling norms as facilitators of trust and parochial cooperation .....	15
SARA LOWES & NATHAN NUNN – The slave trade and the origins of matrilineal kinship .....	15
QIAO-QIAO HE et al – Jeans and language: kin networks and reproductive success are associated with the adoption of outgroup norms .....	15
PLoS One.....	16
<b>PAPERS.....</b>	<b>16</b>
NOBURO SAJI, CHUNZI HONG & CHONG WANG – Learning semantic categories of L2 verbs: The case of cutting and breaking verbs .....	16
JULIANE KAMINSKI et al with KATJA LIEBAL – Understanding others’ preferences: A comparison across primate species and human societies .....	16
AUSTIN LEEDS et al – Group structure and individual relationships of sanctuary-living Grauer’s gorillas ( <i>Gorilla beringei graueri</i> ).....	16
CASSANDRA VIETEN et al – Measures of empathy and compassion: A scoping review.....	16
Royal Society Open Science.....	17
<b>PAPERS.....</b>	<b>17</b>
LAUREN C. WHITE et al – Female chimpanzees avoid inbreeding even in the presence of substantial bisexual philopatry .....	17
CONNOR M. HULTS et al with ELLIOTT R. SOBER – Still little evidence sex differences in spatial navigation are evolutionary adaptations .....	17
ROSEMARY BLERSCH et al – What you have, not who you know: food-enhanced social capital and changes in social behavioural relationships in a non-human primate .....	17
Science.....	18
<b>ARTICLES.....</b>	<b>18</b>
FREDERIK JOELVING – Paper Trail .....	18
Science Advances.....	18
<b>CORRECTIONS .....</b>	<b>18</b>
H. HOLDEN THORP – Editor’s note and erratum for the Research Article: “Societies of strangers do not speak less complex languages” by Shcherbakova et al. ....	18
Trends in Cognitive Sciences .....	18
<b>PAPERS.....</b>	<b>18</b>
NICHOLAS BUTTRICK – Studying large language models as compression algorithms for human culture.....	18
<b>SUBSCRIBE to the EAORC Bulletin .....</b>	<b>18</b>
<b>UNSUBSCRIBE from the EAORC Bulletin .....</b>	<b>18</b>
<b>PRODUCED BY AND FOR THE EAORC EMAIL GROUP.....</b>	<b>18</b>

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## NOTICES

### PUBLICATION ALERTS

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

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

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

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### EDITORIAL INTERJECTIONS

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

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### ACADEMIA.EDU – Claims for occupations at Melka Kunture not supported by robust age model

*Quaternary Science Reviews* 326, 1085060277-3791 (2024).

#### **TEGENU GOSSA et al with ERELLA HOVERS – Claims for 1.9–2.0 Ma old early Acheulian and Oldowan occupations at Melka Kunture are not supported by a robust age model**

Recent attempts to resolve the chronostratigraphic sequence of the sedimentary layers encasing the Oldowan and early Acheulian occupation horizons of the Garba IV gully of Melka Kunture constitute a welcome effort, given the longstanding uncertainties and frequent changes in the reporting on the age of the early Acheulian occupation horizons from this gully (e.g., ca. 1.5 Ma, Gallotti, 2013; Gallotti and Mussi, 2017; ca. 1.6 Ma, Gallotti and Mussi, 2018; Mussi et al., 2023a). Muttoni et al. (2023) contend that their new magnetostratigraphic framework places Garba IVD and E-F below the base of the Olduvai subchron, rendering a minimum age of 1.925 Ma for the underlying early Acheulian and Oldowan archaeological sequences. These data serve as the basis for Mussi et al. (2023b) in their interpretation of Garba IVD as the oldest Acheulian occurrence in the world at around 2.0 Ma, roughly 200 ka older than other widely accepted occurrences dated to ca. 1.75 Ma (i.e., Kokiselei 4, Lepre et al., 2011; KGA6-A1 of Konso, Beyene et al., 2013), thus significantly pushing back the origin of the Acheulian. The newly proposed age model for Garba IV would have important implications for our understanding of the

origins and evolution of the Oldowan and Acheulian techno-complexes and their environmental contexts. Such far-reaching conclusions should therefore be based on a robust and conclusive age model.

[https://www.academia.edu/113785633/Gossa\\_T\\_Asrat\\_A\\_Hovers\\_E\\_Tholt\\_A\\_J\\_Renne\\_P\\_R\\_2024\\_Claims\\_for\\_1\\_9\\_2\\_0\\_Ma\\_old\\_early\\_Acheulian\\_and\\_Oldowan\\_occupations\\_at\\_Melka\\_Kunture\\_are\\_not\\_supported\\_by\\_a\\_robust\\_age\\_model\\_Quaternary\\_Science\\_Reviews\\_360\\_https\\_doi\\_org\\_10\\_1016\\_j\\_quascirev\\_2024\\_108506](https://www.academia.edu/113785633/Gossa_T_Asrat_A_Hovers_E_Tholt_A_J_Renne_P_R_2024_Claims_for_1_9_2_0_Ma_old_early_Acheulian_and_Oldowan_occupations_at_Melka_Kunture_are_not_supported_by_a_robust_age_model_Quaternary_Science_Reviews_360_https_doi_org_10_1016_j_quascirev_2024_108506)

### ACADEMIA.EDU – The Nature of Culture: an eight-grade model

*Journal of Anthropological Sciences* 93, 43-70 (2015).

**MIRIAM NOËL HAIDLE et al with NICHOLAS J. CONARD, MARLIZE LOMBARD, APRIL NOWELL, CLAUDIO TENNIE & ANDREW WHITEN – The Nature of Culture: an eight-grade model for the evolution and expansion of cultural capacities in hominins and other animals**

Tracing the evolution of human culture through time is arguably one of the most controversial and complex scholarly endeavors, and a broad evolutionary analysis of how symbolic, linguistic, and cultural capacities emerged and developed in our species is lacking. Here we present a model that, in broad terms, aims to explain the evolution and portray the expansion of human cultural capacities (the EEC model), that can be used as a point of departure for further multidisciplinary discussion and more detailed investigation. The EEC model is designed to be flexible, and can be refined to accommodate future archaeological, paleoanthropological, genetic or evolutionary psychology/behavioral analyses and discoveries. Our proposed concept of cultural behavior differentiates between empirically traceable behavioral performances and behavioral capacities that are theoretical constructs. Based largely on archaeological data (the ‘black box’ that most directly opens up hominin cultural evolution), and on the extension of observable problem-solution distances, we identify eight grades of cultural capacity. Each of these grades is considered within evolutionary-biological and historical-social trajectories. Importantly, the model does not imply an inevitable progression, but focuses on expansion of cultural capacities based on the integration of earlier achievements. We conclude that there is not a single cultural capacity or a single set of abilities that enabled human culture; rather, several grades of cultural capacity in animals and hominins expanded during our evolution to shape who we are today.

[https://www.academia.edu/89205330/The\\_Nature\\_of\\_Culture\\_an\\_eight\\_grade\\_model\\_for\\_the\\_evolution\\_and\\_expansion\\_of\\_cultural\\_capacities\\_in\\_hominins\\_and\\_other\\_animals](https://www.academia.edu/89205330/The_Nature_of_Culture_an_eight_grade_model_for_the_evolution_and_expansion_of_cultural_capacities_in_hominins_and_other_animals)

### ONLINE ARCHIVES – Emotional contagion and prosocial behavior

*In Human Nature* 24, 375-401 (2013).

**CHRISTIAN KEYSERS et al – Emotional contagion and prosocial behavior in rodents**

Empathy is critical to adjusting our behavior to the state of others. The past decade dramatically deepened our understanding of the biological origin of this capacity. We now understand that rodents robustly show emotional contagion for the distress of others via neural structures homologous to those involved in human empathy. Their propensity to approach others in distress strengthens this effect. Although rodents can also learn to favor behaviors that benefit others via structures overlapping with those of emotional contagion, they do so less reliably and more selectively. Together, this suggests evolution selected mechanisms for emotional contagion to prepare animals for dangers by using others as sentinels. Such shared emotions additionally can, under certain circumstances, promote prosocial behavior.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(22\)00111-5](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(22)00111-5)

### CONFERENCE ALERT – Perspectives on Speciation

Linnean Society of London, 11 April 2024

A one-day interdisciplinary symposium examining how the process of speciation is viewed from a diversity of disciplines. Supported by the Integration of Speciation Research network of ESEB, by Oxford University Press and by the Company of Biologists

Accompanied by a Special Issue of the Evolutionary Journal of the Linnean Society:

<https://academic.oup.com/evolinnean/pages/perspectives-on-speciation>

Attendance is possible in person or online – registration is required and in-person places are limited.

Details, including speakers, and registration at:

<https://www.eventbrite.com/e/perspectives-on-speciation-hybrid-meeting-tickets-728342330517?aff=oddtcreator>

Roger Butlin

### CONFERENCE ALERT – Euro Evo Devo 2024

We are excited to let you know that registration for the Euro Evo Devo 2024 is now open! \*Abstract submission deadline is the 15th February 2024, please register via the website here: <https://www.helsinki.fi/en/conferences/euroevodevo-2024>

Euro Evo Devo 2024 will take place from 25th to 28th June 2024 in Helsinki, Finland. We have a diverse and exciting programme including Scott Gilbert, Steph Hoehn, Paula Elomaa and Yann Guiguen as keynote speakers.

5 satellite meetings (amphioxus, platynereis, arthropod, fish and crustacean) will take place before the main meeting on the 24./25. June.

Registration is via the main registration page.

Looking forward to seeing you in Helsinki!

Rainer Melzer (secretary) on behalf of the EED executive committee and local organizing committee

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## NEWS

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### GUARDIAN SCIENCE – A groundbreaking study shows kids learn better on paper, not screens. Now what?

For 'deeper reading' among children aged 10-12, paper trumps screens. What does it mean when schools are going digital?

<https://www.theguardian.com/lifeandstyle/2024/jan/17/kids-reading-better-paper-vs-screen>

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### NATURE BRIEFING – The consciousness wars

Five collaborations have been funded to empirically test competing theories of consciousness against each other. These projects, and others, are raising hopes that we're making progress on one of science's most intractable questions. But the field is hard to pin down: consciousness means different things to different people. And it's combative: an open letter last year raised hackles with claims that a prominent theory about consciousness — integrated information theory (IIT) — is "pseudoscience". A fresh generation of researchers is leading efforts to heal the divisions and push research forward.

<https://www.nature.com/articles/d41586-024-00107-7>

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### NATURE BRIEFING – Science supergroup will battle paper mills

A high-profile group of funders, academic publishers and research organizations has launched an effort to tackle paper mills — businesses that churn out fake or poor-quality journal papers and sell authorships. United2Act includes the European Research Council, the publishing-services company Clarivate and major publishers including Elsevier, Wiley and Springer Nature. Working groups will focus on: Education and awareness; Detailed research into paper mills; Improved post-publication corrections; Tools that verify the identities of authors, editors and reviewers; Communication between groups across publishing that are tackling the issue.

<https://www.nature.com/articles/d41586-024-00159-9>

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### NATURE BRIEFING – Can scientists ever agree on how consciousness works?

Projects to test competing theories of consciousness are raising hopes that we're making progress on one of science's most intractable questions. Plus, a cloned rhesus monkey lives to adulthood for first time and what a 92-year-old elite athlete teaches us about healthy ageing.

<https://www.nature.com/articles/d41586-024-00153-1>

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### NATURE BRIEFING – Huge ancient civilization discovered in the Amazon

A 2,500-year-old network of interconnected cities has been found hidden under vegetation in Ecuador. Plus, the oldest reptile skin ever found pre-dates the dinosaurs.

<https://www.nature.com/articles/d41586-024-00120-w>

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### SCIENCEADVISER – What's in a tail wag?

When your dog greets you with a furiously wagging tail, is she happy to see you—or is there more going on than meets the eye? Wagging, which is mainly confined to domestic dogs, may represent a whole canine language that we are only beginning to understand.

A new review article in *Biology Letters* pulls together more than 100 studies covering why dogs wag their tails and what those wags mean. Science spoke with three of its authors—bioacousticians Silvia Leonetti of the University of Turin and Taylor Hersh of Oregon State University, and evolutionary cognitive scientist Andrea Ravignani of Sapienza University of Rome about what waggly tails can teach us about dogs, and about ourselves.

"A lot of people, myself included, have this idea that tail wagging is happy," says Hersh. "So I would expect that if a dog's wagging its tail, it's not going to have very high levels of cortisol—the main stress hormone in mammals—compared to other dogs. But one major takeaway that we saw in reviewing the research is that the links just aren't as clear."

<https://www.science.org/content/article/what-does-your-dog-s-tail-wag-really-mean>

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### THE CONVERSATION – Is our sense of fairness driven by selfishness? We're studying the brain to find out

The preference for fairness emerges early in childhood, suggesting it is to some extent hardwired.

<https://theconversation.com/is-our-sense-of-fairness-driven-by-selfishness-were-studying-the-brain-to-find-out-216550>

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## PUBLICATIONS

### Biology Letters

#### PAPERS

##### **SILVIA LEONETTI et al – Why do dogs wag their tails?**

Tail wagging is a conspicuous behaviour in domestic dogs (*Canis familiaris*). Despite how much meaning humans attribute to this display, its quantitative description and evolutionary history are rarely studied. We summarize what is known about the mechanism, ontogeny, function and evolution of this behaviour. We suggest two hypotheses to explain its increased occurrence and frequency in dogs compared to other canids. During the domestication process, enhanced rhythmic tail wagging behaviour could have (i) arisen as a by-product of selection for other traits, such as docility and tameness, or (ii) been directly selected by humans, due to our proclivity for rhythmic stimuli. We invite testing of these hypotheses through neurobiological and ethological experiments, which will shed light on one of the most readily observed yet understudied animal behaviours. Targeted tail wagging research can be a window into both canine ethology and the evolutionary history of characteristic human traits, such as our ability to perceive and produce rhythmic behaviours.

<https://royalsocietypublishing.org/doi/10.1098/rsbl.2023.0407>

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### Current Biology

#### PAPERS

##### **SUDHANSHU SRIVASTAVA, WILLIAM YANG WANG & MIGUEL P. ECKSTEIN – Emergent human-like covert attention in feedforward convolutional neural networks**

Covert attention allows the selection of locations or features of the visual scene without moving the eyes. Cues and contexts predictive of a target's location orient covert attention and improve perceptual performance. The performance benefits are widely attributed to theories of covert attention as a limited resource, zoom, spotlight, or weighting of visual information. However, such concepts are difficult to map to neuronal populations. We show that a feedforward convolutional neural network (CNN) trained on images to optimize target detection accuracy and with no explicit incorporation of an attention mechanism, a limited resource, or feedback connections learns to utilize cues and contexts in the three most prominent covert attention tasks (Posner cueing, set size effects in search, and contextual cueing) and predicts the cue/context influences on human accuracy. The CNN's cueing/context effects generalize across network training schemes, to peripheral and central pre-cues, discrimination tasks, and reaction time measures, and critically do not vary with reductions in network resources (size). The CNN shows comparable cueing/context effects to a model that optimally uses image information to make decisions (Bayesian ideal observer) but generalizes these effects to cue instances unseen during training. Together, the findings suggest that human-like behavioral signatures of covert attention in the three landmark paradigms might be an emergent property of task accuracy optimization in neuronal populations without positing limited attentional resources. The findings might explain recent behavioral results showing cueing and context effects across a variety of simple organisms with no neocortex, from archerfish to fruit flies.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)01758-X](https://www.cell.com/current-biology/fulltext/S0960-9822(23)01758-X)

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### eLife

#### PAPERS

##### **SUNG WON HUR et al – Correlated signatures of social behavior in cerebellum and anterior cingulate cortex**

The cerebellum has been implicated in the regulation of social behavior. Its influence is thought to arise from communication, via the thalamus, to forebrain regions integral in the expression of social interactions, including the anterior cingulate cortex (ACC). However, the signals encoded or the nature of the communication between the cerebellum and these brain regions is poorly understood. Here, we describe an approach that overcomes technical challenges in exploring the coordination of distant brain regions at high temporal and spatial resolution during social behavior. We developed the E-Scope, an electrophysiology-integrated miniature microscope, to synchronously measure extracellular electrical activity in the cerebellum along with calcium imaging of the ACC. This single coaxial cable device combined these data streams to provide a powerful tool to monitor the activity of distant brain regions in freely behaving animals. During social behavior, we recorded the spike timing of multiple single units in cerebellar right Crus I (RCrus I) Purkinje cells (PCs) or dentate nucleus (DN) neurons while synchronously imaging calcium transients in contralateral ACC neurons. We found that during social interactions a significant subpopulation of cerebellar PCs were robustly inhibited, while most modulated neurons in the DN were activated, and their activity was correlated with positively modulated ACC neurons. These distinctions largely disappeared when only non-social epochs were analyzed suggesting that cerebellar-cortical interactions were behaviorally specific. Our work provides new insights into the complexity of cerebellar activation and co-modulation of the ACC during social behavior and a valuable open-source tool for simultaneous, multimodal recordings in freely behaving mice.

<https://elifesciences.org/reviewed-preprints/88439>

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**AVANI KOPARKAR et al – Lesions in a songbird vocal circuit increase variability in song syntax**

Complex motor skills like speech and dance are composed of ordered sequences of simpler elements, but the neuronal basis for syntactic ordering of individual actions into sequences is poorly understood. Birdsong is a learned vocal behavior composed of syntactically ordered sequences of individual syllables. Activity in song premotor nucleus HVC (proper name) has been linked to the control of syllable sequencing, but sequencing may also be affected by its recurrent inputs. We here test the contribution of one of HVC's inputs, mMAN (medial magnocellular nucleus of the anterior nidopallium), to the variable songs of adult male Bengalese finches (*Lonchura striata domestica*). The syntax of Bengalese song includes several patterns: 1) chunks, where syllables follow stereotypical order 2) branch points, where a given syllable can be followed by two or more different syllables in a probabilistic manner and 3) repeat phrases, where an individual syllable is repeated a variable number of times. We found that after bilateral lesions of mMAN, the acoustic structure of syllables remained largely intact, but sequencing became more variable for each of these patterns, seen by 'breaks' in previously stereotyped chunks, increased uncertainty at branch points and increased variability of repeat numbers. This increase in sequencing variability highlights the potential importance of regions projecting to HVC in the ordering of vocal elements. Previous studies on zebra finches found little effect of mMAN lesions on their relatively stereotyped adult song. In contrast, our results suggest that mMAN contributes to sequencing the variable songs of Bengalese finches and highlight the utility of species with more complex song syntax in investigating neuronal control of ordered motor sequences.

<https://elifesciences.org/reviewed-preprints/93272>

**TOMMASO GHILARDI et al – Early roots of information-seeking: Infants predict and generalize the value of information**

Humans face the challenge of making sense of a complex world. Learning where to find information is crucial to filter through the abundance of stimuli, distinguish relevant from irrelevant sources, and optimize our learning. Here, we examined the developmental roots of information-seeking by testing whether 8-month-old infants can predict where to find information. We presented infants with visual cues indicating whether they will later receive information about the location of a rewarding stimulus. We analyzed the dynamics of pupil dilation when the cues were presented, but before the actual information was delivered. By combining additive Bayesian models with reinforcement learning, we show that infants learn to successfully predict what cues have a greater informational value and that they generalize these predictions to novel cues that share the same perceptual features. These results reveal the fundamental learning processes that support information-seeking from early in life.

<https://elifesciences.org/reviewed-preprints/92388>

**VIKTOR KEWENIG, GABRIELLA VIGLIOCCO & JEREMY I SKIPPER – When Abstract Becomes Concrete: Naturalistic Encoding of Concepts in the Brain**

Language is acquired and processed in complex and dynamic naturalistic contexts, involving simultaneous processing of connected speech, faces, bodies, objects, etc. How words and their associated concepts are encoded in the brain during real-world processing is still unknown. Here, the representational structure of concrete and abstract concepts was investigated during movie watching to address the extent to which brain responses dynamically change depending on contextual information. First, across contexts, concrete and abstract concepts are shown to encode different experience-based information in separable sets of brain regions. However, these differences are reduced when multimodal context is considered. Specifically, the response profile of abstract words becomes more concrete-like when these are processed in visual scenes highly related to their meaning. Conversely, when the visual context is unrelated to a given concrete word, the activation pattern resembles more that of abstract conceptual processing. These results suggest that while concepts generally encode habitual experiences, the underlying neurobiological organisation is not fixed but depends dynamically on available contextual information.

<https://elifesciences.org/reviewed-preprints/91522>

**Evolutionary Anthropology****PAPERS****JESSE M. MARTIN et al – A lineage perspective on hominin taxonomy and evolution**

An uncritical reliance on the phylogenetic species concept has led paleoanthropologists to become increasingly typological in their delimitation of new species in the hominin fossil record. As a practical matter, this approach identifies species as diagnosably distinct groups of fossils that share a unique suite of morphological characters but, ontologically, a species is a metapopulation lineage segment that extends from initial divergence to eventual extinction or subsequent speciation. Working from first principles of species concept theory, it is clear that a reliance on morphological diagnosability will systematically overestimate species diversity in the fossil record; because morphology can evolve within a lineage segment, it follows that early and late populations of the same species can be diagnosably distinct from each other. We suggest that a combination of morphology and chronology provides a more robust test of the single-species null hypothesis than morphology alone.

<https://onlinelibrary.wiley.com/doi/full/10.1002/evan.22018>

**ILARIA PRETELLI et al – Child and adolescent foraging: New directions in evolutionary research**

Young children and adolescents in subsistence societies forage for a wide range of resources. They often target child-specific foods, they can be very successful foragers, and they share their produce widely within and outside of their nuclear family. At the same time, while foraging, they face risky situations and are exposed to diseases that can influence their immune development. However, children's foraging has largely been explained in light of their future (adult) behavior. Here, we reinterpret findings from human behavioral ecology, evolutionary medicine and cultural evolution to center foraging children's contributions to life history evolution, community resilience and immune development. We highlight the need to foreground immediate alongside delayed benefits and costs of foraging, including inclusive fitness benefits, when discussing children's food production from an evolutionary perspective. We conclude by recommending that researchers carefully consider children's social and ecological context, develop cross-cultural perspectives, and incorporate children's foraging into Indigenous sovereignty discourse.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/evan.22020>

**Frontiers in Cognition****PAPERS****ALICE MADDO PROVERBIO et al – The key role of the right posterior fusiform gyrus in music reading: an electrical neuroimaging study on 90 readers**

In this study, we employed a combined electromagnetic recording technique, i.e., electroencephalogram (EEG)/event-related potentials (ERPs) plus standardized weighted low-resolution electromagnetic tomography (swLORETA), to investigate the neural mechanism subserving the orthographic processing of symbols in language and music. While much is known about word processing, the current literature remains inconclusive regarding music reading, as its mechanisms appear to be left lateralized in some cases (as suggested by music-alexia clinical case reports) and either right-sided or bilateral in others, depending on the study and the methodology used.

In this study, 90 right-handed participants with varying musical abilities and sexes performed an attentional selection task that involved the recognition of target letters and musical notes, while their EEG signals were recorded from 128 sites. The occipito/temporal N170 component of ERPs (170–210 ms) was found strictly left-sided during letter selection and bilateral (with a right-hemispheric tendency) during note selection. Source reconstruction data indicated the preponderant engagement of the right posterior fusiform gyrus (BA19) for processing musical notes. Also involved were other brain regions belonging to the word reading circuit, including the left-sided visual word form area (VWFA) and frontal eye-fields (FEFs). This finding provides an explanation for the infrequent appearance of musical alexia cases (previously observed only in patients with left hemispheric lesions). It also suggests how musical literacy could be a rehabilitative and preventive factor for dyslexia, by promoting neuroplasticity and bilaterality in the reading areas.

<https://www.frontiersin.org/articles/10.3389/fcogn.2024.1323220/full>

**Frontiers in Language Sciences****PAPERS****ANTONIO BENÍTEZ-BURRACO, SIHAN CHEN & DAVID GIL – The absence of a trade-off between morphological and syntactic complexity**

The hypothesis that all languages are equally complex often invokes a trade-off principle, according to which if a language is more complex in one particular domain, it will be simpler in another different domain. In this paper, we use data from WALS to test the existence of a trade-off between two specific domains: morphology and syntax. Contrary to widespread views, we did not find a negative correlation between these two language domains, but in fact a positive correlation. At the same time, this positive correlation seems to be driven by some language families, and it disappears when one considers purely morphological and purely syntactic features only. We discuss these findings in relation to ongoing research about language complexity, and in particular, the effects of factors external to language on linguistic structure.

<https://www.frontiersin.org/articles/10.3389/flang.2024.1340493/full>

**Frontiers in Psychology****PAPERS****JOSEPH JORDANIA – Music as aposematic signal: predator defense strategies in early human evolution**

The article draws attention to a neglected key element of human evolutionary history—the defense strategies of hominins and early humans against predators. Possible reasons for this neglect are discussed, and the historical development of this field is outlined. Many human morphological and behavioral characteristics—musicality, sense of rhythm, use of dissonances, entrainment, bipedalism, long head hair, long legs, strong body odor, armpit hair, traditions of body painting and cannibalism—are explained as predator avoidance tactics of an aposematic (warning display) defense strategy. The article argues that the origins of human musical faculties should be studied in the wider context of an early, multimodal human defense strategy from predators.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1271854/full>



**BAS VAN BOEKHOLT, RAY WILKINSON & SIMONE PIKA – Bodies at play: the role of intercorporeality and bodily affordances in coordinating social play in chimpanzees in the wild**

The comparative approach is a crucial method to gain a better understanding of the behavior of living human and nonhuman animals to then draw informed inferences about the behavior of extinct ancestors. One focus has been on disentangling the puzzle of language evolution. Traditionally, studies have predominantly focused on intentionally produced signals in communicative interactions. However, in collaborative and highly dynamic interactions such as play, underlying intentionality is difficult to assess and often interactions are negotiated via body movements rather than signals. This “lack” of signals has led to this dynamic context being widely ignored in comparative studies. The aim of this paper is threefold: First, we will show how comparative research into communication can benefit from taking the intentionality-agnostic standpoint used in conversation analysis. Second, we will introduce the concepts of ‘intercorporeality’ and ‘bodily affordance’, and show how they can be applied to the analysis of communicative interactions of nonhuman animals. Third, we will use these concepts to investigate how chimpanzees (*Pan troglodytes*) initiate, end, and maintain ‘contact social play’. Our results showed that bodily affordances are able to capture elements of interactions that more traditional approaches failed to describe.

Participants made use of bodily affordances to achieve coordinated engagement in contact social play. Additionally, these interactions could display a sequential organization by which one ‘move’ by a chimpanzee was responded to with an aligning ‘move’, which allowed for the co-construction of the activity underway. Overall, the present approach innovates on three fronts: First, it allows for the analysis of interactions that are often ignored because they do not fulfil criteria of intentionality, and/or consist of purely body movements. Second, adopting concepts from research on human interaction enables a better comparison of communicative interactions in other animal species without a too narrow focus on intentional signaling only. Third, adopting a stance from interaction research that highlights how practical action can also be communicative, our results show that chimpanzees can communicate through their embodied actions as well as through signaling. With this first step, we hope to inspire new research into dynamic day-to-day interactions involving both “traditional” signals and embodied actions, which, in turn, can provide insights into evolutionary precursors of human language.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1206497/full>

**KAZUKI SEKINE & ASLI ÖZYÜREK – Children benefit from gestures to understand degraded speech but to a lesser extent than adults**

The present study investigated to what extent children, compared to adults, benefit from gestures to disambiguate degraded speech by manipulating speech signals and manual modality. Dutch-speaking adults (N = 20) and 6- and 7-year-old children (N = 15) were presented with a series of video clips in which an actor produced a Dutch action verb with or without an accompanying iconic gesture. Participants were then asked to repeat what they had heard. The speech signal was either clear or altered into 4- or 8-band noise-vocoded speech. Children had more difficulty than adults in disambiguating degraded speech in the speech-only condition. However, when presented with both speech and gestures, children reached a comparable level of accuracy to that of adults in the degraded-speech-only condition. Furthermore, for adults, the enhancement of gestures was greater in the 4-band condition than in the 8-band condition, whereas children showed the opposite pattern. Gestures help children to disambiguate degraded speech, but children need more phonological information than adults to benefit from use of gestures. Children’s multimodal language integration needs to further develop to adapt flexibly to challenging situations such as degraded speech, as tested in our study, or instances where speech is heard with environmental noise or through a face mask.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1305562/full>

**iScience****PAPERS****YUNMAN XIA et al – Development of Sensorimotor-Visual Connectome Gradient at Birth Predicts Neurocognitive Outcomes at 2 Years of Age**

Functional connectome gradients represent fundamental organizing principles of the brain. Here, we report the development of the connectome gradients in preterm and term babies aged 31-42 postmenstrual weeks using task-free functional MRI, and its association with postnatal cognitive growth. We show that the principal sensorimotor-to-visual gradient present during the late preterm period and continuously evolves towards a term-like pattern. The global measurements of this gradient, characterized by explanation ratio, gradient range, and gradient variation, increased with age ( $P < 0.05$ , corrected). Focal gradient development mainly occurs in the sensorimotor, lateral and medial parietal regions, and visual regions ( $P < 0.05$ , corrected). The connectome gradient at birth predicts cognitive and language outcomes at 2-y follow-up ( $P < 0.005$ ). These results are replicated using an independent dataset from the Developing Human Connectome Project. Our findings highlight early emergent rules of brain connectome gradient and their implications in later cognitive growth.

[https://www.cell.com/iscience/fulltext/S2589-0042\(24\)00202-5](https://www.cell.com/iscience/fulltext/S2589-0042(24)00202-5)

**JULIA MÖRCHEN et al with CAROLINE SCHUPPLI – Orangutan males make increased use of social learning opportunities, when resource availability is high**

Humans’ colonization of diverse habitats relied on our ancestors’ abilities to innovate and share innovations with others. While ecological impacts on innovations are well studied, their effect on social learning remains poorly understood. We

examined how food availability affects social learning in migrant orangutan unflanged males, who may learn from local orangutans through peering (i.e., observational social learning). We analysed 1384 dyadic associations, including 360 peering events, among 46 wild Sumatran orangutan and 25 Bornean orangutan males, collected over 18 years. Migrants' peering rates significantly increased with higher food availability and time spent in proximity to others. Furthermore, migrants in the more sociable Sumatran population exhibited significantly higher peering rates compared to the Borneans', suggesting intrinsic and/or developmental effects of food availability on social learning. These findings emphasize the importance of investigating ecological effects on social learning on the immediate, developmental, and intrinsic levels for our understanding of cultural evolution.

[https://www.cell.com/iscience/fulltext/S2589-0042\(24\)00161-5](https://www.cell.com/iscience/fulltext/S2589-0042(24)00161-5)

### **CLEANTHE SPANAKI et al – Glutamate-specific Gene Linked to Human Brain Evolution Enhances Synaptic Plasticity and Cognitive Processes**

The human brain is characterized by upregulation of synaptic, mainly glutamatergic, transmission, but its evolutionary origin(s) remain elusive. Here we approached this fundamental question by studying mice transgenic (Tg) for GLUD2, a human gene involved in glutamate metabolism that emerged in the hominoid and evolved concomitantly with brain expansion. We demonstrate that Tg mice express the human enzyme in hippocampal astrocytes and CA1-CA3 pyramidal neurons. LTP, evoked by theta-burst stimulation, is markedly enhanced in the CA3-CA1 synapses of Tg mice, with patch-clamp recordings from CA1 pyramidal neurons revealing increased sNMDA currents. LTP enhancement is blocked by D-lactate, implying that GLUD2 potentiates L-lactate-mediated astrocyte-neuron interaction. Dendritic spine density and synaptogenesis are increased in the hippocampus of Tg mice, which exhibit enhanced responses to sensory stimuli and improved performance on complex memory tasks. Hence, GLUD2 likely contributed to human brain evolution by enhancing synaptic plasticity and metabolic processes central to cognitive functions.

[https://www.cell.com/iscience/fulltext/S2589-0042\(24\)00042-7](https://www.cell.com/iscience/fulltext/S2589-0042(24)00042-7)

## Nature

### NEWS

#### **Science's fake-paper problem: high-profile effort will tackle paper mills**

Poor-quality studies are polluting the literature — a group will study the businesses that produce them to stem the flow of bogus research.

<https://www.nature.com/articles/d41586-024-00159-9>

#### **The consciousness wars: can scientists ever agree on how the mind works?**

There are dozens of theories of how the brain produces conscious experience, and a new type of study is testing some of them head-to-head.

<https://www.nature.com/articles/d41586-024-00107-7>

## Nature Communications

### PAPERS

#### **JAN WEBER et al – Ramping dynamics and theta oscillations reflect dissociable signatures during rule-guided human behavior**

Contextual cues and prior evidence guide human goal-directed behavior. The neurophysiological mechanisms that implement contextual priors to guide subsequent actions in the human brain remain unclear. Using intracranial electroencephalography (iEEG), we demonstrate that increasing uncertainty introduces a shift from a purely oscillatory to a mixed processing regime with an additional ramping component. Oscillatory and ramping dynamics reflect dissociable signatures, which likely differentially contribute to the encoding and transfer of different cognitive variables in a cue-guided motor task. The results support the idea that prefrontal activity encodes rules and ensuing actions in distinct coding subspaces, while theta oscillations synchronize the prefrontal-motor network, possibly to guide action execution. Collectively, our results reveal how two key features of large-scale neural population activity, namely continuous ramping dynamics and oscillatory synchrony, jointly support rule-guided human behavior.

<https://www.nature.com/articles/s41467-023-44571-7>

## Nature Communications Biology

### PAPERS

#### **SHOVONLAL ROY, ÅKE BRÄNNSTRÖM & ULF DIECKMANN – Ecological determinants of Cope's rule and its inverse**

Cope's rule posits that evolution gradually increases the body size in lineages. Over the last decades, two schools of thought have fueled a debate on the applicability of Cope's rule by reporting empirical evidence, respectively, for and against Cope's rule. The apparent contradictions thus documented highlight the need for a comprehensive process-based synthesis through which both positions of this debate can be understood and reconciled. Here, we use a process-based community-evolution model to investigate the eco-evolutionary emergence of Cope's rule. We report three characteristic macroevolutionary

patterns, of which only two are consistent with Cope's rule. First, we find that Cope's rule applies when species interactions solely depend on relative differences in body size and the risk of lineage extinction is low. Second, in environments with higher risk of lineage extinction, the recurrent evolutionary elimination of top predators induces cyclic evolution toward larger body sizes, according to a macroevolutionary pattern we call the recurrent Cope's rule. Third, when interactions between species are determined not only by their body sizes but also by their ecological niches, the recurrent Cope's rule may get inverted, leading to cyclic evolution toward smaller body sizes. This recurrent inverse Cope's rule is characterized by highly dynamic community evolution, involving the diversification of species with large body sizes and the extinction of species with small body sizes. To our knowledge, these results provide the first theoretical foundation for reconciling the contrasting empirical evidence reported on body-size evolution.

<https://www.nature.com/articles/s42003-023-05375-z>

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## Nature Ecology & Evolution

### ARTICLES

#### **CHRISTOPHER J. BAE – Modern humans in Northeast Asia**

A multidisciplinary study of the Shiyu archaeological site in northern China reveals a complex human behavioural record that currently is the oldest of its kind in Northeast Asia and provides insight into the nature of the northward dispersal of modern humans across Asia.

<https://www.nature.com/articles/s41559-023-02316-1>

### PAPERS

#### **SHI-XIA YANG et al with FRANCESCO D'ERRICO & MICHAEL PETRAGLIA – Initial Upper Palaeolithic material culture by 45,000 years ago at Shiyu in northern China**

The geographic expansion of *Homo sapiens* populations into southeastern Europe occurred by ~47,000 years ago (~47 ka), marked by Initial Upper Palaeolithic (IUP) technology. *H. sapiens* was present in western Siberia by ~45 ka, and IUP industries indicate early entries by ~50 ka in the Russian Altai and 46–45 ka in northern Mongolia. *H. sapiens* was in northeastern Asia by ~40 ka, with a single IUP site in China dating to 43–41 ka. Here we describe an IUP assemblage from Shiyu in northern China, dating to ~45 ka. Shiyu contains a stone tool assemblage produced by Levallois and Volumetric Blade Reduction methods, the long-distance transfer of obsidian from sources in China and the Russian Far East (800–1,000 km away), increased hunting skills denoted by the selective culling of adult equids and the recovery of tanged and hafted projectile points with evidence of impact fractures, and the presence of a worked bone tool and a shaped graphite disc. Shiyu exhibits a set of advanced cultural behaviours, and together with the recovery of a now-lost human cranial bone, the record supports an expansion of *H. sapiens* into eastern Asia by about 45 ka.

<https://www.nature.com/articles/s41559-023-02294-4>

#### **NICHOLA A. STRANDBERG et al – Floristic homogenization of South Pacific Islands commenced with human arrival**

The increasing similarity of plant species composition among distinct areas is leading to the homogenization of ecosystems globally. Human actions such as ecosystem modification, the introduction of non-native plant species and the extinction or extirpation of endemic and native plant species are considered the main drivers of this trend. However, little is known about when floristic homogenization began or about pre-human patterns of floristic similarity. Here we investigate vegetation trends during the past 5,000 years across the tropical, sub-tropical and warm temperate South Pacific using fossil pollen records from 15 sites on 13 islands within the biogeographical realm of Oceania. The site comparisons show that floristic homogenization has increased over the past 5,000 years. Pairwise Bray–Curtis similarity results also show that when two islands were settled by people in a given time interval, their floristic similarity is greater than when one or neither of the islands were settled. Importantly, higher elevation sites, which are less likely to have experienced human impacts, tended to show less floristic homogenization. While biotic homogenization is often referred to as a contemporary issue, we have identified a much earlier trend, likely driven by human colonization of the islands and subsequent impacts.

<https://www.nature.com/articles/s41559-023-02306-3>

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## Nature Human Behaviour

### PAPERS

#### **ELEANOR SPENS & NEIL BURGESS – A generative model of memory construction and consolidation**

Episodic memories are (re)constructed, share neural substrates with imagination, combine unique features with schema-based predictions and show schema-based distortions that increase with consolidation. Here we present a computational model in which hippocampal replay (from an autoassociative network) trains generative models (variational autoencoders) to (re)create sensory experiences from latent variable representations in entorhinal, medial prefrontal and anterolateral temporal cortices via the hippocampal formation. Simulations show effects of memory age and hippocampal lesions in agreement with previous models, but also provide mechanisms for semantic memory, imagination, episodic future thinking, relational inference and schema-based distortions including boundary extension. The model explains how unique sensory and predictable conceptual elements of memories are stored and reconstructed by efficiently combining both hippocampal

and neocortical systems, optimizing the use of limited hippocampal storage for new and unusual information. Overall, we believe hippocampal replay training generative models provides a comprehensive account of memory construction, imagination and consolidation.

<https://www.nature.com/articles/s41562-023-01799-z>

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## Nature Humanities & Social Sciences Communications

### PAPERS

#### **NISREEN N. AL-KHAWALDEH et al – Ideological representations of women in Jordanian folk proverbs from the perspective of cultural semiotics**

This study analyses the semiotics of proverbs by presenting the ideological portrayals of women in Jordanian folk proverbs. The content analysis of the proverbs shows that women are represented both positively and negatively, though they are preponderantly depicted negatively in the majority of the analysed proverbs. They are represented negatively as a symbol of feebleness, foolishness, disgrace, cunning, deception, jealousy and reproduction. Few are the proverbs that elevate the status of women, and if they do, it is on the condition that they are confined to particular restricted gender roles, such as mothers, sisters, wives and daughters providing kindness, help, motivation, and comfort to others. The findings uncover how socially dominant ideologies can influence the way power is practiced in the context of gender relations. They also show the immense significance of such proverbs as a social discourse that has been long used for perpetuating gendered roles and constructing and interpreting related realities, thus affecting social structures and relationships. The inferiority of women constitutes the basis of their assigned roles and responsibilities in various life domains. The proverbs have the ideological indexicals of underestimating women, showing their position in society and also reminding them of their roles.

<https://www.nature.com/articles/s41599-024-02635-z>

#### **LY THI PHUONG TRAN et al – Cultural schemas and folk-belief: an insight into the belief in worshipping the Mother Goddess in Vietnam**

Religious belief, as noted by scholars like Émile Durkheim (1858–1917), Max Weber (1864–1920), Sigmund Freud (1856–1939), and William James (1842–1910), reflects shared values, shapes human conduct, and provides spiritual strength. Furthermore, it is considered a template that expresses the basic spiritual needs and aspirations of human life, containing many cultural values and characteristics of the thinking of ethnic communities. Moreover, people perceive everything by schemas formed in memory. In this study, the authors chose the subject of the belief in worshipping the Mother Goddess—one of the most popular and ancient beliefs in Vietnam and inscribed by UNESCO as a Representative Intangible Cultural Heritage of Humanity in 2016. Employing a combination of quantitative and qualitative methods, including surveys, linguistic materials, and field research, the study explores how Vietnamese cultural beliefs shape perception, behavior, and lifestyle. Therefore, understanding and analyzing the characteristics of the beliefs in worshipping the Mother Goddess through the lens of Cultural Linguistics can present the actual spiritual experiences of Vietnamese people. From this unique perspective, the process of perceiving the world has meaning to the language and behavior of a community culture.

<https://www.nature.com/articles/s41599-024-02602-8>

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## Nature Reviews Psychology

### ARTICLES

#### **JANE ARISTIA – Neural evidence of word prediction**

In a conversation, speakers can comprehend their conversation partner seamlessly and even respond before the other person has finished a sentence. This fast comprehension process is enabled by language prediction mechanisms. Prediction stems from a notion that brains are not passive, but instead actively use stored information to predict possible upcoming input.

<https://www.nature.com/articles/s44159-024-00279-z>

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## Nature Scientific Reports

### PAPERS

#### **ASHLEY N. GILLIAM & ANGELA GUTCHESS – Influence of acculturation and cultural values on the self-reference effect**

Cultural milieu can influence the way information is processed and what strategies are employed to deal with ever-changing environments. This study assessed whether acculturation and cultural values of East Asians can affect memory, with a specific focus on the self-reference effect in Chinese international students. Participants encoded and retrieved adjectives, with some trials relating the words to the self (i.e., the self-referencing task), another person, or a control condition; participants also completed questionnaires assessing cultural adaptation and self-construal. Results did not show a relationship between acculturation orientation and self-construal and the magnitude of the self-reference effect in memory, defined as better memory for adjectives encoded related to the self compared to those related to close others, in this sample of Chinese international students. Future research should explore effects of acculturation over time, incorporating more heterogeneous samples and sensitive neural measures.

<https://www.nature.com/articles/s41598-023-46210-z>

**FEDERICA AMICI et al with KATJA LIEBAL – A longitudinal comparison of maternal behaviour in German urban humans (*Homo sapiens*) and captive chimpanzees (*Pan troglodytes*)**

Comparative perspectives are crucial in the study of human development, yet longitudinal comparisons of humans and other primates are still relatively uncommon. Here, we combined theoretical frameworks from cross-cultural and comparative psychology, to study maternal style in 10 mother–infant pairs of German urban humans (*Homo sapiens*) and 10 mother–infant pairs of captive chimpanzees (*Pan troglodytes*), during the first year of infants’ development. We conducted focal observations of different behaviours (i.e. nursing, carrying, body contact, touching, grooming, restraining, approaching, leaving, rejection, aggression, mutual gaze, object stimulation), during natural interactions. Analyses revealed a more distal maternal style in WEIRD humans than in captive chimpanzees, with different behaviours being generally more common in one of the two species throughout development. For other behaviours (i.e. nursing), developmental trajectories differed between WEIRD humans and captive chimpanzees, although differences generally decreased through infants’ development. Overall, our study confirms functional approaches as a valid tool for comparative longitudinal studies.

<https://www.nature.com/articles/s41598-024-51999-4>

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**Neuron****ARTICLES****CHRISTIAN KEYSERS & FRÉDÉRIC MICHON – Can mirror self-recognition in mice unpack the neural underpinnings of self-awareness?**

In this issue of *Neuron*, Yokose et al. show that mice groom a mark on their forehead when exposed to a mirror. Comparing this behavior with hominids’ helps carve self-awareness into its component parts and explore the neural mechanisms of its shared components.

[https://www.cell.com/neuron/fulltext/S0896-6273\(23\)00933-9](https://www.cell.com/neuron/fulltext/S0896-6273(23)00933-9)

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**PAPERS****JUN YOKOSE, WILLIAM D. MARKS & TAKASHI KITAMURA – Visuotactile integration facilitates mirror-induced self-directed behavior through activation of hippocampal neuronal ensembles in mice**

Remembering the visual features of oneself is critical for self-recognition. However, the neural mechanisms of how the visual self-image is developed remain unknown because of the limited availability of behavioral paradigms in experimental animals. Here, we demonstrate a mirror-induced self-directed behavior (MSB) in mice, resembling visual self-recognition. Mice displayed increased mark-directed grooming to remove ink placed on their heads when an ink-induced visual-tactile stimulus contingency occurred. MSB required mirror habituation and social experience. The chemogenetic inhibition of dorsal or ventral hippocampal CA1 (vCA1) neurons attenuated MSB. Especially, a subset of vCA1 neurons activated during the mirror exposure was significantly reactivated during re-exposure to the mirror and was necessary for MSB. The self-responding vCA1 neurons were also reactivated when mice were exposed to a conspecific of the same strain. These results suggest that visual self-image may be developed through social experience and mirror habituation and stored in a subset of vCA1 neurons.

<https://www.sciencedirect.com/science/article/pii/S0896627323008036>

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**New Scientist****NEWS****Leave no stone unturned in search for an explanation of consciousness**

A solid theory of human consciousness eludes us, which is why seemingly fringe ideas such as those that rely on quantum effects in the brain are still worth pursuing.

<https://www.newscientist.com/article/mg26134743-100-leave-no-stone-untuned-in-search-for-an-explanation-of-consciousness/>

**Ancient cities discovered in the Amazon are the largest yet found**

A mysterious civilisation built a network of cities and roads in the Amazon between 3000 and 1500 years ago, and then disappeared.

<https://www.newscientist.com/article/2411924-ancient-cities-discovered-in-the-amazon-are-the-largest-yet-found/>

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**ARTICLES****GEORGE MUSSER – The intriguing experiments forcing a rethink on quantum consciousness**

With anaesthetics and brain organoids, we are finally testing the idea that quantum effects explain consciousness – and the early results suggest this long-derided idea may have been misconstrued.

<https://www.newscientist.com/article/mg26134740-800-the-intriguing-experiments-forcing-a-rethink-on-quantum-consciousness/>

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PeerJ

## PAPERS

**MASHAIL N. ALKHOMSAN, MALAK BASLYMAN & MOHAMMAD ALSHAYEB – Eliciting and modeling emotional requirements: a systematic mapping review**

Considering users' emotions plays an extremely crucial role in the adoption and acceptance of recent technology by the end user. User emotions can also help to identify unknown requirements, saving resources that would otherwise be wasted if discovered later. However, eliciting and modeling users' emotional requirements in software engineering is still an open research area.

This systematic mapping review analyzes emotional requirements (ER) practices in software engineering from two perspectives: elicitation and modeling. For elicitation techniques, we investigate the techniques, evaluation methods, limitations, and application domains. For modeling techniques, we examine the modeling languages, analyses, limitations, and domains.

We systematically reviewed studies on emotional requirements engineering published between 1993–2023 and identified 46 relevant primary studies.

A total of 34 studies investigated ER elicitation techniques, five examined modeling techniques, and seven covered both. Illustrative case studies were the main evaluation method for proposed elicitation techniques. Identified limitations include time consumption and extensive human involvement. The dominant application domains were healthcare and well-being, and game development.

This review summarizes the current landscape of emotional requirements research, highlighting key elicitation and modeling techniques, evaluations, limitations, and domains. Further research can build on these findings to advance emotional requirements practices in software engineering. Future research may address (1) managing conflicting emotional requirements across users, (2) evaluating the value and impact of considering emotional requirements during the development and (3) Modeling and analyzing emotional requirements in relation to other requirements.

<https://peerj.com/articles/cs-1782/>

## Philosophical Transactions of the Royal Society B

## PAPERS

**KRISTIN ANDREWS, SIMON FITZPATRICK & EVAN WESTRA – Human and nonhuman norms: a dimensional framework**

Human communities teem with a variety of social norms. In order to change unjust and harmful social norms, it is crucial to identify the psychological processes that give rise to them. Most researchers take it for granted that social norms are uniquely human. By contrast, we approach this matter from a comparative perspective, leveraging recent research on animal social behaviour. While there is currently only suggestive evidence for norms in nonhuman communities, we argue that human social norms are likely produced by a wide range of mechanisms, many of which we share with nonhuman animals. Approaching this variability from a comparative perspective can help norm researchers expand and reframe the range of hypotheses they test when attempting to understand the causes of socially normative behaviours in humans. First, we diagnose some of the theoretical obstacles to developing a comparative science of social norms, and offer a few basic constructs and distinctions to help norm researchers overcome these obstacles. Then we develop a six-dimensional model of the psychological and social factors that contribute to variability in both human and potential nonhuman norms.

<https://royalsocietypublishing.org/doi/full/10.1098/rstb.2023.0026>

**SERGEY GAVRILETS, DENIS TVERSKOI & ANGEL SÁNCHEZ – Modelling social norms: an integration of the norm-utility approach with beliefs dynamics**

We review theoretical approaches for modelling the origin, persistence and change of social norms. The most comprehensive models describe the coevolution of behaviours, personal, descriptive and injunctive norms while considering influences of various authorities and accounting for cognitive processes and between-individual differences. Models show that social norms can improve individual and group well-being. Under some conditions though, deleterious norms can persist in the population through conformity, preference falsification and pluralistic ignorance. Polarization in behaviour and beliefs can be maintained, even when societal advantages of particular behaviours or belief systems over alternatives are clear. Attempts to change social norms can backfire through cognitive processes including cognitive dissonance and psychological reactance. Under some conditions social norms can change rapidly via tipping point dynamics. Norms can be highly susceptible to manipulation, and network structure influences their propagation. Future models should incorporate network structure more thoroughly, explicitly study online norms, consider cultural variations and be applied to real-world processes.

<https://royalsocietypublishing.org/doi/full/10.1098/rstb.2023.0027>

**JINYI KUANG & CRISTINA BICCHIERI – Language matters: how normative expressions shape norm perception and affect norm compliance**

Previous studies have used various normative expressions such as 'should', 'appropriate' and 'approved' interchangeably to communicate injunctions and social norms. However, little is known about whether people's interpretations of normative language differ and whether behavioural responses might vary across them. In two studies (total n = 2903), we find that

compliance is sensitive to the types of normative expressions and how they are used. Specifically, people are more likely to comply when the message is framed as an injunction rather than as what most people consider good behaviour (social norm framing). Behaviour is influenced by the type of normative expression when the norm is weak (donation to charities), not so when the norm is strong (reciprocity). Content analysis of free responses reveals individual differences in the interpretation of social norm messages, and heterogeneous motives for compliance. Messages in the social norm framing condition are perceived to be vague and uninformative, undermining their effectiveness. These results suggest that careful choice of normative expressions is in order when using messages to elicit compliance, especially when the underlying norms are weak.  
<https://royalsocietypublishing.org/doi/full/10.1098/rstb.2023.0037>

### **ANA MACANOVIC et al – Signals of belonging: emergence of signalling norms as facilitators of trust and parochial cooperation**

Mechanisms of social control reinforce norms that appear harmful or wasteful, such as mutilation practises or extensive body tattoos. We suggest such norms arise to serve as signals that distinguish between ingroup 'friends' and outgroup 'foes', facilitating parochial cooperation. Combining insights from research on signalling and parochial cooperation, we incorporate a trust game with signalling in an agent-based model to study the dynamics of signalling norm emergence in groups with conflicting interests. Our results show that costly signalling norms emerge from random acts of signalling in minority groups that benefit most from parochial cooperation. Majority groups are less likely to develop costly signalling norms. Yet, norms that prescribe sending costless group identity signals can easily emerge in groups of all sizes—albeit, at times, at the expense of minority group members. Further, the dynamics of signalling norm emergence differ across signal costs, relative group sizes, and levels of ingroup assortment. Our findings provide theoretical insights into norm evolution in contexts where groups develop identity markers in response to environmental challenges that put their interests at odds with the interests of other groups. Such contexts arise in zones of ethnic conflict or during contestations of existing power relations.  
<https://royalsocietypublishing.org/doi/full/10.1098/rstb.2023.0029>

### **SARA LOWES & NATHAN NUNN – The slave trade and the origins of matrilineal kinship**

Matrilineal kinship systems—where descent is traced through mothers only—are present all over the world but are most concentrated in sub-Saharan Africa. We explore the relationship between exposure to Africa's external slave trades, during which millions of people were shipped from the continent during a 400-year period, and the evolution of matrilineal kinship. Scholars have hypothesized that matrilineal kinship, which is well-suited to incorporating new members, maintaining lineage continuity and insulating children from the removal of parents (particularly fathers), was an adaptive response to the slave trades. Motivated by this, we test for a connection between the slave trades and matrilineal kinship by combining historical data on an ethnic group's exposure to the slave trades and the presence of matrilineal kinship following the end of the trades. We find that the slave trades are positively associated with the subsequent presence of matrilineal kinship. The result is robust to a variety of measures of exposure to the slave trades, the inclusion of additional covariates, sensitivity analyses that remove outliers, and an instrumental variables estimator that uses a group's historical distance from the coast as an instrument. We also find evidence of a complementarity between polygyny and matrilineal kinship, which were both social responses to the disruption of the trades.

*{Really? This, like Chomsky in the Shard elevator, seems wrong on so many levels. For instance, were polygyny and matrilineal kinship really just de novo responses to the slave trade, or were they continuations of much older social norms? This paper is going to get picked to pieces out there in the wild.}*

<https://royalsocietypublishing.org/doi/full/10.1098/rstb.2023.0032>

### **QIAO-QIAO HE et al – Jeans and language: kin networks and reproductive success are associated with the adoption of outgroup norms**

Traditional norms of human societies in rural China may have changed owing to population expansion, rapid development of the tourism economy and globalization since the 1990s; people from different ethnic groups might adopt cultural traits from outside their group or lose their own culture at different rates. Human behavioural ecology can help to explain adoption of outgroup cultural values. We compared the adoption of four cultural values, specifically speaking outgroup languages/mother tongue and wearing jeans, in two co-residing ethnic groups, the Mosuo and Han. Both groups are learning outgroup traits, including each other's languages through contact in economic activities, education and kin networks, but only the Mosuo are starting to lose their own language. Males are more likely to adopt outgroup values than females in both groups. Females of the two groups are no different in speaking Mandarin and wearing jeans, whereas males do differ, with Mosuo males being keener to adopt them than Han males. The reason might be that Mosuo men experience more reproductive competition over mates, as Mosuo men have larger reproductive skew than others. Moreover, Mosuo men but not others gain fitness benefits from the adoption of Mandarin (they start reproducing earlier than non-speakers).

<https://royalsocietypublishing.org/doi/full/10.1098/rstb.2023.0031>

**NOBURO SAJI, CHUNZI HONG & CHONG WANG – Learning semantic categories of L2 verbs: The case of cutting and breaking verbs**

To attain native-like proficiency in second-language word usage, learners have to discover intricate semantic categories in the target language. We investigated the factors influencing the development of two aspects of second-language learners' semantic categories: the category center and category boundary of word meanings. In the experiment, second-language learners of Japanese, whose first language is Mandarin, were asked to produce the best verb for 28 videos depicting various cutting and breaking events. Descriptive analyses were conducted to compare the verb patterns used by second-language learners with those of native speakers. The second-language learners' verb use pattern suggested their struggle in delineating the semantic ranges of breaking verbs in a native-like manner. Model analyses further revealed that different factors contribute to learning two different aspects of word meanings. The learning category center of word meaning depended on the similarity between the lexical domains in the first and second languages. On the contrary, the success of learning the semantic boundaries of verbs required a large input frequency and smaller semantic coverage, and smaller category ambiguity. The results suggest that constructing a semantic domain in the second language should be evaluated from at least two different aspects of semantic representation.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0296628>

**JULIANE KAMINSKI et al with KATJA LIEBAL – Understanding others' preferences: A comparison across primate species and human societies**

We investigated children's and non-human great apes' ability to anticipate others' choices from their evident food preferences—regardless of whether these preferences deviate or align with one's own. We assessed children from three culturally-diverse societies (Namibia, Germany, and Samoa; N = 71; age range = 5–11) and four non-human great ape species (chimpanzees (*Pan troglodytes*), bonobos (*Pan paniscus*), gorillas (*Gorilla gorilla*), and orangutans (*Pongo abelii*); N = 25; age range = 7–29) regarding their choices in a dyadic food-retrieval task. Across conditions, participants' preferences were either aligned (same preference condition) or opposed (opposite preference condition) to those of their competitors. Children across societies altered their choices based on their competitor's preferences, indicating a cross-culturally recurrent capacity to anticipate others' choices relying on preferences-based inferences. In contrast to human children, all non-human great apes chose according to their own preferences but independent of those of their competitors. In sum, these results suggest that the tendency to anticipate others' choices based on their food preferences is cross-culturally robust and, among the great apes, most likely specific to humans.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0295221>

**AUSTIN LEEDS et al – Group structure and individual relationships of sanctuary-living Grauer's gorillas (*Gorilla beringei graueri*)**

The study of individual social relationships and group structure provides insights into a species' natural history and can inform management decisions for animals living in human care. The Gorilla Rehabilitation and Conservation Education (GRACE) center provides permanent sanctuary for a group of 14 Grauer's gorillas (*Gorilla beringei graueri*), a critically endangered and poorly studied subspecies of the genus gorilla, in the Democratic Republic of the Congo. We monitored the association patterns of the gorillas at GRACE over eight months and here describe their individual relationships and group structure via multiple social network statistics. The group was highly connected but associations between individuals were weak on average. Social network metrics describe that an adult female was the most gregarious and socially central individual within the group. In fact, adult females were the most gregarious and socially central on average. Group level association patterns were significantly correlated over the study period and across observation types, suggesting the group was socially stable during the eight month study period. The data collected in this study were done so by GRACE caregivers as part of their daily husbandry routine and provided important insights into this group's behavior, ultimately informing on their care, welfare and future release considerations. The methodological approaches implemented here are easily scalable to any primate sanctuary or care facility seeking to use data to inform husbandry and management procedures. Lastly, our study is the first social network analysis to be conducted on Grauer's gorillas and provides tentative insights into the behavior of this poorly studied subspecies. Though more research is needed to evaluate if the findings here are reflective of this subspecies' natural history or the idiosyncrasies of the group.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0295561>

**CASSANDRA VIETEN et al – Measures of empathy and compassion: A scoping review**

Evidence to date indicates that compassion and empathy are health-enhancing qualities. Research points to interventions and practices involving compassion and empathy being beneficial, as well as being salient outcomes of contemplative practices such as mindfulness. Advancing the science of compassion and empathy requires that we select measures best suited to evaluating effectiveness of training and answering research questions. The objective of this scoping review was to 1) determine what instruments are currently available for measuring empathy and compassion, 2) assess how and to what extent they have been validated, and 3) provide an online tool to assist researchers and program evaluators in selecting



appropriate measures for their settings and populations. A scoping review and broad evidence map were employed to systematically search and present an overview of the large and diverse body of literature pertaining to measuring compassion and empathy. A search string yielded 19,446 articles, and screening resulted in 559 measure development or validation articles reporting on 503 measures focusing on or containing subscales designed to measure empathy and/or compassion. For each measure, we identified the type of measure, construct being measured, in what context or population it was validated, response set, sample items, and how many different types of psychometrics had been assessed for that measure. We provide tables summarizing these data, as well as an open-source online interactive data visualization allowing viewers to search for measures of empathy and compassion, review their basic qualities, and access original citations containing more detail. Finally, we provide a rubric to help readers determine which measure(s) might best fit their context. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0297099>

## Royal Society Open Science

### PAPERS

#### **LAUREN C. WHITE et al – Female chimpanzees avoid inbreeding even in the presence of substantial bisexual philopatry**

Inbreeding (reproduction between relatives) often decreases the fitness of offspring and is thus expected to lead to the evolution of inbreeding avoidance strategies. Chimpanzees (*Pan troglodytes*) are expected to avoid inbreeding as they are long-lived, invest heavily in offspring and may encounter adult, opposite sex kin frequently, especially in populations where both males and females commonly remain in the group in which they were born (bisexual philopatry). However, it is unclear whether substantial bisexual philopatry has been a feature of chimpanzees' evolutionary history or whether it is a result of recent anthropogenic interference, as the only groups for which it has been documented are significantly impacted by human encroachment and experience notable rates of potentially unsustainable inbreeding. Here we use 14 years of observational data and a large genomic dataset of 256 481 loci sequenced from 459 individuals to document dispersal and inbreeding dynamics in an eastern chimpanzee (*P. t. schweinfurthii*) community with low levels of anthropogenic disturbance. We document the first case of substantial bisexual philopatry in a relatively undisturbed chimpanzee community and show that, despite an increased inbreeding risk incurred by females who do not disperse before reaching reproductive age, natal females were still able to avoid producing inbred offspring.

<https://royalsocietypublishing.org/doi/10.1098/rsos.230967>

#### **CONNOR M. HULTS et al with ELLIOTT R. SOBER – Still little evidence sex differences in spatial navigation are evolutionary adaptations**

A putative male advantage in wayfinding ability is the most widely documented sex difference in human cognition and has also been observed in other animals. The common interpretation, the sex-specific adaptation hypothesis, posits that this male advantage evolved as an adaptive response to sex differences in home range size. A previous study a decade ago tested this hypothesis by comparing sex differences in home range size and spatial ability among 11 species and found no relationship. However, the study was limited by the small sample size, the lack of species with a larger female home range and the lack of non-Western human data. The present study represents an update that addresses all of these limitations, including data from 10 more species and from human subsistence cultures. Consistent with the previous result, we found little evidence that sex differences in spatial navigation and home range size are related. We conclude that sex differences in spatial ability are more likely due to experiential factors and/or unselected biological side effects, rather than functional outcomes of natural selection.

<https://royalsocietypublishing.org/doi/10.1098/rsos.231532>

#### **ROSEMARY BLERSCH et al – What you have, not who you know: food-enhanced social capital and changes in social behavioural relationships in a non-human primate**

Social network position in non-human primates has far-reaching fitness consequences. Critically, social networks are both heterogeneous and dynamic, meaning an individual's current network position is likely to change due to both intrinsic and extrinsic factors. However, our understanding of the drivers of changes in social network position is largely confined to opportunistic studies. Experimental research on the consequences of in situ, controlled network perturbations is limited. Here we conducted a food-based experiment in rhesus macaques to assess whether allowing an individual the ability to provide high-quality food to her group changed her social behavioural relationships. We considered both her social network position across five behavioural networks, as well as her dominance and kin interactions. We found that gaining control over a preferential food resource had far-reaching social consequences. There was an increase in both submission and aggression centrality and changes in the socio-demographic characteristics of her agonistic interaction partners. Further, we found that her grooming balance shifted in her favour as she received more grooming than she gave. Together, these results provide a novel, preliminary insight into how in situ, experimental manipulations can modify social network position and point to broader network-level shifts in both social capital and social power.

<https://royalsocietypublishing.org/doi/10.1098/rsos.231460>

## Science

### ARTICLES

#### **FREDERIK JOELVING – Paper Trail**

In the latest twist of the publishing arms race, firms churning out fake papers have taken to bribing journal editors.

<https://www.science.org/content/article/paper-mills-bribing-editors-scholarly-journals-science-investigation-finds>

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## Science Advances

### CORRECTIONS

#### **H. HOLDEN THORP – Editor’s note and erratum for the Research Article: “Societies of strangers do not speak less complex languages” by Shcherbakova et al.**

On 16 August 2023, Science Advances published a Research Article “Societies of strangers do not speak less complex languages” by O. Shcherbakova et al. On 8 November 2023, an Editorial Expression of Concern alerted readers that the authors notified the journal about a problem with their analyses. The authors have corrected the paper as described in the Erratum. These changes have addressed concerns about the integrity of the paper therefore, Science Advances has removed the Editorial Expression of Concern. The journal has posted this notification in its place to indicate the editors’ confidence in the Research Article’s data and conclusions. We thank the authors for bringing these issues to our attention.

H. Holden Thorp, Editor-in-Chief, Science Advances

O. Shcherbakova, S. M. Michaelis, H. J. Haynie, S. Passmore, V. Gast, R. D. Gray, S. J. Greenhill, D. E. Blasi, H. Skirgård. Societies of strangers do not speak less complex languages. Science Advances 9:33 (2023).

In EAORC Bulletin 1,053.

H. Holden Thorp. Editorial expression of concern. Science Advances 9:45 (2023).

In EAORC Bulletin 1,065.

<https://www.science.org/doi/10.1126/sciadv.adn6113>

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## Trends in Cognitive Sciences

### PAPERS

#### **NICHOLAS BUTTRICK – Studying large language models as compression algorithms for human culture**

Large language models (LLMs) extract and reproduce the statistical regularities in their training data. Researchers can use these models to study the conceptual relationships encoded in this training data (i.e., the open internet), providing a remarkable opportunity to understand the cultural distinctions embedded within much of recorded human communication.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(24\)00001-9](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(24)00001-9)

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