EAORC BULLETIN 1,053 – 20 August 2023

CONTENTS

NOTICES

PUBLICATION ALERTS

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

EDITORIAL INTERJECTIONS

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

ACADEMIA.EDU – 'Trajectory B' from animal to human culture

Humanities and Social Sciences Communications 10, 402 (2023).

CLAES ANDERSSON & CLAUDIO TENNIE – Zooming out the microscope on cumulative cultural evolution: 'Trajectory B' from animal to human culture

It is widely believed that human culture originated in the appearance of Oldowan stone-tool production (circa 2.9 Mya) and a primitive but effective ability to copy detailed know-how. Cumulative cultural evolution is then believed to have led to modern humans and human culture via self-reinforcing gene-culture co-evolution. This outline evolutionary trajectory has come to be seen as all but self-evident, but dilemmas have appeared as it has been explored in increasing detail. Can we attribute even a minimally effective know-how copying capability to Oldowan hominins? Do Oldowan tools really demand know-how copying? Is there any other evidence that know-how copying was present? We here argue that this account, which we refer to as "Trajectory A", may be a red herring, and formulate an alternative "Trajectory B" that resolves these dilemmas. Trajectory B invokes an overlooked group-level channel of cultural inheritance (the Social Protocell) whereby networks of cultural traits can be faithfully inherited and potentially undergo cumulative evolution, also when the underpinning cultural traits are apelike in not being transmitted via know-how copying (Latent Solutions). Since most preconditions of Trajectory B are present in modern-day Pan, Trajectory B may even have its roots considerably before Oldowan toolmaking. The cumulative build-up of networks of non-cumulative cultural traits is then argued to have produced conditions that both called for and afforded a gradual appearance of the ability to copy know-how, but considerably later than the Oldowan.

https://www.academia.edu/105004725/Zooming_out_the_microscope_on_cumulative_cultural_evolution_Trajectory_B_from_animal_to_human_culture

NEWS

NATURE BRIEFING – Iceman Ötzi was balding and dark-skinned

Ötzi the Iceman, the iconic 5,300-year-old mummy found in the Alps in 1991, was not the pale, long-haired man who he is often depicted to be. Improved DNA analysis reveals that Ötzi had much more melanin in his skin and probably had male-pattern baldness. It also showed that his suspected steppe ancestry — from people hailing from eastern Europe and central Asia — probably stemmed from modern DNA contamination. Instead, Ötzi had Anatolian-farmer ancestry.

https://nature.us17.list-manage.com/track/click?u=2c6057c528fdc6f73fa196d9d&id=3cae317dfe&e=1db4b9a19b

SCIENCEADVISER – Uncovering how climate shaped human history

Tens of thousands of years ago, several species of human—including ours as well as Neanderthals and Denisovans—intimately interacted with one another. We know this because some of their DNA lingers on in us, and ancient DNA has found individuals with mixed parentage. So to understand the evolution of humans, scientists need to know when and where these species overlapped in space and time, but that's a question fossils alone can't answer well. Luckily, computer modeling is filling the gaps, University of Houston geoarchaeologist Emily Beverly writes in a Perspective for Science.

Beverly reflects on a pair of papers published in the same issue of the journal, both of which used modeling to transform sparse data from fossils and geological samples into a rich narrative of how climate and ecosystems changed during—and shaped—ancient human history. For instance, modeling in one paper indicated that all of Europe would have been basically uninhabitable 1.1 million years ago, so the humans who had made their way to the continent before then were likely wiped out. Meanwhile, the other study suggests that the habitats of Denisovans and Neanderthals overlapped substantially in certain areas during interglacial periods.

"An added benefit of these types of studies is that the models can be rerun as more fossil and climate records are added," Beverly writes.

https://www.science.org/doi/10.1126/science.adj4631

SCIENCEADVISER – Ötzi the Iceman gets a new look

No one is safe from the age-old misfortune of a receding hairline—not even Ötzi the Iceman. Discovered in 1991 by hikers in the Ötztal Alps, Ötzi was a Copper Age fellow who had been naturally mummified by ice, sun, and wind, keeping his body from decomposing for over 5,300 years. And in the past three decades, he has provided scientists with an invaluable peek into life during prehistoric Europe.

Though the Iceman's DNA had been examined before, researchers for a study published yesterday in Cell Genomics have now reconstructed the Iceman's entire genome with cutting-edge methods, which resulted in a more confident and complete sequence. It turns out Ötzi likely had dark skin, a bald head, and the highest percentage of Anatolian farmer ancestry yet recorded in an individual of his time.

This new look may come as a surprise to the hundreds of thousands of visitors who have met Ötzi's life-sized reconstruction at the Italian museum where his remains are housed. "If you think about the appearance of the mummy, it's actually bald and it has dark skin—yet it was still reconstructed with lots of hair and light skin," says study co-author Johannes Krause, a geneticist at the Max Planck Institute for Evolutionary Anthropology. "This reflects our own biases in assuming what a person from that time looked like."
https://www.science.org/content/article/otzi-tyrolean-iceman-had-dark-skin-and-receding-hairline

SCIENCEADVISER – Environmental scientists abandon Twitter X

According to our simple survey, many ScienceAdviser readers weren't on Twitter when Elon Musk took the helm of the social media platform. But lots of scientists were, and we're starting to get data on how the takeover has affected their behavior. Spoiler alert: It's not good.

According to a new paper in Trends in Ecology and Evolution, almost half of 380,000 users who were previously a part of 'Environmental Twitter' became inactive between October 2022, when the company was sold, and April 2023. Meanwhile, only about one-fifth of a comparable sample of 'Political Twitter' users had similarly gone dark.

The study didn't survey these users, so it can't speak directly to why they've abandoned X. Since the data were obtained before the rebranding effort, it's safe to say that wasn't it. The researchers suggest a rise in climate-related disinformation (and disinformation and hate speech in general) could be to blame.

That certainly fits with the comments provided by some of the people who filled out our survey. "Social media seems more toxic than useful. It is definitely an environment that is in need of cleaning up," one polymer chemist noted. And it fits with what almost 9200 scientists told Nature: More than half have cut the time they spend on X, and 7% have signed out completely, predominantly citing post-Musk changes. "Twitter has always been not so nice let's say, but it is a mess right now," one researcher told Nature.

What will happen now? No one knows for sure. Nature noted that 46% of their respondents had joined other platforms; that's roughly the same percentage that told ScienceAdviser they'd either gotten off X already or were looking at alternatives. As far as other platforms go, Facebook and Instagram were the top two already joined by our respondents—still, most said they didn't think Threads was for them. Mastodon and LinkedIn weren't too far behind, so perhaps those communities can fill some of the gaps. Let's hope so, anyway.
{So electronic Twitter users are becoming e-X users. Elaine Musk sure didn't see that one coming. It takes nearly 1,400 years to earn $44 billion at 1 dollar a second; clearly much less time to lose it.}

THE CONVERSATION – Why bilinguals may have a memory advantage – new research

Bilinguals may struggle with hangman but they excel at remembering and categorising objects.
https://theconversationuk.cmail19.com/t/r-l-tthkiuhy-khhlilahh-o/

THE CONVERSATION – Consciousness may rely on brain cells acting collectively

We still don't know a lot about how the networks of cells in the brain enable conscious experience.
https://theconversationuk.cmail20.com/t/r-l-tthumjy-khhlilahh-w/

PUBLICATIONS

Cell Genomics

PAPERS

KE WANG et al with KAY PRÜFER & JOHANNES KRAUSE – High-coverage genome of the Tyrolean Iceman reveals unusually high Anatolian farmer ancestry

The Tyrolean Iceman is known as one of the oldest human glacier mummies, directly dated to 3350–3120 calibrated BCE. A previously published low-coverage genome provided novel insights into European prehistory, despite high present-day DNA contamination. Here, we generate a high-coverage genome with low contamination (15.3×) to gain further insights into the genetic history and phenotype of this individual. Contrary to previous studies, we found no detectable Steppe-related ancestry in the Iceman. Instead, he retained the highest Anatolian-farmer-related ancestry among contemporaneous European populations, indicating a rather isolated Alpine population with limited gene flow from hunter-gatherer-ancestry-related populations. Phenotypic analysis revealed that the Iceman likely had darker skin than present-day Europeans and carried risk alleles associated with male-pattern baldness, type 2 diabetes, and obesity-related metabolic syndrome. These results corroborate phenotypic observations of the preserved mummified body, such as high pigmentation of his skin and the absence of hair on his head.
https://www.cell.com/cell-genomics/fulltext/S2666-979X(23)00174-X

eLife

ARTICLES

Social training changes the brain

Three months of training to increase compassion or understanding of others can alter the function and structure of various regions in the human brain.
https://elifesciences.org/digests/85188/social-training-changes-the-brain

PAPERS

BINGJIANG LYU et al – Finding structure during incremental speech comprehension

A core aspect of human speech comprehension is the incremental combination of consecutive words into a structured and coherent interpretation of the speaker's intended meaning. This rapid process is subject to multi-dimensional probabilistic constraints, including both linguistic and non-linguistic knowledge in the specific context, and it is their interpretative coherence that drives successful comprehension. To unveil the neural substrates of this process, we extracted word-by-word measures of sentential structure from artificial neural networks, approximating a coherent outcome of the dynamic interplay between various types of constraints that is difficult to model with traditional methods. Using representational similarity analysis, we tested these structural measures and relevant lexical properties against the spatiotemporally resolved brain activity recorded by electro/magnetoencephalography when participants were listening to the same sentences. Our results reveal a detailed picture of the neurobiological processes involved in building structured interpretations through the integration across multifaceted constraints, including an extensive set of bilateral brain regions beyond the classical fronto-temporal language system, which sheds light on the distributed nature of language processing in the brain. This study also highlights the power of combining multiple methodologies to uncover the neural dynamics of complex cognitive processes.
https://elifesciences.org/reviewed-preprints/89311

SOFIE LOUISE VALK et al – Functional and microstructural plasticity following social and interoceptive mental training

The human brain supports social cognitive functions, including Theory of Mind, empathy, and compassion, through its intrinsic hierarchical organization. However, it remains unclear how the learning and refinement of social skills shapes brain function and structure. We studied if different types of social mental training induce changes in cortical function and microstructure, investigating 332 healthy adults (197 women, 20–55 years) with repeated multimodal neuroimaging and behavioral testing. Our neuroimaging approach examined longitudinal changes in cortical functional gradients and myelin-sensitive T1 relaxometry, two complementary measures of cortical hierarchical organization. We observed marked changes in intrinsic cortical function and microstructure, which varied as a function of social training content. In particular, cortical function and microstructure changed as a result of attention-mindfulness and socio-cognitive training in regions functionally associated with attention and interoception, including insular and parietal cortices. Conversely, socio-affective and socio-cognitive training resulted in differential microstructural changes in regions classically implicated in interoceptive and emotional processing, including insular and orbitofrontal areas, but did not result in functional reorganization. Notably, longitudinal changes in cortical function and microstructure predicted behavioral change in attention, compassion and perspective-taking. Our work demonstrates functional and microstructural plasticity after the training of social-interoceptive functions, and illustrates the bidirectional relationship between brain organisation and human social skills.
https://elifesciences.org/articles/85188

Frontiers in Human Dynamics

PAPERS

TREVOR WATKINS – Settling down in Southwest Asia: the Epipalaeolithic-Neolithic transformation

Permanent settlement began in southwest Asia across the end of the Pleistocene (the Epipalaeolithic) and the beginning of the Holocene (the Neolithic). Aggregation represents a transformation of the cultural niche, involving major social and cultural innovations and profound developments of the strategies of subsistence. At first, the scalar stress of living in large, permanent communities was diffused through corporate effort in the construction and maintenance of monumental communal buildings, a complex material symbolism, and increasing intensity of communal rituals; participation demonstrated commitment and conformity to community norms. As cultivated crops and managed herds of sheep and goat gradually became the predominant source of subsistence, the old sharing ethos was overtaken by the household as the central socio-economic unit; the household became the focus for ritual and symbolism. As population aggregations grew larger, their supra-regional networks of socio-economic sharing and exchange also became more complex, extensive and intensive. The new cultural niche based on networked aggregations produced a marked acceleration in both the rate of cultural accumulation and the rate of demographic growth. At the end of the Neolithic, plow-agriculture began in place of horticulture; there are the first signs of mixed agro-pastoral economies, the marking of private property, new technologies (ceramics and copper metallurgy), and, in southern Iraq, irrigation agriculture. At this time, too, the accelerating expansion of the population of farmers is marked by the appearance of their new settlements in all directions.
https://www.frontiersin.org/articles/10.3389/fhumd.2023.1250167/full

Frontiers in Human Neuroscience

PAPERS

JESSICA MORREL et al – Neural correlates and predictors of speech and language development in infants at elevated likelihood for autism: a systematic review

Autism spectrum disorder (ASD) is an increasingly prevalent and heterogeneous neurodevelopmental condition, characterized by social communicative differences, and a combination of repetitive behaviors, focused interests, and sensory sensitivities. Early speech and language delays are characteristic of young autistic children and are one of the first concerns reported by parents; often before their child's second birthday. Elucidating the neural mechanisms underlying these delays has the potential to improve early detection and intervention efforts. To fill this gap, this systematic review aimed to synthesize evidence on early neurobiological correlates and predictors of speech and language development across different neuroimaging modalities in infants with and without a family history of autism [at an elevated (EL infants) and low likelihood (LL infants) for developing autism, respectively]. A comprehensive, systematic review identified 24 peer-reviewed articles published between 2012 and 2023, utilizing structural magnetic resonance imaging (MRI; n = 2), functional MRI (fMRI; n = 4), functional near-infrared spectroscopy (fNIRS; n = 4), and electroencephalography (EEG; n = 14). Three main themes in results emerged: compared to LL infants, EL infants exhibited (1) atypical language-related neural lateralization; (2) alterations in structural and functional connectivity; and (3) mixed profiles of neural sensitivity to speech and non-speech stimuli, with some differences detected as early as 6 weeks of age. These findings suggest that neuroimaging techniques may be sensitive to early indicators of speech and language delays well before overt behavioral delays emerge. Future research should aim to harmonize experimental paradigms both within and across neuroimaging modalities and additionally address the feasibility, acceptability, and scalability of implementing such methodologies in non-academic, community-based settings.
https://www.frontiersin.org/articles/10.3389/fnhum.2023.1211676/full

Frontiers in Psychology

PAPERS

CARLY DEMOPOULOS et al – Associations between rapid auditory processing of speech sounds and specific verbal communication skills in autism

The ability to rapidly process speech sounds is integral not only for processing other's speech, but also for auditory processing of one's own speech, which allows for maintenance of speech accuracy. Deficits in rapid auditory processing have been demonstrated in autistic individuals, particularly those with language impairment. We examined rapid auditory processing for speech sounds in relation to performance on a battery of verbal communication measures to determine which aspects of verbal communication were associated with cortical auditory processing in a sample of individuals with autism. Participants were 57 children and adolescents (40 male and 17 female) ages 5–18 who were diagnosed with an Autism Spectrum Disorder (ASD). Rapid auditory processing of speech sounds was measured via a magnetoencephalographic (MEG) index of the quality of the auditory evoked response to the second of two differing speech sounds ("Ga" / "Da") presented in rapid succession. Verbal communication abilities were assessed on standardized clinical measures of overall expressive and receptive language, vocabulary, articulation, and phonological processing. Associations between cortical measures of left- and right-hemisphere rapid auditory processing and verbal communication measures were examined.
Rapid auditory processing of speech sounds was significantly associated with speech articulation bilaterally ($r = 0.463$, $p = 0.001$ for left hemisphere and $r = 0.328$, $p = 0.020$ for right hemisphere). In addition, rapid auditory processing in the left hemisphere was significantly associated with overall expressive language abilities ($r = 0.354$, $p = 0.013$); expressive ($r = 0.384$, $p = 0.005$) vocabulary; and phonological memory ($r = 0.325$, $p = 0.024$). Phonological memory was found to mediate the relationship between rapid cortical processing and receptive language.
These results demonstrate that impaired rapid auditory processing for speech sounds is associated with dysfunction in verbal communication in ASD. The data also indicate that intact rapid auditory processing may be necessary for even basic communication skills that support speech production, such as phonological memory and articulatory control.
https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1223250/full

Frontiers in Psychiatry

PAPERS

KOSTAKIS GKIATIS et al – Independent component analysis: a reliable alternative to general linear model for task-based fMRI

Functional magnetic resonance imaging (fMRI) is a valuable tool for the presurgical evaluation of patients undergoing neurosurgeries. Although many pre-processing steps have been modified according to advances in recent years, statistical analysis has remained largely the same since the first days of fMRI. In this study, we examined the ability of Independent Component Analysis (ICA) to separate the activation of a language task in fMRI, and we compared it with the results of the General Lineal Model (GLM).
Sixty patients undergoing evaluation for brain surgery due to various brain lesions and/or epilepsy and 20 control subjects completed an fMRI language mapping protocol that included three tasks, resulting in 259 fMRI scans. Depending on brain

lesion characteristics, patients were allocated to (1) static/chronic not-expanding lesions (Group 1) and (2) progressive/expanding lesions (Group 2). GLM and ICA statistical maps were evaluated by fMRI experts to assess the performance of each technique.
In the control group, ICA and GLM maps were similar without any superiority of either technique. In Group 1 and Group 2, ICA performed statistically better than GLM, with a p-value of <0.01801 and <0.0237, respectively. This indicated that ICA performs as well as GLM when the subjects are able to cooperate well (less movement, good task performance), but ICA could outperform GLM in the patient groups. When both techniques were combined, 240 out of 259 scans produced reliable results, showing that the sensitivity of task-based fMRI can be increased when both techniques are integrated with the clinical setup.
ICA may be slightly more advantageous, compared to GLM, in patients with brain lesions, across the range of pathologies included in our population and independent of symptoms chronicity. Our findings suggest that GLM analysis may be more susceptible to brain activity perturbations induced by a variety of lesions or scanner-induced artifacts due to motion or other factors. In our research, we demonstrated that ICA is able to provide fMRI results that can be used in surgery, taking into account patient and task-wise aspects that differ from those when fMRI is used in research.
https://www.frontiersin.org/articles/10.3389/fpsyt.2023.1214067/full

NOOSHIN JAVAHERIPOUR et al – Altered brain network organization in adults with Asperger's syndrome: decreased connectome transitivity and assortativity with increased global efficiency

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that persists into adulthood with both social and cognitive disturbances. Asperger's syndrome (AS) was a distinguished subcategory of autism in the DSM-IV-TR defined by specific symptoms including difficulties in social interactions, inflexible thinking patterns, and repetitive behaviour without any delay in language or cognitive development. Studying the functional brain organization of individuals with these specific symptoms may help to better understand Autism spectrum symptoms.
The aim of this study is therefore to investigate functional connectivity as well as functional network organization characteristics using graph-theory measures of the whole brain in male adults with AS compared to healthy controls (HC) (AS: n = 15, age range 21–55 (mean ± sd: 39.5 ± 11.6), HC: n = 15, age range 22–57 [mean ± sd: 33.5 ± 8.5]).
No significant differences were found when comparing the region-by-region connectivity at the whole-brain level between the AS group and HC. However, measures of “transitivity,” which reflect local information processing and functional segregation, and “assortativity,” indicating network resilience, were reduced in the AS group compared to HC. On the other hand, global efficiency, which represents the overall effectiveness and speed of information transfer across the entire brain network, was increased in the AS group.
Our findings suggest that individuals with AS may have alterations in the organization and functioning of brain networks, which could contribute to the distinctive cognitive and behavioural features associated with this condition. We suggest further research to explore the association between these altered functional patterns in brain networks and specific behavioral traits observed in individuals with AS, which could provide valuable insights into the underlying mechanisms of its symptomatology.
https://www.frontiersin.org/articles/10.3389/fpsyt.2023.1223147/full

Interface: Journal of the Royal Society

PAPERS

EDWIN DICKINSON et al – A functional framework for interpreting phalangeal form

Across tetrapods, the proportional lengths of the manual and pedal phalanges are highly constrained, following a generalized blueprint of shortening in a proximodistal gradient. Despite this, several lineages of both mammals (e.g. sloths, bats and colugos) and birds (e.g. raptors, parrots and woodpeckers) have broken this pattern, shortening the proximal phalanx while elongating more distal elements. As yet, no unifying explanation for this convergence has been empirically evaluated. This study combines a comparative phylogenetic assessment of phalangeal morphology across mammals and birds with a novel bioinspired robotics approach to explicitly test functional hypotheses relating to these morphotypes. We demonstrate that shortening the proximal phalanx allows taxa to maximize forces produced at the proximal interphalangeal joint, while elongation of subsequent elements maintains total ray length—ensuring arboreal species can still enclose large-diameter supports. Within suspensory and vertically clinging mammals, we additionally observe a secondary adaptation towards maximizing grip strength: namely increasing the height of the trochleae to increase the moment arm of digital flexor muscles that cross the joint. Together, our analyses highlight that numerous tetrapod lineages independently converged upon this morphotype to maximize proximal gripping strength, an adaptation to support specialized hunting and locomotor behaviours.
https://royalsocietypublishing.org/doi/10.1098/rsif.2023.0251

iScience

PAPERS

SAKUMI IKI & IKUMA ADACHI – Fearful snake pictures make monkeys pessimistic

Judgment bias is the cognitive tendency of animals experiencing negative (or positive) affect to expect undesirable (or favorable) outcomes in ambiguous situations. The lack of examination of judgment biases induced by ecologically relevant stimuli hampers our understanding of the adaptive role of these biases. We examined whether predator-related stimuli, i.e., pictures of snakes, induce a pessimistic judgment bias in Japanese macaques (Macaca fuscata). Our subjects underwent a touchscreen-based Go/No-go judgment bias test. We found that the subjects were less likely and slower to make Go responses to ambiguous stimuli after viewing the snake pictures, indicating that pictures of snakes induce a pessimistic evaluation of ambiguous stimuli. In environments with high levels of threat, behavioral strategies that reduce risk-taking would be evolutionarily advantageous. Hence, an affective response system that lowers expectations of favorable outcomes in ambiguous situations after encountering threat-related stimuli would serve adaptive purposes, such as curbing excessive exploratory behavior.

https://www.cell.com/iscience/fulltext/S2589-0042(23)01699-1

JOAN DANIELLE K. ONGCHOCO, SANTIAGO CASTIELLO & PHILIP R. CORLETT – Excessive teleological thinking is driven by aberrant associations and not by failure of reasoning

Teleological thought — the tendency to ascribe purpose to objects and events — is useful in some cases (encouraging explanation-seeking), but harmful in others (fueling delusions and conspiracy theories). What drives excessive and maladaptive teleological thinking? In causal learning, there is a fundamental distinction between associative versus via propositional mechanisms. Here, we propose that directly contrasting the contributions of these two pathways can elucidate the roots of excess teleology. We modified a causal learning task such that we could encourage associative versus propositional mechanisms in different instances. Across three experiments (total N=600), teleological tendencies were correlated with delusion-like ideas and uniquely explained by aberrant associative learning, but not by learning via propositional rules. Computational modeling suggested that the relationship between associative learning and teleological thinking can be explained by excessive prediction errors that imbue random events with more significance — providing a new understanding for how humans make meaning of lived events.

https://www.cell.com/iscience/fulltext/S2589-0042(23)01720-0

Nature

NEWS

Ötzi the Iceman has a new look: balding and dark-skinned

Improved DNA analysis updates thinking on alpine mummy's skin colour, ancestry and more.

https://www.nature.com/articles/d41586-023-02562-0

PAPERS

MAÏTÉ RIVOLLAT et al with JOHANNES KRAUSE – Extensive pedigrees reveal the social organization of a Neolithic community

Social anthropology and ethnographic studies have described kinship systems and networks of contact and exchange in extant populations. However, for prehistoric societies, these systems can be studied only indirectly from biological and cultural remains. Stable isotope data, sex and age at death can provide insights into the demographic structure of a burial community and identify local versus non-local childhood signatures, archaeogenetic data can reconstruct the biological relationships between individuals, which enables the reconstruction of pedigrees, and combined evidence informs on kinship practices and residence patterns in prehistoric societies. Here we report ancient DNA, strontium isotope and contextual data from more than 100 individuals from the site Gurgy 'les Noisats' (France), dated to the western European Neolithic around 4850–4500 BC. We find that this burial community was genetically connected by two main pedigrees, spanning seven generations, that were patrilocal and patrilineal, with evidence for female exogamy and exchange with genetically close neighbouring groups. The microdemographic structure of individuals linked and unlinked to the pedigrees reveals additional information about the social structure, living conditions and site occupation. The absence of half-siblings and the high number of adult full siblings suggest that there were stable health conditions and a supportive social network, facilitating high fertility and low mortality. Age-structure differences and strontium isotope results by generation indicate that the site was used for just a few decades, providing new insights into shifting sedentary farming practices during the European Neolithic.

https://www.nature.com/articles/s41586-023-06350-8

Nature Communications Biology

PAPERS

ANNA GERGELY et al – Dog brains are sensitive to infant- and dog-directed prosody

When addressing preverbal infants and family dogs, people tend to use specific speech styles. While recent studies suggest acoustic parallels between infant- and dog-directed speech, it is unclear whether dogs, like infants, show enhanced neural sensitivity to prosodic aspects of speech directed to them. Using functional magnetic resonance imaging on awake unrestrained dogs we identify two non-primary auditory regions, one that involve the ventralmost part of the left caudal Sylvian gyrus and the temporal pole and the other at the transition of the left caudal and rostral Sylvian gyrus, which respond more to naturalistic dog- and/or infant-directed speech than to adult-directed speech, especially when speak by female speakers. This activity increase is driven by sensitivity to fundamental frequency mean and variance resulting in positive modulatory effects of these acoustic parameters in both aforementioned non-primary auditory regions. These findings show that the dog auditory cortex, similarly to that of human infants, is sensitive to the acoustic properties of speech directed to non-speaking partners. This increased neuronal responsiveness to exaggerated prosody may be one reason why dogs outperform other animals when processing speech.
https://www.nature.com/articles/s42003-023-05217-y

Nature Neuroscience

PAPERS

FELICITY GORE et al – Orbitofrontal cortex control of striatum leads economic decision-making

Animals must continually evaluate stimuli in their environment to decide which opportunities to pursue, and in many cases these decisions can be understood in fundamentally economic terms. Although several brain regions have been individually implicated in these processes, the brain-wide mechanisms relating these regions in decision-making are unclear. Using an economic decision-making task adapted for rats, we find that neural activity in both of two connected brain regions, the ventrolateral orbitofrontal cortex (OFC) and the dorsomedial striatum (DMS), was required for economic decision-making. Relevant neural activity in both brain regions was strikingly similar, dominated by the spatial features of the decision-making process. However, the neural encoding of choice direction in OFC preceded that of DMS, and this temporal relationship was strongly correlated with choice accuracy. Furthermore, activity specifically in the OFC projection to the DMS was required for appropriate economic decision-making. These results demonstrate that choice information in the OFC is relayed to the DMS to lead accurate economic decision-making.
https://www.nature.com/articles/s41593-023-01409-1

Nature Schizophrenia

PAPERS

NICOLE GANGL et al – Resting-state perfusion in motor and fronto-limbic areas is linked to diminished expression of emotion and speech in schizophrenia

Negative symptoms (NS) are a core component of schizophrenia affecting community functioning and quality of life. We tested neural correlates of NS considering NS factors and consensus subdomains. We assessed NS using the Clinical Assessment Interview for Negative Symptoms and the Scale for Assessment of Negative Symptoms. Arterial spin labeling was applied to measure resting-state cerebral blood flow (rCBF) in 47 schizophrenia patients and 44 healthy controls. Multiple regression analyses calculated the relationship between rCBF and NS severity. We found an association between diminished expression (DE) and brain perfusion within the cerebellar anterior lobe and vermis, and the pre-, and supplementary motor area. Blunted affect was linked to fusiform gyrus and alogia to fronto-striatal rCBF. In contrast, motivation and pleasure was not associated with rCBF. These results highlight the key role of motor areas for DE. Considering NS factors and consensus subdomains may help identifying specific pathophysiological pathways of NS.
https://www.nature.com/articles/s41537-023-00384-7

Nature Scientific Reports

PAPERS

CAROLINE SCHUPPLI et al – Ecological, social, and intrinsic factors affecting wild orangutans' curiosity, assessed using a field experiment

The readiness to interact with and explore novel stimuli—i.e., curiosity—is the cornerstone of innovation. Great apes show broad and complex innovation repertoires. However, little is known about the factors that affect curiosity in wild apes. To shed light on wild apes' curiosity, we measured the reactions of wild Sumatran orangutans (Pongo abelii) to an experiment apparatus. Overall, individuals were reluctant to touch the apparatus. However, compared to adults, immatures showed higher tendencies to explore (measured through looking durations and the probability of touching the apparatus) and to approach (measured through approach latencies and approach distances) the apparatus but were more likely to show behavioral signs of agitation. The presence of conspecifics who approached the apparatus increased visual exploration and approach tendencies. Prevailing habitat food availability positively affected visual exploration but had a negative effect on

approach tendencies. These findings indicate that intrinsic, social, and ecological factors affect reactions to novelty in wild orangutans and suggest that exploration, neophobia and neophilia are independently regulated. Because reactions to novelty can be an essential pathway to innovation, our results suggest that factors acting on different elements of curiosity must be considered to understand the evolution of innovative tendencies.
https://www.nature.com/articles/s41598-023-39214-2

V. SCLAFANI et al – Similarities and differences in the functional architecture of mother- infant communication in rhesus macaque and British mother-infant dyads
Similarly to humans, rhesus macaques engage in mother-infant face-to-face interactions. However, no previous studies have described the naturally occurring structure and development of mother-infant interactions in this population and used a comparative-developmental perspective to directly compare them to the ones reported in humans. Here, we investigate the development of infant communication, and maternal responsiveness in the two groups. We video-recorded mother-infant interactions in both groups in naturalistic settings and analysed them with the same micro-analytic coding scheme. Results show that infant social expressiveness and maternal responsiveness are similarly structured in humans and macaques. Both human and macaque mothers use specific mirroring responses to specific infant social behaviours (modified mirroring to communicative signals, enriched mirroring to affiliative gestures). However, important differences were identified in the development of infant social expressiveness, and in forms of maternal responsiveness, with vocal responses and marking behaviours being predominantly human. Results indicate a common functional architecture of mother-infant communication in humans and monkeys, and contribute to theories concerning the evolution of specific traits of human behaviour.
https://www.nature.com/articles/s41598-023-39623-3

MICHELLE R. BEBBER et al – Atlatl use equalizes female and male projectile weapon velocity
The atlatl is a handheld, rod-shaped device that employs leverage to launch a dart, and represents a major human technological innovation. One hypothesis for forager atlatl adoption over its presumed predecessor, the thrown javelin, is that a diverse array of people could achieve equal performance results, thereby facilitating inclusive participation of more people in hunting activities. We tested this hypothesis via a systematic assessment of 2160 weapon launch events by 108 people who used both technologies. Our results show that, unlike the javelin, the atlatl equalizes the velocity of female- and male-launched projectiles. This result indicates that a javelin to atlatl transition would have promoted a unification, rather than division, of labor. Moreover, our results suggest that female and male interments with atlatl weaponry should be interpreted similarly.
https://www.nature.com/articles/s41598-023-40451-8

WALDIR M. SAMPAIO et al – Effects of co-players' identity and reputation in the public goods game
Players' identity and their reputation are known to influence cooperation in economic games, but little is known about how they interact. Our study aimed to understand how presenting pre-programmed co-players' identities (face photos; names) along with their previous cooperation history (reputation) could influence participants' cooperative decisions in a public goods game. Participants (N = 759) were allocated to one of six experimental groups: (i) control (no information); (ii) only reputation (neutral, free-rider, or cooperative); (iii) only face; (iv) face with reputation; (v) only name; (vi) name with reputation. In the reputation group, cooperation significantly decreased when free-riders were playing and significantly increased when they were cooperators. Person's identity affected cooperativeness only when combined with reputation: face photo mitigated the negative effect of the free-rider reputation, while name identity mitigated any significant effect expected for reputation. Our study suggests a hierarchy: reputation changes cooperation, but a person's identity can modulate reputation.
https://www.nature.com/articles/s41598-023-40730-4

New Scientist

ARTICLES

SUSAN GOLDIN-MEADOW – Gesture is a uniquely powerful tool. Here's how to make the most of it
Understand the surprising power of gesture and you could use it to boost your learning, improve your memory and influence others.
https://www.newscientist.com/article/mg25934521-000-gesture-is-a-uniquely-powerful-tool-heres-how-to-make-the-most-of-it/

Philosophical Transactions of the Royal Society A

PAPERS

D. AERTS et al – Development of a thermodynamics of human cognition and human culture
Inspired by foundational studies in classical and quantum physics, and by information retrieval studies in quantum information theory, we prove that the notions of 'energy' and 'entropy' can be consistently introduced in human language and, more generally, in human culture. More explicitly, if energy is attributed to words according to their frequency of

appearance in a text, then the ensuing energy levels are distributed non-classically, namely, they obey Bose–Einstein, rather than Maxwell–Boltzmann, statistics, as a consequence of the genuinely 'quantum indistinguishability' of the words that appear in the text. Secondly, the 'quantum entanglement' due to the way meaning is carried by a text reduces the (von Neumann) entropy of the words that appear in the text, a behaviour which cannot be explained within classical (thermodynamic or information) entropy. We claim here that this 'quantum-type behaviour is valid in general in human language', namely, any text is conceptually more concrete than the words composing it, which entails that the entropy of the overall text decreases. In addition, we provide examples taken from cognition, where quantization of energy appears in categorical perception, and from culture, where entities collaborate, thus 'entangle', to decrease overall entropy. We use these findings to propose the development of a new 'non-classical thermodynamic theory' for human cognition, which also covers broad parts of human culture and its artefacts and bridges concepts with quantum physics entities.
https://royalsocietypublishing.org/doi/10.1098/rsta.2022.0378

LÜTFI SUNAR & GÖZDE GEÇIMLI – The effects of the modern evolutionary synthesis on the new organizational paradigm

This paper discusses the connection between natural and social sciences through how the modern evolutionary synthesis approach, which emerged in biology, influenced social organizations. First, the paper examines the relationship of neo-evolutionism with organizational theories. Then the interaction between natural and social sciences is explained in the study. Afterwards, the relationship between neo-evolutionism and organization theory is handled around the discussions in this field. It has been emphasized that the flow of knowledge between sociology and biology is much more organic and mutual than expected. In other words, this study aims to draw attention to the methodological continuity of the interaction between evolution and organization theory from the very beginning to the present. In line with this purpose, the relationship between the transformation of the theory of evolution and the transformation of classical organizational theories is examined. In this study, it is claimed that the source of the paradigmatic interaction of neo-evolutionism and organization theories is the analogical relationship that began to be established between biology and sociology in the nineteenth century and that this relationship has turned into a much more organic structure than a mechanical and technical analogy in the historical process.
https://royalsocietypublishing.org/doi/10.1098/rsta.2023.0017

PLoS One

PAPERS

HANNAH METZLER et al – Power pose effects on approach and avoidance decisions in response to social threat

Individuals' opportunities for action in threatening social contexts largely depend on their social power. While powerful individuals can afford to confront aggressors and dangers, powerless individuals need others' support and better avoid direct challenges. Here, we investigated if adopting expansive or contracted poses, which signal dominance and submission, impacts individuals' approach and avoidance decisions in response to social threat signals using a within-subject design. Overall, participants more often chose to avoid rather than to approach angry individuals, but showed no clear approach or avoidance preference for fearful individuals. Crucially, contracted poses considerably increased the tendency to avoid angry individuals, whereas expansive poses induced no substantial changes. This suggests that adopting power-related poses may impact action decisions in response to social threat signals. The present results emphasize the social function of power poses, but should be replicated before drawing strong conclusions.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0286904

VASILEIA ARISTOTELIDOU, PAUL G. OVERTON & ANA B. VIVAS – Frontal lobe-related cognition in the context of self-disgust

Self- disgust is an adverse self-conscious emotion that plays an important role in psychopathology and well-being. However, self-disgust has received little attention in the emotion literature, therefore our understanding of the processes underlying the experience of self-disgust is relatively scarce, although neuropsychological and neuroimaging studies support the idea that this emotion may heavily rely on frontal lobe-related cognition. To test this hypothesis, in two studies we investigated the relationship between state and trait levels of self-disgust, cognition and emotion regulation in healthy adults. Specifically, in Study 1 we tested the hypothesis that emotion regulation strategies (avoidance, suppression, and cognitive reappraisal) mediate the relationship between inhibition ability and state and trait levels of self-disgust. In Study 2, we followed a more comprehensive approach to test the hypothesis that frontal lobe-related cognitive processes (updating, Theory of Mind–ToM-, and self-attention) are closely related to the experience of self-disgust in healthy adults. Overall, across these studies, we found evidence to support the idea that inhibition ability and ToM may play a role in the experience of state and trait self-disgust, respectively. However, we did not find consistent evidence across the two studies to support the notion held in the literature that the experience of self- conscious emotions, in this case self-disgust, is heavily dependent on frontal lobe-related cognition.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0289948

HANNAH METZLER et al – Power pose effects on approach and avoidance decisions in response to social threat
Individuals' opportunities for action in threatening social contexts largely depend on their social power. While powerful individuals can afford to confront aggressors and dangers, powerless individuals need others' support and better avoid direct challenges. Here, we investigated if adopting expansive or contracted poses, which signal dominance and submission, impacts individuals' approach and avoidance decisions in response to social threat signals using a within-subject design. Overall, participants more often chose to avoid rather than to approach angry individuals, but showed no clear approach or avoidance preference for fearful individuals. Crucially, contracted poses considerably increased the tendency to avoid angry individuals, whereas expansive poses induced no substantial changes. This suggests that adopting power-related poses may impact action decisions in response to social threat signals. The present results emphasize the social function of power poses, but should be replicated before drawing strong conclusions.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0286904

ANNA SEYDELL-GREENWALD et al – Spoken language processing activates the primary visual cortex
Primary visual cortex (V1) is generally thought of as a low-level sensory area that primarily processes basic visual features. Although there is evidence for multisensory effects on its activity, these are typically found for the processing of simple sounds and their properties, for example spatially or temporally-congruent simple sounds. However, in congenitally blind individuals, V1 is involved in language processing, with no evidence of major changes in anatomical connectivity that could explain this seemingly drastic functional change. This is at odds with current accounts of neural plasticity, which emphasize the role of connectivity and conserved function in determining a neural tissue's role even after atypical early experiences. To reconcile what appears to be unprecedented functional reorganization with known accounts of plasticity limitations, we tested whether V1's multisensory roles include responses to spoken language in sighted individuals. Using fMRI, we found that V1 in normally sighted individuals was indeed activated by comprehensible spoken sentences as compared to an incomprehensible reversed speech control condition, and more strongly so in the left compared to the right hemisphere. Activation in V1 for language was also significant and comparable for abstract and concrete words, suggesting it was not driven by visual imagery. Last, this activation did not stem from increased attention to the auditory onset of words, nor was it correlated with attentional arousal ratings, making general attention accounts an unlikely explanation. Together these findings suggest that V1 responds to spoken language even in sighted individuals, reflecting the binding of multisensory high-level signals, potentially to predict visual input. This capability might be the basis for the strong V1 language activation observed in people born blind, re-affirming the notion that plasticity is guided by pre-existing connectivity and abilities in the typically developed brain.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0289671

DAVID K. THULMAN et al – Clovis point allometry, modularity, and integration: Exploring shape variation due to tool use with landmark-based geometric morphometrics
Landmark-based geometric morphometrics (LGM) is most often used in archaeology to characterize and differentiate groups of artifacts, but it can be used for much more. We demonstrate LGM's power to uncover new insights by exploring stone-tool allometry, modularity, and integration using a sample of 100 western North American Clovis points. Here, allometry concerns how stone tools change in shape as their size changes through their use-lives, and modularity and integration concern how the constituent parts of a tool work together. We show that Clovis points are surprisingly complex tools. When their blades and hafts are defined technologically, rather than arbitrarily, they unambiguously exhibit allometry, and their hafts and blades are modular and highly integrated. We use these analyses to further explore questions about Clovis points, including the differences between cache and non-cache points. Finally, we use heuristic haft-size categories to examine functional constraints on the shape and size of hafts and blades. This work illustrates the importance of using accurate measurements of point components rather than estimates or proxies, which can lead to unfounded inferences. These analytical approaches and accompanying R code are easily transferable to other research questions of stone-tool use.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0289489

Royal Society Open Science

PAPERS

LINUS HAHNER & ANDREAS NIEDER – Costs and benefits of voluntary attention in crows
Behavioural signatures of voluntary, endogenous selective attention have been found in both mammals and birds, but the relationship between performance benefits at attended and costs at unattended locations remains unclear. We trained two carrion crows (Corvus corone) on a Posner-like spatial cueing task with dissociated cue and target locations, using both highly predictive and neutral central cues to compare reaction time (RT) and detection accuracy for validly, invalidly and neutrally cued targets. We found robust RT effects of predictive cueing at varying stimulus-onset asynchronies (SOA) that resulted from both advantages at cued locations and costs at un-cued locations. Both crows showed cueing effects around 15–25 ms with an early onset at 100 ms SOA, comparable to macaques. Our results provide a direct assessment of costs and benefits of voluntary attention in a bird species. They show that crows are able to guide spatial attention using associative cues, and that the processing advantage at attended locations impairs performance at unattended locations.
https://royalsocietypublishing.org/doi/10.1098/rsos.230517

TAMAS DAVID-BARRETT – Human group size puzzle: why it is odd that we live in large societies
Human groups tend to be much larger than those of non-human primates. This is a puzzle. When ecological factors do not limit primate group size, the problem of coordination creates an upper threshold even when cooperation is guaranteed. This paper offers a model of group coordination towards behavioural synchrony to spell out the mechanics of group size limits, and thus shows why it is odd that humans live in large societies. The findings suggest that many of our species' evolved social behaviours and culturally maintained social technologies emerged as solutions to this problem.
https://royalsocietypublishing.org/doi/10.1098/rsos.230559

Science Advances

PAPERS

MATIAS FERNANDEZ-DUQUE, SAYURI HAYAKAWA & VIORICA MARIAN – Speakers of different languages remember visual scenes differently
Language can have a powerful effect on how people experience events. Here, we examine how the languages people speak guide attention and influence what they remember from a visual scene. When hearing a word, listeners activate other similar-sounding words before settling on the correct target. We tested whether this linguistic coactivation during a visual search task changes memory for objects. Bilinguals and monolinguals remembered English competitor words that overlapped phonologically with a spoken English target better than control objects without name overlap. High Spanish proficiency also enhanced memory for Spanish competitors that overlapped across languages. We conclude that linguistic diversity partly accounts for differences in higher cognitive functions such as memory, with multilinguals providing a fertile ground for studying the interaction between language and cognition.
https://www.science.org/doi/full/10.1126/sciadv.adh0064

OLENA SHCHERBAKOVA et al – Societies of strangers do not speak less complex languages
Many recent proposals claim that languages adapt to their environments. The linguistic niche hypothesis claims that languages with numerous native speakers and substantial proportions of nonnative speakers (societies of strangers) tend to lose grammatical distinctions. In contrast, languages in small, isolated communities should maintain or expand their grammatical markers. Here, we test these claims using a global dataset of grammatical structures, Grambank. We model the impact of the number of native speakers, the proportion of nonnative speakers, the number of linguistic neighbors, and the status of a language on grammatical complexity while controlling for spatial and phylogenetic autocorrelation. We deconstruct “grammatical complexity” into two separate dimensions: how much morphology a language has (“fusion”) and the amount of information obligatorily encoded in the grammar (“informativity”). We find several instances of weak positive associations but no inverse correlations between grammatical complexity and sociodemographic factors. Our findings cast doubt on the widespread claim that grammatical complexity is shaped by the sociolinguistic environment.
https://www.science.org/doi/full/10.1126/sciadv.adf7704

Trends in Neurosciences

PAPERS

TEIJA KUJALA et al – Prerequisites of language acquisition in the newborn brain
Learning to decode and produce speech is one of the most demanding tasks faced by infants. Nevertheless, infants typically utter their first words within a year, and phrases soon follow. Here we review cognitive abilities of newborn infants that promote language acquisition, focusing primarily on studies tapping neural activity. The results of these studies indicate that infants possess core adult auditory abilities already at birth, including statistical learning and rule extraction from variable speech input. Thus, the neonatal brain is ready to categorize sounds, detect word boundaries, learn words, and separate speech streams: in short, to acquire language quickly and efficiently from everyday linguistic input.
https://www.cell.com/trends/neurosciences/fulltext/S0166-2236(23)00136-4

ANGELA D. FRIEDERICI – Evolutionary neuroanatomical expansion of Broca’s region serving a human-specific function
The question concerning the evolution of language is directly linked to the debate on whether language and action are dependent or not and to what extent Broca’s region serves as a common neural basis. The debate resulted in two opposing views, one arguing for and one against the dependence of language and action mainly based on neuroscientific data. This article presents an evolutionary neuroanatomical framework which may offer a solution to this dispute. It is proposed that in humans, Broca’s region houses language and action independently in spatially separated subregions. This became possible due to an evolutionary expansion of Broca’s region in the human brain, which was not paralleled by a similar expansion in the chimpanzee’s brain, providing additional space needed for the neural representation of language in humans.
https://www.cell.com/trends/neurosciences/fulltext/S0166-2236(23)00164-9

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