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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, do 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, do let me know.

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

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### SCIENCE NEWS – Vast ring of deep shafts found near Stonehenge

The area around Stonehenge, packed with famous Neolithic sites, is one of the most well-studied archaeological regions in the world. Yet it still has new secrets to offer: A paper published yesterday in *Internet Archaeology* reports on the discovery of a vast circle of deep shafts dug more than 4500 years ago.

[https://www.sciencemag.org/news/2020/06/vast-ring-deep-shafts-found-near-stonehenge?utm\\_campaign=news\\_daily\\_2020-06-24](https://www.sciencemag.org/news/2020/06/vast-ring-deep-shafts-found-near-stonehenge?utm_campaign=news_daily_2020-06-24)

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### SCIENCE NEWS – Dolphins learn unusual hunting behavior from their friends

In the crystal clear waters of Shark Bay in Western Australia, scientists have noticed bottlenose dolphins engaging in an unusual behavior: They guide fish into the empty shells of giant snails, bring the shells to the surface, and then shake them vigorously to dislodge the prey into their open mouths—like a person polishing off a bag of popcorn. That extra effort, known as “shelling,” gets them a guaranteed meal.

[https://www.sciencemag.org/news/2020/06/dolphins-learn-unusual-hunting-behavior-their-friends?utm\\_campaign=news\\_daily\\_2020-06-25&et rid=17774313&et cid=3379645](https://www.sciencemag.org/news/2020/06/dolphins-learn-unusual-hunting-behavior-their-friends?utm_campaign=news_daily_2020-06-25&et rid=17774313&et cid=3379645)

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### BREAKING SCIENCE – Archaeologists Find Giant Ring of Shafts near Stonehenge

Archaeologists have discovered a 4,500-year-old ring of large ‘shafts’ around the great henge at Durrington Walls and the famous site at Woodhenge, just a few kilometers from Stonehenge, in southern Britain. The newly-discovered circle is over 2 km in diameter and has been carbon dated to 2500 BC.

[http://feedproxy.google.com/~r/BreakingScienceNews/~3/5EEfw2B32il/durrington-ring-08560.html?utm\\_source=feedburner&utm\\_medium=email](http://feedproxy.google.com/~r/BreakingScienceNews/~3/5EEfw2B32il/durrington-ring-08560.html?utm_source=feedburner&utm_medium=email)

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### BREAKING SCIENCE – Spectacular Maya Wall Paintings Discovered in Guatemala

An unparalleled set of Maya wall paintings, most probably from the 17th to 18th centuries CE, discovered in a local house in the Guatemalan city of San Gaspar Chajul (further referred to as Chajul) blends pre-Columbian with imported European elements, making them a unique example of Colonial art from Latin America.

[http://feedproxy.google.com/~r/BreakingScienceNews/~3/6tOhvw3kCk0/chajul-maya-wall-paintings-guatemala-08558.html?utm\\_source=feedburner&utm\\_medium=email](http://feedproxy.google.com/~r/BreakingScienceNews/~3/6tOhvw3kCk0/chajul-maya-wall-paintings-guatemala-08558.html?utm_source=feedburner&utm_medium=email)

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### SCIENCE DAILY – Does 'mommy brain' last? Study shows motherhood does not diminish attention

'Mommy brain' is a long-held perception that mothers are more forgetful and less attentive. A new study shows that mothers are equally as attentive, or more attentive than, non-mothers.

<https://www.sciencedaily.com/releases/2020/06/200623145352.htm>

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### SCIENCE DAILY – Massive prehistoric circle near Stonehenge

Archaeologists have discovered a major new prehistoric monument only a short distance away from Stonehenge. Fieldwork and analysis have revealed evidence for 20 or more massive, prehistoric shafts, measuring more than 10 metres in diameter and 5 metres deep. These shafts form a circle more than 2 kilometres in diameter and enclose an area greater than 3 square kilometres around the Durrington Walls henge, one of Britain's largest henge monuments, and the famous, smaller prehistoric circle at Woodhenge.

<https://www.sciencedaily.com/releases/2020/06/200622164652.htm>

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### SCIENCE DAILY – Dolphins learn foraging skills from peers

Dolphins can learn new skills from their fellow dolphins. New findings show that dolphins are not only capable of learning new ways to catch prey, but they are also motivated to learn from peers, not just from their mothers, the researchers say.

<https://www.sciencedaily.com/releases/2020/06/200625115929.htm>

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### SCIENCE DAILY – Variability in natural speech is challenging for the dyslexic brain

A new study brings neural-level evidence that the continuous variation in natural speech makes the discrimination of phonemes challenging for adults suffering from developmental reading-deficit dyslexia.

<https://www.sciencedaily.com/releases/2020/06/200625102522.htm>

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### SCIENCE DAILY – New study examines recursive thinking

A multi-institutional research team found the cognitive ability to represent recursive sequences occurs in humans and non-human primates across age, education, culture and species.

<https://www.sciencedaily.com/releases/2020/06/200626141418.htm>

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### SCIENCE DAILY – Computational model decodes speech by predicting it

UNIGE scientists developed a neuro-computer model which helps explain how the brain identifies syllables in natural speech. The model uses the equivalent of neuronal oscillations produced by brain activity to process the continuous sound flow of connected speech. The model functions according to a theory known as predictive coding, whereby the brain optimizes perception by constantly trying to predict the sensory signals based on candidate hypotheses (syllables in this model).

<https://www.sciencedaily.com/releases/2020/06/200626114808.htm>

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## NATURE BRIEFING – Circle of huge shafts found near Stonehenge

Archaeologists have discovered a 2-kilometre ring of prehistoric shafts about 3 kilometres from Stonehenge. There are at least 20 of the 4,500-year-old shafts, each more than 5 metres deep and 10 metres in diameter. The startling discovery, in one of the world's most studied archeological landscapes, comes thanks to modern techniques including ground-penetrating radar. They show "the capacity and desire of Neolithic communities to record their cosmological belief systems in ways, and at a scale, that we had never previously anticipated," says archaeologist Vincent Gaffney.

<https://nature.us17.list-manage.com/track/click?u=2c6057c528fdc6f73fa196d9d&id=56e7d6166a&e=1db4b9a19b>

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## ACADEMIA.EDU – The beginnings of European Upper-Paleolithic art

(2010), *North Atlantic Archaeology* 2, 1-18.

### OSCAR MORO ABADÍA & DIEGO GÁRATE MAIDAGÁN – The beginnings of European Upper-Paleolithic art: A critical review

Until recently, the beginnings of European Upper-Paleolithic Art had been explained by appealing to the model created by André Leroi-Gourhan in the 1960s. According to Leroi-Gourhan, art had evolved in a unilinear movement from simple to complex representations throughout the Paleolithic. Under the influence of this model, the origins of Paleolithic art had been traditionally associated with very simple, primitive forms. However, a number of recent developments and discoveries have put into question the supposed "simplicity" of the earliest Upper-Paleolithic representations. To begin, recent AMS dates from a number of Paleolithic caves (Cosquer, Cougnac, Aldène, Chauvet) indicate the existence of a very sophisticated parietal art since the beginnings of the Upper Paleolithic. Similarly, the discovery of new statuettes at Hohle Fels (Germany) seems to confirm that modern humans were able to manufacture refined portable figurines more than 30,000 years ago. Taking into account these and other developments, we review in this article the current evidence concerning the earliest forms of Paleolithic art in Europe.

[https://www.academia.edu/2143576/Moro\\_Abad%3%ADa\\_O\\_Garate\\_Maidagan\\_D.2010\\_The\\_beginnings\\_of\\_European\\_Upper\\_Paleolithic\\_art\\_a\\_critical\\_review\\_North\\_Atlantic\\_Archaeology\\_no\\_2\\_pp.1-18?email\\_work\\_card=view-paper](https://www.academia.edu/2143576/Moro_Abad%3%ADa_O_Garate_Maidagan_D.2010_The_beginnings_of_European_Upper_Paleolithic_art_a_critical_review_North_Atlantic_Archaeology_no_2_pp.1-18?email_work_card=view-paper)

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## THE CONVERSATION – New Stonehenge discovery: how we found a prehistoric monument hidden in data

Archaeologists reveal two-kilometre ring of pits around the neolithic Durrington Walls by studying old geophysical surveys.

<https://theconversationuk.cmail19.com/t/r-l-jktiuldy-khhllilahlh-g/>

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## PUBLICATIONS

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### American Journal of Human Genetics

#### PAPERS

### PETER A. STAMOS & TIMOTHY D. WEAVER – Ontogeny of the distal femoral metaphyseal surface and its relationship to locomotor behavior in hominoids

Distal femoral metaphyseal surface morphology is highly variable in extant mammals. This variation has previously been linked to differences in locomotor behavior. We perform the first systematic survey and description of the development of this morphology in extant hominoids.

We collected 3D surface laser scans of the femora of 179 human and great ape individuals throughout all subadult stages of development. We qualitatively and quantitatively describe metaphyseal surface morphology.

Major shifts in morphology appear to coincide with major shifts in locomotor behavior, suggesting that metaphyseal morphology is developmentally plastic and highly dependent on the biomechanical loadings at the knee joint. This is consistent with a large body of biomedical research, which demonstrates the primacy of mechanical forces in determining growth plate ossification patterns. Additionally, specific metaphyseal morphology appears highly correlated with specific locomotor modes, suggesting that metaphyseal surface morphology will be useful for reconstructing the locomotor behavior of fossil primate taxa.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24036?campaign=wolletoc>

### ASIER GÓMEZ-OLIVENCIA et al – The human remains from Axlor (Dima, Biscay, northern Iberian Peninsula)

We provide the description and comparative analysis of all the human fossil remains found at Axlor during the excavations carried out by J. M. de Barandiarán from 1967 to 1974: a cranial vault fragment and seven teeth, five of which likely belonged to the same individual, although two are currently lost. Our goal is to describe in detail all these human remains and discuss both their taxonomic attribution and their stratigraphic context.

A left parietal fragment (Level VIII) from a single probably adult Neandertal individual was recovered during the old excavations performed by Barandiarán. Additionally, two different Neandertal children lost deciduous teeth during the formations of levels V (left di1) and IV (right dm2). In addition, a modern human individual is represented by five remains (two currently lost) from a complex stratigraphic setting. Some of the morphological features of these remains suggest that they may represent one of the scarce examples of Upper Paleolithic modern human remains in the northern Iberian Peninsula, which should be confirmed by direct dating.

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## American Journal of Physical Anthropology

### PAPERS

#### **GWENAËLLE GOUDE et al – New Insights on Neolithic food and mobility patterns in Mediterranean coastal populations**

Carbon and nitrogen stable isotope ratios indicate a consumption of protein by humans mainly focused on terrestrial animals and possible exploitation of marine resources for one male and one undetermined adult. Sulfur stable isotope ratios allowed distinguishing groups with different geographical origins, including two females possibly more exposed to the sea spray effect. While strontium isotope data do not indicate different origins for the individuals, mitochondrial lineage diversity from petrous bone DNA suggests the burial includes genetically differentiated groups or a group practicing patrilocality. Moreover, the diversity of plant microremains recorded in dental calculus provide the first evidence that the groups of Les Bréguières consumed a wide breadth of plant foods (as cereals and wild taxa) that required access to diverse environments. This transdisciplinary research paves the way for new perspectives and highlights the relevance for novel research of contexts (whether recently discovered or in museum collections) excavated near shorelines, due to the richness of the biodiversity and the wide range of edible resources available.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24089?campaign=wolearlyview>

#### **DEBRA R. BOLTER & NOEL CAMERON – Utilizing auxology to understand ontogeny of extinct hominins: A case study on *Homo naledi***

The methods used to study human growth and development (auxology) have not previously been applied within the setting of hominin maturation (ontogeny). Ontogeny is defined here as the pattern of biological change into an adult form, both at the individual and species level. The hominin fossil record has a lack of recovered immature materials, due to such factors as taphonomic processes that destroy pre-adults; the fragility of immature compared to adult bone; and the lower mortality rates of juveniles compared to adults. The recent discovery of pre-adult hominin skeletal material from a single, homogeneous *Homo naledi* species from the Rising Star cave system in South Africa provides the opportunity for a broader application of auxology methods and thus the need to understand their use in a modern context. Human auxology studies benefit from a robust database, across multiple populations, and with longitudinal studies in order to assess the patterns and variations in typical growth, development and life history stages. Here, we review the approach, vocabulary, and methods of these human studies, investigate commonalities in data with the fossil record, and then advance the reconstruction of ontogeny for the extinct hominin species *H. naledi*. To this end, we apply an auxology model into the paleontological context to broadly predict *H. naledi* birthweight of the offspring at 2.06 kg with a range ( $\pm 1$  SD) of 1.89 to 2.24 kg, with a length at birth 45.5 cm. We estimate a *H. naledi* juvenile partial skeleton DH7 to be a height of 111–125 cm at death.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24088?campaign=wolearlyview>

#### **RICARDO MIGUEL GODINHO, PAUL O'HIGGINS & CÉLIA GONÇALVES – Assessing the reliability of virtual reconstruction of mandibles**

Mandibular morphological variation is often used to examine various aspects of human palaeobiology. However, fossil and archeological skeletal remains are often fragmented/distorted and so are frequently excluded from studies. This leads to decreased sample sizes and, potentially, to biased results. Thus, it is of interest to restore the original anatomy of incomplete/distorted specimens. Thin plate splines (TPS), commonly used in Geometric Morphometrics (GM), offer the prospect of reconstruction of missing parts and particularly of interest here, missing landmarks.

Results show that error varies according to the number and location of estimated landmarks. Notwithstanding, estimation error is usually considerably smaller than the morphological differences between individuals from the same species.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/ajpa.24095?campaign=wolearlyview>

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## Biology Letters

### PAPERS

#### **ELISA BANDINI et al – Examining the mechanisms underlying the acquisition of animal tool behaviour**

Despite major advances in the study of animal tool behaviour, researchers continue to debate how exactly certain behaviours are acquired. While specific mechanisms, such as genetic predispositions or action copying, are sometimes suspected to play a major role in behavioural acquisition, controlled experiments are required to provide conclusive evidence. In this opinion piece, we refer to classic ethological methodologies to emphasize the need for studying the relative contributions of different factors to the emergence of specific tool behaviours. We describe a methodology, consisting of a carefully staged series of baseline and social-learning conditions, that enables us to tease apart the roles of different mechanisms in the development of behavioural repertoires. Experiments employing our proposed methodology will not only advance our understanding of animal learning and culture, but as a result, will also help inform hypotheses about human cognitive, cultural and technological evolution. More generally, our conceptual framework is suitable for guiding the detailed investigation of other seemingly complex animal behaviours.

<https://royalsocietypublishing.org/doi/full/10.1098/rsbl.2020.0122>

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## Current Biology

### PAPERS

#### **SONJA WILD et al – Integrating Genetic, Environmental, and Social Networks to Reveal Transmission Pathways of a Dolphin Foraging Innovation**

Cultural behavior, which is transmitted among conspecifics through social learning, is found across various taxa. Vertical social transmission from parent to offspring is thought to be adaptive because of the parental generation being more skilled than maturing individuals. It is found throughout the animal kingdom, particularly in species with prolonged parental care. Social learning can also occur among members of the same generation or between older, non-parental individuals and younger generations via horizontal or oblique transmission, respectively. Extensive work on primate culture has shown that horizontal transmission of foraging behavior is biased toward species with broad cultural repertoires and those with increased levels of social tolerance, such as great apes. Vertical social transmission has been established as the primary transmission mechanism of foraging behaviors in the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) population of Shark Bay, Western Australia. Here, we investigated the spread of another foraging strategy, “shelling”, whereby some dolphins in this population feed on prey trapped inside large marine gastropod shells. Using a multi-network version of “network-based diffusion analysis” (NBDA), we show that shelling behavior spreads primarily through non-vertical social transmission. By statistically accounting for both environmental and genetic influences, our findings thus represent the first evidence of non-vertical transmission of a foraging tactic in toothed whales. This research suggests there are multiple transmission pathways of foraging behaviors in dolphins, highlighting the similarities between cetaceans and great apes in the nature of the transmission of cultural behaviors.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(20\)30756-9?dgcid=raven\\_jbs\\_aip\\_email](https://www.cell.com/current-biology/fulltext/S0960-9822(20)30756-9?dgcid=raven_jbs_aip_email)

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## Evolutionary Anthropology

### PAPERS

#### **NATHAN E. THOMPSON et al – Digitization of the Nissen–Riesen chimpanzee radiological growth series**

Longitudinal morphological growth data of apes are incredibly difficult to obtain. Long life histories, combined with practical and ethical issues of obtaining such long-term data have resulted in few longitudinal data sets in chimpanzees of known chronological ages. One classic, long-term growth study of chimpanzees was that of Drs Nissen and Riesen initiated at the Yale Laboratories of Primate Biology in 1939. Through that study, whole-body radiological images were taken on a regular basis from a “normative” group of chimpanzees from birth to adulthood. Here we have digitized the known remaining radiographs from that growth study, many of which are deteriorating, and uploaded the data set to the free, online database MorphoSource. The database comprises 3,568 X-ray images of 15 of the 16 chimpanzee subjects in the normative group and 1 individual from an experimental group. Herein, we briefly review the historical context of this study and specific details of the data set.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/evan.21836?campaign=wolearlyview>

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## Interface: Journal of the Royal Society

### PAPERS

#### **BOLDIZSÁR BALÁZS, GÁBOR VÁSÁRHELYI & TAMÁS VICSEK – Adaptive leadership overcomes persistence–responsivity trade-off in flocking**

The living world is full of cohesive collectives that have evolved to move together with high efficiency. Schools of fish or flocks of birds maintain their global direction despite significant noise perturbing the individuals, yet they are capable of performing abrupt collective turns when relevant agitation alters the state of a few members. Ruling local fluctuations out of global movement leads to persistence and requires overdamped interaction dynamics, while propagating swift turns throughout the group leads to responsivity and requires underdamped interaction dynamics. In this paper we show a way to avoid this conflict by introducing a time-dependent leadership hierarchy that adapts locally to will: agents’ intention of changing direction. Integrating our new concept of will-based inter-agent behaviour highly enhances the responsivity of standard collective motion models, thus enables breaking out of their former limit, the persistence–responsivity trade-off. We also show that the increased responsivity to environmental cues scales well with growing flock size. Our solution relies on active communication or advanced cognition for the perception of will. The incorporation of these into collective motion is a plausible hypothesis in higher order species, while it is a realizable feature for artificial robots, as demonstrated by our swarm of 52 drones.

<https://royalsocietypublishing.org/doi/full/10.1098/rsif.2019.0853>

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## Nature

### PAPERS

#### **YARDEN COHEN et al – Hidden neural states underlie canary song syntax**

Coordinated skills such as speech or dance involve sequences of actions that follow syntactic rules in which transitions between elements depend on the identities and order of past actions. Canary songs consist of repeated syllables called phrases, and the ordering of these phrases follows long-range rules in which the choice of what to sing depends on the song structure many seconds prior. The neural substrates that support these long-range correlations are unknown. Here, using

miniature head-mounted microscopes and cell-type-specific genetic tools, we observed neural activity in the premotor nucleus HVC as canaries explored various phrase sequences in their repertoire. We identified neurons that encode past transitions, extending over four phrases and spanning up to four seconds and forty syllables. These neurons preferentially encode past actions rather than future actions, can reflect more than one song history, and are active mostly during the rare phrases that involve history-dependent transitions in song. These findings demonstrate that the dynamics of HVC include 'hidden states' that are not reflected in ongoing behaviour but rather carry information about prior actions. These states provide a possible substrate for the control of syntax transitions governed by long-range rules.

<https://www.nature.com/articles/s41586-020-2397-3>

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## Nature Communications

### PAPERS

#### **SEVADA HOVSEPYAN, ITSASO OLASAGASTI & ANNE-LISE GIRAUD – Combining predictive coding and neural oscillations enables online syllable recognition in natural speech**

On-line comprehension of natural speech requires segmenting the acoustic stream into discrete linguistic elements. This process is argued to rely on theta-gamma oscillation coupling, which can parse syllables and encode them in decipherable neural activity. Speech comprehension also strongly depends on contextual cues that help predicting speech structure and content. To explore the effects of theta-gamma coupling on bottom-up/top-down dynamics during on-line syllable identification, we designed a computational model (Precoss—predictive coding and oscillations for speech) that can recognise syllable sequences in continuous speech. The model uses predictions from internal spectro-temporal representations of syllables and theta oscillations to signal syllable onsets and duration. Syllable recognition is best when theta-gamma coupling is used to temporally align spectro-temporal predictions with the acoustic input. This neurocomputational modelling work demonstrates that the notions of predictive coding and neural oscillations can be brought together to account for on-line dynamic sensory processing.

<https://www.nature.com/articles/s41467-020-16956-5>

#### **MOHSEN MOSLEH et al – Globalization and the rise and fall of cognitive control**

The scale of human interaction is larger than ever before—people regularly interact with and learn from others around the world, and everyone impacts the global environment. We develop an evolutionary game theory model to ask how the scale of interaction affects the evolution of cognition. Our agents make decisions using automatic (e.g., reflexive) versus controlled (e.g., deliberative) cognition, interact with each other, and influence the environment (i.e., game payoffs). We find that globalized direct contact between agents can either favor or disfavor control, depending on whether controlled agents are harmed or helped by contact with automatic agents; globalized environment disfavors cognitive control, while also promoting strategic diversity and fostering mesoscale communities of more versus less controlled agents; and globalized learning destroys mesoscale communities and homogenizes the population. These results emphasize the importance of the scale of interaction for the evolution of cognition, and help shed light on modern challenges.

<https://www.nature.com/articles/s41467-020-16850-0>

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## Nature Human Behaviour

### PAPERS

#### **MICHELLE C. LANGLEY et al – Portable art from Pleistocene Sulawesi**

The ability to produce recognizable depictions of objects from the natural world—known as figurative art—is unique to *Homo sapiens* and may be one of the cognitive traits that separates our species from extinct hominin relatives. Surviving examples of Pleistocene figurative art are generally confined to rock art or portable three-dimensional works (such as figurines) and images engraved into the surfaces of small mobile objects. These portable communicative technologies first appear in Europe some 40 thousand years ago (ka) with the arrival of *H. sapiens*. Conversely, despite *H. sapiens* having moved into Southeast Asia–Australasia by at least 65 ka, very little evidence for Pleistocene-aged portable art has been identified, leading to uncertainties regarding the cultural behaviour of the earliest *H. sapiens* in this region. Here, we report the discovery of two small stone 'plaquettes' incised with figurative imagery dating to 26–14 ka from Leang Bulu Bettue, Sulawesi. These new findings, together with the recent discovery of rock art dating to at least 40 ka in this same region, overturns the long-held belief that the first *H. sapiens* of Southeast Asia–Australasia did not create sophisticated art and further cements the importance of this behaviour for our species' ability to overcome environmental and social challenges.

<https://www.nature.com/articles/s41562-020-0837-6>

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## Nature Scientific Reports

### PAPERS

#### **JAMIE WHITEHOUSE & HÉLÈNE MEUNIER – An understanding of third-party friendships in a tolerant macaque**

Complex societies are shaped by social relationships between multiple individuals. The pressure to track these relationships has driven the evolution of social cognition in primates. Importantly, it can be adaptive to track not only personal relationships, but also those established between third-parties. Primates have knowledge about others' dominance hierarchies and kinship, but we do not know to what extent they also understand friendships. In a playback experiment,

Tonkean macaques were presented with simulated conflicts involving third-party female dyads who were established friends or non-friends. Hearing a conflict between friends elicited a stronger behavioural response in listeners (i.e. an increase in looking time) compared to hearing a conflict between non-friends. Conflicts between friends are likely to represent a greater disruption of the social group and structure of the network, and therefore this difference in response may represent an adaptive strategy employed by the macaques to selectively monitor important social interactions in the group. These findings provide evidence that Tonkean macaques (and potentially other primates) can classify the relationships of others based on their degree of friendship and additionally, confirms the important role friendships have within the societies of social primates.

<https://www.nature.com/articles/s41598-020-66407-w>

### **BAHIA GUELLAÍ et al – Premises of social cognition: Newborns are sensitive to a direct versus a faraway gaze**

Previous studies evidenced that already from birth, newborns can perceive differences between a direct versus an averted gaze in faces both presented in static and interactive situations. It has been hypothesized that this early sensitivity would rely on modifications of the location of the iris (i.e. the darker part of the eye) in the sclera (i.e. the white part), or that it would be an outcome of newborns' preference for configurations of faces with the eye region being more contrasted. One question still remains: What happens when the position of the iris is not modified in the sclera, but the look is 'faraway', that is when the gaze is toward the newborns' face but above his or her own eyes? In the present study, we tested the influence of a direct versus a faraway gaze (i.e., two gazes that only differed slightly in the position of the iris on the vertical axis and not on the horizontal axis) on newborns' face recognition. The procedure was identical to that used in previous studies: using a familiarization-test procedure, we familiarized two groups of newborns (N = 32) with videos of different talking faces that were presented with either a direct or a faraway gaze. Newborns were then tested with photographs of the face seen previously and of a new one. Results evidenced that newborns looked longer at the familiar face, but only in the direct gaze condition. These results suggest that, already from birth, infants can perceive slight differences of gazes when someone is addressing to them.

<https://www.nature.com/articles/s41598-020-66576-8>

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## New Scientist

### ARTICLES

#### **LAURA SPINNEY – Consciousness Isn't Just the brain: The body shapes your sense of self**

Electrical signals coming from your heart and other organs influence how you perceive the world, the decisions you take, your sense of who you are and consciousness itself.

<https://www.newscientist.com/article/mg24632881-300-consciousness-isnt-just-the-brain-the-body-shapes-your-sense-of-self/#ixzz6QPehJOHy>

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## PLoS Biology

### PAPERS

#### **BENJAMIN M. BASILE et al – The anterior cingulate cortex is necessary for forming prosocial preferences from vicarious reinforcement in monkeys**

A key feature of most social relationships is that we like seeing good things happen to others. Research has implicated the anterior cingulate cortex (ACC) in attaching value to social outcomes. For example, single neurons in macaque ACC selectively code reward delivery to the self, a partner, both monkeys, or neither monkey. Here, we assessed whether the ACC's contribution to social cognition is causal by testing rhesus monkeys (*Macaca mulatta*) on a vicarious reinforcement task before and after they sustained ACC lesions. Prior to surgery, actors learned that 3 different visual cues mapped onto 3 distinct reward outcomes: to self ("Self"), to the other monkey ("Other"), or to neither monkey ("Neither"). On each trial, actors saw a cue that predicted one of the 3 juice offers and could accept the offer by making a saccade to a peripheral target or reject the offer by breaking fixation. Preoperatively, all 6 actors displayed prosocial preferences, indicated by their greater tendency to give reward to Other relative to Neither. Half then received selective, bilateral, excitotoxic lesions of the ACC, and the other half served as unoperated controls. After surgery, all monkeys retained the social preferences they had demonstrated with the preoperatively learned cues, but this preference was reduced in the monkeys with ACC lesions. Critically, none of the monkeys in the ACC lesion group acquired social preferences with a new set of cues introduced after surgery. These data indicate that the primate ACC is necessary for acquisition of prosocial preferences from vicarious reinforcement.

<https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000677>

#### **BRUNO MIRANDA et al – Combined model-free and model-sensitive reinforcement learning in non-human primates**

Contemporary reinforcement learning (RL) theory suggests that potential choices can be evaluated by strategies that may or may not be sensitive to the computational structure of tasks. A paradigmatic model-free (MF) strategy simply repeats actions that have been rewarded in the past; by contrast, model-sensitive (MS) strategies exploit richer information associated with knowledge of task dynamics. MF and MS strategies should typically be combined, because they have complementary statistical and computational strengths; however, this tradeoff between MF/MS RL has mostly only been demonstrated in



humans, often with only modest numbers of trials. We trained rhesus monkeys to perform a two-stage decision task designed to elicit and discriminate the use of MF and MS methods. A descriptive analysis of choice behaviour revealed directly that the structure of the task (of MS importance) and the reward history (of MF and MS importance) significantly influenced both choice and response vigour. A detailed, trial-by-trial computational analysis confirmed that choices were made according to a combination of strategies, with a dominant influence of a particular form of model sensitivity that persisted over weeks of testing. The residuals from this model necessitated development of a new combined RL model which incorporates a particular credit assignment weighting procedure. Finally, response vigor exhibited a subtly different collection of MF and MS influences. These results provide new illumination onto RL behavioural processes in non-human primates.

<https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1007944>

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## PLoS One

### PAPERS

#### **KENDRA V. LANGE et al – Evidence against a relation between bilingualism and creativity**

Are bilinguals more creative than monolinguals? Some prior research suggests bilinguals are more creative because the knowledge representations for their second language are similarly structured to those of highly creative people. However, there is contrasting research showing that the knowledge representations of bilinguals' second language are actually structured like those of less creative people. Finally, there is growing skepticism about there being differences between bilinguals and monolinguals on non-language tasks (e.g., the bilingual advantage for executive control). We tested whether bilinguals tested in their second language are more or less creative than both monolinguals and bilinguals tested in their first language. Participants also took a repeated semantic fluency test that we used to estimate individual semantic networks for each participant. We analyzed our results with Bayesian statistics and found support for the null hypothesis that bilingualism offers no advantage for creativity. Further, using best practices for estimating semantic networks, we found support for the hypothesis that there is no association between an individual's semantic network and their creativity. This is in contrast with published research, and suggests that some of those findings may have been the result of idiosyncrasies, outdated methods for estimating semantic networks, or statistical noise. Our results call into question reported relations between bilingualism and creativity, as well as semantic network structure as an explanatory mechanism for individual differences in creativity.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0234928>

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## PNAS

### ARTICLES

#### **JAMES F. O'CONNELL – Aboriginal fires modify an ideal free distribution**

Optimality and game-theoretic models grounded in behavioral ecology have enjoyed increasing popularity in anthropology and prehistoric archaeology over the last three to four decades. They have been especially important to prehistorians in fostering the development of comprehensive, theoretically well-grounded expectations about past human behavior and in helping to identify testable explanations for its variation across time and space. Bliege Bird et al. provide an example of this approach in their discussion of two game-theoretic models in an Australian ethnographic context. The results have important implications for reconstructing the process of hunter-gatherer dispersal across Sahul (Pleistocene Australia–New Guinea) and about changes in human subsistence during the Late Pleistocene and early Holocene.

<https://www.pnas.org/content/117/25/13873?etoc=>

### PAPERS

#### **ROBIN GERRITS, HELENA VERHELST & GUY VINGERHOETS – Mirrored brain organization: Statistical anomaly or reversal of hemispheric functional segregation bias?**

Humans demonstrate a prototypical hemispheric functional segregation pattern, with language and praxis lateralizing to the left hemisphere and spatial attention, face recognition, and emotional prosody to the right hemisphere. In this study, we used fMRI to determine laterality for all five functions in each participant. Crucially, we recruited a sample of left-handers preselected for atypical (right) language dominance (n = 24), which allowed us to characterize hemispheric asymmetry of the other functions and compare their functional segregation pattern with that of left-handers showing typical language dominance (n = 39). Our results revealed that most participants with left language dominance display the prototypical pattern of functional hemispheric segregation (44%) or deviate from this pattern in only one function (35%). Similarly, the vast majority of right language dominant participants demonstrated a completely mirrored brain organization (50%) or a reversal for all but one cognitive function (32%). Participants deviating by more than one function from the standard segregation pattern showed poorer cognitive performance, in line with an oft-presumed biological advantage of hemispheric functional segregation.

<https://www.pnas.org/content/117/25/14057.abstract?etoc>

**CÉDRIC GIRARD-BUTTOZ et al with CHRISTOPHE BOESCH & CATHERINE CROCKFORD – Information transfer efficiency differs in wild chimpanzees and bonobos, but not social cognition**

Several theories have been generated to understand the socio-cognitive mechanisms underlying the unique cooperative abilities of humans. The 'interdependence hypothesis' posits first, that the cognitive dimension of human cooperation evolved in contexts when several individuals needed to act together to achieve a common goal, like when hunting large prey. Second, the more interdependent individuals are, the more likely they are to provide services to conspecifics in other contexts. Alternatively, the 'social tolerance hypothesis' proposes that higher social tolerance allows conspecifics to cooperate more efficiently and with a wider range of partners. We conducted the first field experimental evaluation of both hypotheses in our closest living relatives by contrasting chimpanzees to the less interdependent but more tolerant bonobos. We compared each species' performance during a cooperative task: informing conspecifics about a danger. We presented Gaboon viper models to 82 individuals from five wild communities. Chimpanzees arriving late at the snake were significantly more likely to have heard a call and less likely to startle, indicating that chimpanzees were better informed about the presence of the threat than bonobos. This stems from clear species differences in how individuals adjusted their calling decisions to the level of information already available. Chimpanzees were more likely to call and produced more alarm calls when they had not yet heard a call, whereas bonobos did so when they already heard a call. Our results confirm the link between interdependence and cooperation performance. These species differences were most likely driven by differences in motivation rather than in cognitive capacities because both species tended to consider audience knowledge in their decision to call. Our results inform theories on the evolution of human cooperation by linking inter-group competition pressure and in-group cooperative motivation and/or capability.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.0523>

**PAT BARCLAY – Reciprocity creates a stake in one's partner, or why you should cooperate even when anonymous**

Why do we care so much for friends, even making sacrifices for them they cannot repay or never know about? When organisms engage in reciprocity, they have a stake in their partner's survival and wellbeing so the reciprocal relationship can persist. This stake (aka fitness interdependence) makes organisms willing to help beyond the existing reciprocal arrangement (e.g. anonymously). I demonstrate this with two mathematical models in which organisms play a prisoner's dilemma, and where helping keeps their partner alive and well. Both models show that reciprocity creates a stake in partners' welfare: those who help a cooperative partner—even when anonymous—do better than those who do not, because they keep that cooperative partner in good enough condition to continue the reciprocal relationship. 'Machiavellian' cooperators, who defect when anonymous, do worse because their partners become incapacitated. This work highlights the fact that reciprocity and stake are not separate evolutionary processes, but are inherently linked.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.0819>

**ROZA G. KAMILOĞLU et al with KATIE E. SLOCOMBE – Human listeners' perception of behavioural context and core affect dimensions in chimpanzee vocalizations**

Vocalizations linked to emotional states are partly conserved among phylogenetically related species. This continuity may allow humans to accurately infer affective information from vocalizations produced by chimpanzees. In two pre-registered experiments, we examine human listeners' ability to infer behavioural contexts (e.g. discovering food) and core affect dimensions (arousal and valence) from 155 vocalizations produced by 66 chimpanzees in 10 different positive and negative contexts at high, medium or low arousal levels. In experiment 1, listeners (n = 310), categorized the vocalizations in a forced-choice task with 10 response options, and rated arousal and valence. In experiment 2, participants (n = 3120) matched vocalizations to production contexts using yes/no response options. The results show that listeners were accurate at matching vocalizations of most contexts in addition to inferring arousal and valence. Judgments were more accurate for negative as compared to positive vocalizations. An acoustic analysis demonstrated that, listeners made use of brightness and duration cues, and relied on noisiness in making context judgements, and pitch to infer core affect dimensions. Overall, the results suggest that human listeners can infer affective information from chimpanzee vocalizations beyond core affect, indicating phylogenetic continuity in the mapping of vocalizations to behavioural contexts.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.1148>

**ANNE C. PISOR et al – Preferences and constraints: the value of economic games for studying human behaviour**

As economic games have spread from experimental economics to other social sciences, so too have critiques of their usefulness for drawing inferences about the 'real world'. What these criticisms often miss is that games can be used to reveal individuals' private preferences in ways that observational and interview data cannot; furthermore, economic games can be designed such that they do provide insights into real-world behaviour. Here, we draw on our collective experience using economic games in field contexts to illustrate how researchers can strategically alter the framing or design of economic games to draw inferences about private-world or real-world preferences. A detailed case study from coastal Colombia

provides an example of the subtleties of game design and how games can be combined fruitfully with self-report data. We close with a list of concrete recommendations for how to modify economic games to better match particular research questions and research contexts.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.192090>

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## Science Advances

### PAPERS

#### **STEPHEN FERRIGNO et al with STEVEN T. PIANTADOSI – Recursive sequence generation in monkeys, children, U.S. adults, and native Amazonians**

The question of what computational capacities, if any, differ between humans and nonhuman animals has been at the core of foundational debates in cognitive psychology, anthropology, linguistics, and animal behavior. The capacity to form nested hierarchical representations is hypothesized to be essential to uniquely human thought, but its origins in evolution, development, and culture are controversial. We used a nonlinguistic sequence generation task to test whether subjects generalize sequential groupings of items to a center-embedded, recursive structure. Children (3 to 5 years old), U.S. adults, and adults from a Bolivian indigenous group spontaneously induced recursive structures from ambiguous training data. In contrast, monkeys did so only with additional exposure. We quantify these patterns using a Bayesian mixture model over logically possible strategies. Our results show that recursive hierarchical strategies are robust in human thought, both early in development and across cultures, but the capacity itself is not unique to humans.

[https://advances.sciencemag.org/content/6/26/eaaz1002?utm\\_campaign=toc\\_advances\\_2020-06-26&et rid=17774313&et cid=3380814](https://advances.sciencemag.org/content/6/26/eaaz1002?utm_campaign=toc_advances_2020-06-26&et rid=17774313&et cid=3380814)

#### **JEREMY KOSTER et mul with REBECCA BLIEGE BIRD – The life history of human foraging: cross-cultural and individual variation**

Human adaptation depends on the integration of slow life history, complex production skills, and extensive sociality. Refining and testing models of the evolution of human life history and cultural learning benefit from increasingly accurate measurement of knowledge, skills, and rates of production with age. We pursue this goal by inferring hunters' increases and declines of skill from approximately 23,000 hunting records generated by more than 1800 individuals at 40 locations. The data reveal an average age of peak productivity between 30 and 35 years of age, although high skill is maintained throughout much of adulthood. In addition, there is substantial variation both among individuals and sites. Within study sites, variation among individuals depends more on heterogeneity in rates of decline than in rates of increase. This analysis sharpens questions about the coevolution of human life history and cultural adaptation.

[https://advances.sciencemag.org/content/6/26/eaax9070?utm\\_campaign=toc\\_advances\\_2020-06-26&et rid=17774313&et cid=3380814](https://advances.sciencemag.org/content/6/26/eaax9070?utm_campaign=toc_advances_2020-06-26&et rid=17774313&et cid=3380814)

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## Trends in Cognitive Sciences

### ARTICLES

#### **DANIELA J. PALOMBO & CHANTELLE COCQUYT – Emotion in Context: Remembering When**

Our subjective sense of time, both during an event and later when we remember it, differs vastly from one episode to the next. How does emotional arousal shape our memory for the temporal elements of an experience – our memory for 'when'?

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(20\)30142-X?dgcid=raven\\_jbs\\_aip\\_email](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(20)30142-X?dgcid=raven_jbs_aip_email)

### PAPERS

#### **DANIEL J. HORSCHLER, EVAN L. MACLEAN & LAURIE R. SANTOS – Do Non-Human Primates Really Represent Others' Beliefs?**

Over two decades of research have produced compelling evidence that non-human primates understand some psychological states in other individuals but are unable to represent others' beliefs. Recently, three studies employing anticipatory looking (AL) paradigms reported that non-human primates do show hints of implicitly understanding the beliefs of others. However, measures of AL have been increasingly scrutinized in the human literature owing to extensive replication problems. We argue that new reports of belief representation in non-human primates using AL should be interpreted cautiously because of methodological and theoretical challenges paralleling trends in the human literature. We explore how future work can address these challenges, and conclude by identifying new evolutionary questions raised by the prospect that non-human primates implicitly represent others' beliefs without an explicit belief representation system that guides fitness-relevant behavior.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(20\)30133-9?dgcid=raven\\_jbs\\_aip\\_email](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(20)30133-9?dgcid=raven_jbs_aip_email)

#### **MAXIME GARCIA & MARTA MANSER – Bound for Specific Sounds: Vocal Predisposition in Animal Communication**

Mechanical constraints imposed by anatomical adaptations are a ubiquitous feature of animal sound production. They can give rise to 'vocal predispositions' (i.e., acoustic structures strictly determined by vocal anatomy). Such predispositions are crucial to the investigation of the cognitive and evolutionary processes underlying acoustic communication in vertebrates, including human speech.

## Trends in Neurosciences

### PAPERS

#### **KATE J. JEFFERY & CARLO ROVELLI – Transitions In Brain Evolution: Space, Time and Entropy**

How did brains evolve to become so complex, and what is their future? Brains pose an explanatory challenge because entropy, which inexorably increases over time, is commonly associated with disorder and simplicity. Recently we showed how evolution is an entropic process, building structures – organisms – which themselves facilitate entropy growth. Here we suggest that key transitional points in evolution extended organisms' reach into space and time, opening channels into new regions of a complex multidimensional state space that also allow entropy to increase. Brain evolution enabled representation of space and time, which vastly enhances this process. Some of these channels lead to tiny, dead-ends in the state space: the persistence of complex life is thus not thermodynamically guaranteed.

[https://www.cell.com/trends/neurosciences/fulltext/S0166-2236\(20\)30099-0?dgcid=raven\\_jbs\\_etoc\\_email](https://www.cell.com/trends/neurosciences/fulltext/S0166-2236(20)30099-0?dgcid=raven_jbs_etoc_email)

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