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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.

SCIENCE NEWS – Like humans, these big-brained birds may owe their smarts to long childhoods

Human beings typically don’t leave the nest until well into our teenage years—a relatively rare strategy among animals. But corvids—a group of birds that includes jays, ravens, and crows—also spend a lot of time under their parents’ wings. Now, in a parallel to humans, researchers have found that ongoing tutelage by patient parents may explain how corvids have managed to achieve their smarts.

https://www.sciencemag.org/news/2020/06/humans-these-big-brained-birds-may-owe-their-smarts-long-childhoods?utm_campaign=news_daily_2020-06-08&et rid=17774313&et cid=3357529

SOCIETY FOR SCIENCE – Lidar reveals the oldest and biggest Maya structure yet found

A previously unknown Maya site in Mexico, called Aguada Fénix, adds to evidence that massive public works may have preceded kings in the civilization.

<http://click.societyforscience-email.com/?qs=8ecaf6cdead0a548b394142283a01fe0f5a3e529ebdb59c353c27716a0eb9b8825a2493170bfefbb785518447fc5d8371d56ed52c0349a20>

SOCIETY FOR SCIENCE – Clues to the earliest known bow-and-arrow hunting outside Africa found

Possible arrowheads at a rainforest site in Sri Lanka date to 48,000 years ago.

<http://click.societyforscience-email.com/?qs=c6a8c747c0014d4a6e68b4b38791ee5d82c1a18ac1b6e03e898b9f608a2e8dcf48efc33674064a56279ef9195b3eaddfc7393294cfedc184>

SCIENCE DAILY – How the brain controls our speech

Speaking requires both sides of the brain. Each hemisphere takes over a part of the complex task of forming sounds, modulating the voice and monitoring what has been said. However, the distribution of tasks is different than has been thought up to now, as an interdisciplinary team of neuroscientists and phoneticians has discovered.

<https://www.sciencedaily.com/releases/2020/06/200610094042.htm>

SCIENCE DAILY – Twitter fight: Birds use social networks to pick opponents wisely

Researchers say animals such as monk parakeets seem to understand where they fit in a dominance hierarchy and pick their fights accordingly. This high-level social information helps animals improve or maintain their status.

<https://www.sciencedaily.com/releases/2020/06/200609190723.htm>

SCIENCE DAILY – Denisovan DNA influences immune system of modern day Oceanian populations

More than 120,000 novel human genetic variations that affect large regions of DNA have been discovered, some of which are linked to immune response, disease susceptibility or digestion.

<https://www.sciencedaily.com/releases/2020/06/200611152424.htm>

SCIENCE DAILY – The brain uses minimum effort to look for key information in text

The human brain avoids taking unnecessary effort. When a person is reading, she strives to gain as much information as possible by dedicating as little of her cognitive capacity as possible to the processing.

<https://www.sciencedaily.com/releases/2020/06/200611114536.htm>

SCIENCE DAILY – Mixture and migration brought food production to sub-Saharan Africa

A new interdisciplinary study reports on 20 newly sequenced ancient genomes from sub-Saharan Africa, including the first genomes from the Democratic Republic of the Congo, Botswana, and Uganda. The study documents the coexistence, movements, interactions and admixture of diverse human groups during the spread of food production in sub-Saharan Africa.

<https://www.sciencedaily.com/releases/2020/06/200612172240.htm>

SCIENCE DAILY – Discovery of oldest bow and arrow technology in Eurasia

The origins of human innovation have traditionally been sought in the grasslands and coasts of Africa or the temperate environments of Europe. More extreme environments, such as the tropical rainforests of Asia, have been largely overlooked, despite their deep history of human occupation. A new study provides the earliest evidence for bow-and-arrow use, and perhaps the making of clothes, outside of Africa ~48-45,000 years ago -in the tropics of Sri Lanka.

<https://www.sciencedaily.com/releases/2020/06/200612172238.htm>

RESEARCHGATE – Monkeys Show Theory of Mind

RAYMUNDO BÁEZ-MENDOZA & ZIV M. WILLIAMS – Monkeys Show Theory of Mind

Hayashi et al. (2020) provide evidence that Japanese macaques show theory of mind abilities in an anticipatory-looking variant of the canonical false belief task. This study paves the way to investigate the neuronal basis of social cognition in non-human primates.

https://www.researchgate.net/publication/340321183_Monkeys_Show_Theory_of_Mind

PUBLICATIONS

Cell

PAPERS

TAKETSUGU HAYASHI et al – Macaques Exhibit Implicit Gaze Bias Anticipating Others' False-Belief-Driven Actions via Medial Prefrontal Cortex

The ability to infer others' mental states is essential to social interactions. This ability, critically evaluated by testing whether one attributes false beliefs (FBs) to others, has been considered to be uniquely hominid and to accompany the activation of a distributed brain network. We challenge the taxon specificity of this ability and identify the causal brain locus by introducing an anticipatory-looking FB paradigm combined with chemogenetic neuronal manipulation in macaque monkeys. We find spontaneous gaze bias of macaques implicitly anticipating others' FB driven actions. Silencing of the medial prefrontal neuronal activity with inhibitory designer receptor exclusively activated by designer drugs (DREADDs) specifically eliminates the implicit gaze bias while leaving the animals' visually guided and memory guided tracking abilities intact. Thus, neuronal activity in the medial prefrontal cortex could have a causal role in FB-attribution-like behaviors in the primate lineage, emphasizing the importance of probing the neuronal mechanisms underlying theory of mind with relevant macaque animal models.

<https://www.sciencedirect.com/science/article/pii/S2211124720303193>

Frontiers in Neuroscience

PAPERS

TIM COOLEN et al – Frequency-Dependent Intrinsic Electrophysiological Functional Architecture of the Human Verbal Language Network

Functional magnetic resonance imaging (fMRI) allowed the spatial characterization of the resting-state verbal language network (vLN). While other resting-state networks (RSNs) were matched with their electrophysiological equivalents at rest and could be spectrally defined, such correspondence is lacking for the vLN. This magnetoencephalography (MEG) study aimed at defining the spatio-spectral characteristics of the neuromagnetic intrinsic functional architecture of the vLN.

Neuromagnetic activity was recorded at rest in 100 right-handed healthy adults (age range: 18–41 years). Band-limited power envelope correlations were performed within and across frequency bands (θ , α , β , and low γ) from a seed region

placed in the left Broca's area, using static orthogonalization as leakage correction. K-means clustering was used to segregate spatio-spectral clusters of resting-state functional connectivity (rsFC). Remarkably, unlike other RSNs, within-frequency long-range rsFC from the left Broca's area was not driven by one main carrying frequency but was characterized by a specific spatio-spectral pattern segregated along the ventral (predominantly θ and α) and dorsal (β and low- γ bands) vLN streams. In contrast, spatial patterns of cross-frequency vLN functional integration were spectrally more widespread and involved multiple frequency bands. Moreover, the static intrinsic functional architecture of the neuromagnetic human vLN involved clearly left-hemisphere-dominant vLN interactions as well as cross-network interactions with the executive control network and postero-medial nodes of the DMN. Overall, this study highlighted the involvement of multiple modes of within and cross-frequency power envelope couplings at the basis of long-range electrophysiological vLN functional integration. As such, it lays the foundation for future works aimed at understanding the pathophysiology of language-related disorders.

https://www.frontiersin.org/articles/10.3389/fnint.2020.00027/full?utm_source=F-AAE&utm_medium=EMLF&utm_campaign=MRK_1348443_55_Neurosci_20200609_arts_A

Nature Communications

PAPERS

MAREIKE FLOEGEL, SUSANNE FUCHS & CHRISTIAN A. KELL – Differential contributions of the two cerebral hemispheres to temporal and spectral speech feedback control

Proper speech production requires auditory speech feedback control. Models of speech production associate this function with the right cerebral hemisphere while the left hemisphere is proposed to host speech motor programs. However, previous studies have investigated only spectral perturbations of the auditory speech feedback. Since auditory perception is known to be lateralized, with right-lateralized analysis of spectral features and left-lateralized processing of temporal features, it is unclear whether the observed right-lateralization of auditory speech feedback processing reflects a preference for speech feedback control or for spectral processing in general. Here we use a behavioral speech adaptation experiment with dichotically presented altered auditory feedback and an analogous fMRI experiment with binaurally presented altered feedback to confirm a right hemisphere preference for spectral feedback control and to reveal a left hemisphere preference for temporal feedback control during speaking. These results indicate that auditory feedback control involves both hemispheres with differential contributions along the spectro-temporal axis.

<https://www.nature.com/articles/s41467-020-16743-2>

Nature Scientific Reports

PAPERS

JOAQUIM FORT – Biased dispersal can explain fast human range expansions

Some human fronts spread faster than expected by models based on dispersal and reproduction. The only explanation proposed so far assumes that some autochthonous individuals are incorporated by the expanding populations, leading to faster front speeds. Here we show that simple models without this effect are also consistent with the observed speeds of two fronts (a Khoi-khoi expansion of herders and a Bantu expansion of farmers), provided that the dispersal of individuals is biased (i.e., more probable) in directions closer to the front propagation direction. The physical models presented may also be applied to other kinds of social phenomena, including innovation diffusion, rumor propagation, linguistic fronts, epidemic spread, diffusion in economic space and the evolution of cooperation in spatial systems. They can be also adapted to non-human systems with biased dispersal, including biological invasions, cancer tumors and virus treatment of tumors.

<https://www.nature.com/articles/s41598-020-66045-2>

ANTONIETTA GABRIELLA LIUZZI, AIDAS AGLINSKAS & SCOTT LAURENCE FAIRHALL – General and feature-based semantic representations in the semantic network

How semantic representations are manifest over the brain remains a topic of active debate. A semantic representation may be determined by specific semantic features (e.g. sensorimotor information), or may abstract away from specific features and represent generalized semantic characteristics (general semantic representation). Here we tested whether nodes of the semantic system code for a general semantic representation and/or possess representational spaces linked to particular semantic features. In an fMRI study, eighteen participants performed a typicality judgment task with written words drawn from sixteen different categories. Multivariate pattern analysis (MVPA) and representational similarity analysis (RSA) were adopted to investigate the sensitivity of the brain regions to semantic content and the type of semantic representation coded (general or feature-based). We replicated previous findings of sensitivity to general semantic similarity in posterior middle/inferior temporal gyrus (pMTG/ITG) and precuneus (PC) and additionally observed general semantic representations in ventromedial prefrontal cortex (PFC). Finally, two brain regions of the semantic network were sensitive to semantic features: the left pMTG/ITG was sensitive to haptic perception and the left ventral temporal cortex (VTC) to size. This finding supports the involvement of both general semantic representation and feature-based representations in the brain's semantic system.

<https://www.nature.com/articles/s41598-020-65906-0>

ROSALIA GALLOTTI et al – Dedicated core-on-anvil production of bladelet-like flakes in the Acheulean at Thomas Quarry I - L1 (Casablanca, Morocco)

The ability to produce large cutting tools (LCTs) is considered as the technological marker of the Acheulean and the indicator of a greater technological complexity compared to the previous Oldowan. Although Acheulean techno-complexes are also composed of a concurrent core-and-flake technology, the iconic handaxes have attracted more attention than any other lithic component. Consequently, little is known of the small and medium-sized flake productions (small flaking), especially starting from 1 Ma, when handaxe and cleaver manufacture becomes intensive and widespread across Africa, including the Atlantic coastal regions of Morocco. Research at Thomas Quarry I yielded a rich early Acheulean lithic assemblage, mainly composed of quartzite LCTs and small flaking, together with a small-sized flint production. Here, we report a particular aspect of this flint assemblage, i.e. a flint bladelet-like flake production. This process represents a discrete technical behaviour among those related to small flaking both in quartzite and flint: pebbles were flaked using the bipolar-on-anvil technique repeatedly employing a specific method to produce bladelet-like flakes. This production represents the oldest dated occurrence of bladelet-like technology in Africa and reveals technical competencies hitherto unknown for these periods, providing further elements for the techno-economic diversification of the African Acheulean.

<https://www.nature.com/articles/s41598-020-65903-3>

ROSSELLA DUCHES et al – Experimental and archaeological data for the identification of projectile impact marks on small-sized mammals

The role of small game in prehistoric hunter-gatherer economy is a highly debated topic. Despite the general assumption that this practice was uneconomic, several studies have underlined the relevance of the circumstance of capture – in terms of hunting strategies and technology – in the evaluation of the actual role of small mammals in human foraging efficiency. Since very few studies have focused on the recognition of bone hunting lesions, in a previous work we explored the potential of 3D microscopy in distinguishing projectile impact marks from other taphonomic marks, developing a widely-applicable diagnostic framework based on experimental data and focused on Late Epigravettian projectiles. Even though we confirmed the validity of the method on zooarchaeological remains of large-sized mammals, the reliability of the experimental record in relation to smaller animals needed more testing and verification. In this report we thus present the data acquired through a new ballistic experiment on small mammals and compare the results to those previously obtained on medium-sized animals, in order to bolster the diagnostic criteria useful in bone lesion identification with specific reference to small game. We also present the application of this renewed methodology to an archaeological context dated to the Late Glacial and located in the eastern Italian Alps.

<https://www.nature.com/articles/s41598-020-66044-3>

TIMOTHY HUGHES et al – Runaway multi-allelic copy number variation at the α -defensin locus in African and Asian populations

Alpha defensins are anti-microbial peptides of the innate immune system. The defensin A1 and A3 genes are located in a repeat array of variable copy number (the DEFA1A3 locus) and encode the human neutrophil peptides 1, 2 and 3. The possibility that copy number variation (CNV) may be associated with infection susceptibility and autoimmune pathology motivated the study of DEFA1A3 CNV across populations. We enhanced two existing methods (one qPCR-based and one sequencing-based) to enable copy number estimation that discriminates between DEFA1 and DEFA3 genes. We used these methods to quantify A1/A3 copy number variation in 2504 samples from the 1000 Genomes high-coverage dataset as well as performing FiberFISH assays on selected samples to visualize the haplotypes. These methods produce accurate estimates and show that there are substantial differences between populations. The African population is a clear outlier with a high frequency of the ancestral pure DEFA1 haplotype, but also harbours exceptionally long haplotypes of 24 copies of both DEFA1 and DEFA3, whilst the East Asian population displays the highest mean level of DEFA3 copy number. Further, our findings demonstrate that qPCR can be an accurate method for CNV estimation and that defensins substantially extend the known range of copy number variation for a human protein-coding gene.

<https://www.nature.com/articles/s41598-020-65675-w>

EAMONN FERGUSON, RUSLAN SHICHMAN & JONATHAN H. W. TAN – When Lone Wolf Defectors Undermine the Power of the Opt-Out Default

High levels of cooperation are a central feature of human society, and conditional cooperation has been proposed as one proximal mechanism to support this. The counterforce of free-riding can, however, undermine cooperation and as such a number of external mechanisms have been proposed to ameliorate the effects of free-riding. One such mechanism is setting cooperation as the default (i.e., an opt-out default). We posit, however, that in dynamic settings where people can observe and condition their actions on others' behaviour, 'lone wolf' defectors undermine initial cooperation encouraged by an opt-out default, while 'good shepherds' defeat the free-riding encouraged by an opt-in default. Thus, we examine the dynamic emergence of conditional cooperation under different default settings. Specifically, we develop a game theoretical model to analyse cooperation under defaults for cooperation (opt-out) and defection (opt-in). The model predicts that the 'lone wolf' effect is stronger than the 'good shepherd' effect, which – if anticipated by players – should strategically deter free-riding under opt-out and cooperation under opt-in. Our experimental games confirm the existence of both 'lone wolf' defectors and 'good shepherd' cooperators, and that the 'lone wolf' effect is stronger in the context of organ donation registration

behaviour. We thus show a potential 'dark side' to conditional cooperation ('lone wolf effect') and draw implications for the adoption of an opt-out organ donation policy.

<https://www.nature.com/articles/s41598-020-65163-1>

PeerJ

PAPERS

FLORIAN SCHMIEDEK et al – Within-person structures of daily cognitive performance differ from between-person structures of cognitive abilities

Over a century of research on between-person differences has resulted in the consensus that human cognitive abilities are hierarchically organized, with a general factor, termed general intelligence or “g,” uppermost. Surprisingly, it is unknown whether this body of evidence is informative about how cognition is structured within individuals. Using data from 101 young adults performing nine cognitive tasks on 100 occasions distributed over six months, we find that the structures of individuals' cognitive abilities vary among each other, and deviate greatly from the modal between-person structure.

Working memory contributes the largest share of common variance to both between- and within-person structures, but the g factor is much less prominent within than between persons. We conclude that between-person structures of cognitive abilities cannot serve as a surrogate for within-person structures. To reveal the development and organization of human intelligence, individuals need to be studied over time.

<https://peerj.com/articles/9290/>

PLoS One

PAPERS

LAURA MARTÍN-FRANCÉS et al with JOSÉ MARÍA BERMÚDEZ DE CASTRO – Crown tissue proportions and enamel thickness distribution in the Middle Pleistocene hominin molars from Sima de los Huesos (SH) population (Atapuerca, Spain)

Dental enamel thickness, topography, growth and development vary among hominins. In Homo, the thickness of dental enamel in most Pleistocene hominins display variations from thick to hyper-thick, while Neanderthals exhibit proportionally thinner enamel. The origin of the thin trait remains unclear. In this context, the Middle Pleistocene human dental assemblage from Atapuerca-Sima de los Huesos (SH) provides a unique opportunity to trace the evolution of enamel thickness in European hominins. In this study, we aim to test the hypothesis if the SH molar sample approximates the Neanderthal condition for enamel thickness and/or distribution. This study includes 626 molars, both original and comparative data. We analysed the molar inner structural organization of the original collections (n = 124), belonging to SH (n = 72) and modern humans from Spanish origin (n = 52). We compared the SH estimates to those of extinct and extant populations of the genus Homo from African, Asian and European origin (estimates extracted from literature n = 502). The comparative sample included maxillary and mandibular molars belonging to H. erectus, East and North African Homo, European Middle Pleistocene Homo, Neanderthals, and fossil and extant H. sapiens. We used high-resolution images to investigate the endostructural configuration of SH molars (tissue proportions, enamel thickness and distribution). The SH molars exhibit on average thick absolute and relative enamel in 2D and 3D estimates, both in the complete crown and the lateral enamel. This primitive condition is shared with the majority of extinct and extant hominin sample, except for Neanderthals and some isolated specimens. On the contrary, the SH molar enamel distribution maps reveal a distribution pattern similar to the Neanderthal signal (with thicker enamel on the lingual cusps and more peripherally distributed), compared to H. antecessor and modern humans. Due to the phylogenetic position of the SH population, the thick condition in molars could represent the persistence of the plesiomorphic condition in this group. Still, more data is needed on other Early and Middle Pleistocene populations to fully understand the evolutionary meaning of this trait.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0233281>

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>

ZHANYANG LI et al with FRANCESCO D'ERRICO – A Paleolithic bird figurine from the Lingjing site, Henan, China

The recent identification of cave paintings dated to 42–40 ka BP in Borneo and Sulawesi highlights the antiquity of painted representations in this region. However, no instances of three-dimensional portable art, well attested in Europe since at least 40 ka BP, were documented thus far in East Asia prior to the Neolithic. Here, we report the discovery of an exceptionally well-preserved miniature carving of a standing bird from the site of Lingjing, Henan, China. Microscopic and microtomographic analyses of the figurine and the study of bone fragments from the same context reveal the object was made of bone blackened by heating and carefully carved with four techniques that left diagnostic traces on the entire surface of the object. Critical analysis of the site's research history and stratigraphy, the cultural remains associated with the figurine and those recovered from the other archeological layers, as well as twenty-eight radiometric ages obtained on associated archeological items, including one provided by a bone fragment worked with the same technique recorded on the object, suggest a Late Paleolithic origin for the carving, with a probable age estimated to 13,500 years old. The carving, which predates previously known comparable instances from this region by 8,500 years, demonstrates that three-dimensional avian representations were part of East Asian Late Pleistocene cultural repertoires and identifies technological and stylistic peculiarities distinguishing this newly discovered art tradition from previous and contemporary examples found in Western Europe and Siberia.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0233370>

LOUAH SIRRI et al – Infants' conceptual representations of meaningful verbal and nonverbal sounds

In adults, words are more effective than sounds at activating conceptual representations. We aimed to replicate these findings and extend them to infants. In a series of experiments using an eye tracker object recognition task, suitable for both adults and infants, participants heard either a word (e.g. cow) or an associated sound (e.g. mooing) followed by an image illustrating a target (e.g. cow) and a distracter (e.g. telephone). The results showed that adults reacted faster when the visual object matched the auditory stimulus and even faster in the word relative to the associated sound condition. Infants, however, did not show a similar pattern of eye-movements: only eighteen-month-olds, but not 9- or 12-month-olds, were equally fast at recognizing the target object in both conditions. Looking times, however, were longer for associated sounds, suggesting that processing sounds elicits greater allocation of attention. Our findings suggest that the advantage of words over associated sounds in activating conceptual representations emerges at a later stage during language development.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0233968>

PNAS

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/early/2020/06/03/2002981117.abstract?etoc>

JORGE MORALES, AXEL BAX & CHAZ FIRESTONE – Sustained representation of perspectival shape

Arguably the most foundational principle in perception research is that our experience of the world goes beyond the retinal image; we perceive the distal environment itself, not the proximal stimulation it causes. Shape may be the paradigm case of such “unconscious inference”: When a coin is rotated in depth, we infer the circular object it truly is, discarding the perspectival ellipse projected on our eyes. But is this really the fate of such perspectival shapes? Or does a tilted coin retain an elliptical appearance even when we know it's circular? This question has generated heated debate from Locke and Hume to the present; but whereas extant arguments rely primarily on introspection, this problem is also open to empirical test. If tilted coins bear a representational similarity to elliptical objects, then a circular coin should, when rotated, impair search for a distal ellipse. Here, nine experiments demonstrate that this is so, suggesting that perspectival shapes persist in the mind far longer than traditionally assumed. Subjects saw search arrays of three-dimensional “coins,” and simply had to locate a distally elliptical coin. Surprisingly, rotated circular coins slowed search for elliptical targets, even when subjects clearly knew the rotated coins were circular. This pattern arose with static and dynamic cues, couldn't be explained by strategic responding or unfamiliarity, generalized across shape classes, and occurred even with sustained viewing. Finally, these

effects extended beyond artificial displays to real-world objects viewed in naturalistic, full-cue conditions. We conclude that objects have a remarkably persistent dual character: their objective shape “out there,” and their perspectival shape “from here.”

{I think they have forgotten that most people (and, I suspect, all their experimental subjects) have two working eyes and therefore two perspectives on the world. For example, close one eye and hold a coin in front of your nose so you can only see the edge and neither face. Now, without moving the coin, close the open eye and open the closed eye. In other words, we never see just the edge of a coin if we use both eyes, and just because our brain translates the two images into one does not mean it is unable to access the individual images. There may be one objective shape, but there are two perspectival shapes.}

<https://www.pnas.org/content/early/2020/06/11/2000715117.abstract?etoc>

Proceedings of the Royal Society B

PAPERS

NANCY REBOUT et al – Tolerant and intolerant macaques show different levels of structural complexity in their vocal communication

We tested the social complexity hypothesis which posits that animals living in complex social environments should use complex communication systems. We focused on two components of vocal complexity: diversity (number of categories of calls) and flexibility (degree of gradation between categories of calls). We compared the acoustic structure of vocal signals in groups of macaques belonging to four species with varying levels of uncertainty (i.e. complexity) in social tolerance (the higher the degree of tolerance, the higher the degree of uncertainty): two intolerant species, Japanese and rhesus macaques, and two tolerant species, Tonkean and crested macaques. We recorded the vocalizations emitted by adult females in affiliative, agonistic and neutral contexts. We analysed several acoustic variables: call duration, entropy, time and frequency energy quantiles. The results showed that tolerant macaques displayed higher levels of vocal diversity and flexibility than intolerant macaques in situations with a greater number of options and consequences, i.e. in agonistic and affiliative contexts. We found no significant differences between tolerant and intolerant macaques in the neutral context where individuals are not directly involved in social interaction. This shows that species experiencing more uncertain social interactions displayed greater vocal diversity and flexibility, which supports the social complexity hypothesis.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.0439>

MARCEL MONTREY & THOMAS R. SHULTZ – The evolution of high-fidelity social learning

A defining feature of human culture is that knowledge and technology continually improve over time. Such cumulative cultural evolution (CCE) probably depends far more heavily on how reliably information is preserved than on how efficiently it is refined. Therefore, one possible reason that CCE appears diminished or absent in other species is that it requires accurate but specialized forms of social learning at which humans are uniquely adept. Here, we develop a Bayesian model to contrast the evolution of high-fidelity social learning, which supports CCE, against low-fidelity social learning, which does not. We find that high-fidelity transmission evolves when (1) social and (2) individual learning are inexpensive, (3) traits are complex, (4) individual learning is abundant, (5) adaptive problems are difficult and (6) behaviour is flexible. Low-fidelity transmission differs in many respects. It not only evolves when (2) individual learning is costly and (4) infrequent but also proves more robust when (3) traits are simple and (5) adaptive problems are easy. If conditions favouring the evolution of high-fidelity transmission are stricter (3 and 5) or harder to meet (2 and 4), this could explain why social learning is common, but CCE is rare.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.0090>

KEVIN TANG et al – DCDC2 READ1 regulatory element: how temporal processing differences may shape language

Classic linguistic theory ascribes language change and diversity to population migrations, conquests, and geographical isolation, with the assumption that human populations have equivalent language processing abilities. We hypothesize that spectral and temporal characteristics make some consonant manners vulnerable to differences in temporal precision associated with specific population allele frequencies. To test this hypothesis, we modelled association between RU1-1 alleles of DCDC2 and manner of articulation in 51 populations spanning five continents, and adjusting for geographical proximity, and genetic and linguistic relatedness. RU1-1 alleles, acting through increased expression of DCDC2, appear to increase auditory processing precision that enhances stop-consonant discrimination, favouring retention in some populations and loss by others. These findings enhance classical linguistic theories by adding a genetic dimension, which until recently, has not been considered to be a significant catalyst for language change.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2019.2712>

CEDRIC PERRET, EMMA HART & SIMON T. POWERS – From disorganized equality to efficient hierarchy: how group size drives the evolution of hierarchy in human societies

A manifest trend is that larger and more productive human groups shift from distributed to centralized decision-making. Voluntary theories propose that human groups shift to hierarchy to limit scalar stress, i.e. the increase in cost of organization as a group grows. Yet, this hypothesis lacks a mechanistic model to investigate the organizational advantage of hierarchy and its role on its evolution. To fill this gap, we describe social organization by the distribution of individuals' capacity to influence

others. We then integrate this formalization into models of social dynamics and evolutionary dynamics. First, our results demonstrate that hierarchy strongly reduces scalar stress, and that this benefit can emerge solely because leaders and followers differ in their capacity to influence others. Second, the model demonstrates that this benefit can be sufficient to drive the evolution of leader and follower behaviours and ultimately, the transition from small egalitarian to large hierarchical groups.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.0693>

Science Advances

PAPERS

KE WANG et al with JOHANNES KRAUSE – Ancient genomes reveal complex patterns of population movement, interaction, and replacement in sub-Saharan Africa

Africa hosts the greatest human genetic diversity globally, but legacies of ancient population interactions and dispersals across the continent remain understudied. Here, we report genome-wide data from 20 ancient sub-Saharan African individuals, including the first reported ancient DNA from the DRC, Uganda, and Botswana. These data demonstrate the contraction of diverse, once contiguous hunter-gatherer populations, and suggest the resistance to interaction with incoming pastoralists of delayed-return foragers in aquatic environments. We refine models for the spread of food producers into eastern and southern Africa, demonstrating more complex trajectories of admixture than previously suggested. In Botswana, we show that Bantu ancestry post-dates admixture between pastoralists and foragers, suggesting an earlier spread of pastoralism than farming to southern Africa. Our findings demonstrate how processes of migration and admixture have markedly reshaped the genetic map of sub-Saharan Africa in the past few millennia and highlight the utility of combined archaeological and archaeogenetic approaches.

https://advances.sciencemag.org/content/6/24/eaaz0183?utm_campaign=toc_advances_2020-06-12&et rid=17774313&et cid=3363680

MICHELLE C. LANGLEY et al – Bows and arrows and complex symbolic displays 48,000 years ago in the south Asian tropics

Archaeologists contend that it was our aptitude for symbolic, technological, and social behaviors that was central to Homo sapiens rapidly expanding across the majority of Earth's continents during the late Pleistocene. This expansion included movement into extreme environments and appears to have resulted in the displacement of numerous archaic human populations across the old world. Tropical rainforests are thought to have been particularly challenging and, until recently, impenetrable by early H. sapiens. Here, we describe evidence for bow-and-arrow hunting toolkits alongside a complex symbolic repertoire from 48,000 years before present at the Sri Lankan site of Fa-Hien Lena—the earliest bow-and-arrow technology outside of Africa. As one of the oldest H. sapiens rainforest sites outside of Africa, this exceptional assemblage provides the first detailed insights into how our species met the extreme adaptive challenges that were encountered in Asia during global expansion.

https://advances.sciencemag.org/content/6/24/eaba3831?utm_campaign=toc_advances_2020-06-12&et rid=17774313&et cid=3363680

Trends in Cognitive Sciences

PAPERS

H. CLARK BARRETT – Towards a Cognitive Science of the Human: Cross-Cultural Approaches and Their Urgency

While a major aim of cognitive science is to understand human cognition, our conclusions are based on unrepresentative samples of the world's population. A new wave of cross-cultural cognitive science has sought to remedy this with studies that are increasing in scope, scale, and visibility. Here, I review the state of this new wave of research. The portrait of human cognition that emerges is one of variations on a theme, with species-typical capacities shaped by culture and individual experience. The new wave has expanded our understanding of processes underlying human variation and cumulative cultural change, including mechanisms of social learning and cultural transmission. Less consensus has been reached, however, on the cognitive foundations of human nature. The promise of cross-cultural cognitive science will not be fully realized unless we continue to be more inclusive of the world's populations and strive for a more complete cognitive portrait of our species.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(20\)30131-5?dgcid=raven_jbs_aip_email](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(20)30131-5?dgcid=raven_jbs_aip_email)

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