EAORC BULLETIN 1,061 – 15 October 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 – Close encounters vs. missed connections?

Quaternary Science Reviews 319, 108307 (2023).

CLIVE FINLAYSON et al with JOHN SHEA – Close encounters vs. missed connections? A critical review of the evidence for Late Pleistocene hominin interactions in western Eurasia

Recent advances in the study of ancient DNA recovered from fossils and cave sediments have profoundly changed our views on the biological and cultural interactions between populations and lineages of fossil Homo in the Later Pleistocene of Eurasia. A spatiotemporally complex picture emerges, with multiple population admixture and replacement events. Focusing on the evidence from Western Eurasia, we consider here how the mapping out of between-species interactions based on

fossil and material cultural evidence is being replaced by a broader approach. Traditional narratives about human migrations and the biological and/or cultural advantages of our own species over the Neanderthals are now giving way to the study of the biological and cultural dynamics of past human populations and the nature of their interactions in time and space.
https://www.academia.edu/107875845/Close_Encounters_vs_Missed_Connections_A_critical_review_of_the_Evidence_for_Later_Pleistocene_Hominin_Interactions_in_Western_Eurasia_Clive_Finlayson_Christoph_Zollikofer_Marcia_Ponce_de_Le%C3%B3n_Geraldine_Finlayson_Jos%C3%A9_Carri%C3%B3n_Stewart_Finlayson_Francisco_Giles_Guzm%C3%A1n_and_John_Shea

CONFERENCE ALERT – RaAM 2024 specialised seminar - Metaphor, Inclusion, and Accessibility

We are delighted to announce the Call for Papers for the RaAM 2024 specialised seminar, to be held at the University of Macerata, Italy, on 6-7 June 2024.
For more information and the submission procedure, please visit the website https://raam2024.sciencesconf.org/
We're looking forward to this event and to seeing you there!
Best wishes,
The RaAM team

NEWS

NATURE BRIEFING – Ancient footprints point to early Americans

Fossilized human footprints might be the oldest direct evidence that people lived in the Americas thousands of years earlier than thought — as early as 23,000 years ago. Researchers analysed pollen and sediment from the footprints and found that their ages matched estimates from 2021 that were based on the ages of seeds stuck in the fossils. The finding supports the idea that people skirted down the Pacific coast of the Americas after crossing the Bering land bridge, rather than waiting until ice-age glaciers retreated from inland routes. The timeline is also supported by indirect evidence, such as pendants carved from animal remains, but the footprints in New Mexico are special because they were undoubtedly made by people.
https://apnews.com/article/human-footprints-new-mexico-ancient-white-sands-33e086dac71d4054cd5f5122810a73bf

NATURE BRIEFING – How AI might transform the scientific paper

Large language models (LLMs), such as ChatGPT, could become regular assistants for writing manuscripts, peer-review reports and grant applications. These artificial-intelligence (AI) tools could change how scientists interrogate and summarize results, producing 'papers on demand' from experimental data and vastly expanding the scope of meta-analyses and reviews. But publishers worry that LLMs' propensity to make up information might lead to a flood of error-strewn manuscripts — and possibly AI-assisted fakes. And because LLMs trawl Internet content without concern for bias, consent or copyright, their use is "automated plagiarism by design", suggests cognitive scientist Iris van Rooij.
https://www.nature.com/articles/d41586-023-03144-w

NATURE BRIEFING – Largest map of the human brain

More than 3,000 cell types — many of them new to science — have been revealed in the largest-ever atlas of human neurons and other brain cells. One team that contributed to the huge project, which involved hundreds of scientists, sequenced the RNA of more than three million cells. Another uncovered links between certain types of brain cell and neuropsychiatric disorders. "This is only the beginning," says molecular biologist Bing Ren.
https://www.nature.com/articles/d41586-023-03192-2

SAPIENS – Sewing Needles Reveal the Roots of Fashion

Humans have crafted garments for more than 40,000 years—and ancient tools suggest that warmth wasn't their only concern.
https://www.sapiens.org/archaeology/fashion-history-sewing-needles/

SCIENCE.ORG NEWS – New footprint dates bolster claim that humans lived in Americas during Ice Age

Finding could reopen debate on how and when humans arrived. But some researchers remain skeptical.
https://www.science.org/content/article/new-footprint-dates-bolster-claim-human-arrival-americas-during-ice-age

SCIENCE.ORG NEWS – Neanderthals hunted—and revered—cave lions

Study provides oldest direct evidence of our ancient cousins killing the big cats, perhaps not just for their meat.
https://www.science.org/content/article/neanderthals-hunted-and-revered-cave-lions

THE CONVERSATION – How morbid curiosity can lead people to conspiracy theories

The answers lie in early human evolution.

https://theconversation.com/how-morbid-curiosity-can-lead-people-to-conspiracy-theories-214532

THE CONVERSATION – A tooth rewrites history? Discovery challenges what we knew about Neanderthals

What could the extinction of Neanderthals tell us about our own species? An archaeologist explains in The Conversation Weekly podcast.
https://theconversationuk.cmail20.com/t/r-l-tildhthk-khhlilahh-u/

PUBLICATIONS

Acta Linguistica Hafniensia

PAPERS

DAVID ROMAND – Epistemic feelings and the making of the statement as a meaningful linguistic structure. Revisiting Heinrich Gomperz's psychoaffective model of semantics and semiotics and its significance today

In the present article, I revisit the feeling-based model of semantics and semiotics proposed in 1908 by the Austrian philosopher Heinrich Gomperz (1873–1942) within the framework of his "semasiology" (Semasiologie). I discuss how Gomperz regarded epistemic ("intellectual") feelings as the foundations of both conceptual and grammatical meanings, but also of the "semiotization" of the statement (Aussage). Special emphasis is placed on how, for him, affective states help make the statement a global meaningful structure. An analysis of Gomperz's psychoaffective model leads me to wonder about the soundness of the provocative view that epistemic feelings may be the core psychological components of linguistic meaning.
https://www.tandfonline.com/doi/abs/10.1080/03740463.2023.2240685

Current Biology

PAPERS

DANIEL N. HARRIS et al – Diverse African genomes reveal selection on ancient modern human introgressions in Neanderthals

Comparisons of Neanderthal genomes to anatomically modern human (AMH) genomes show a history of Neanderthal-to-AMH introgression stemming from interbreeding after the migration of AMHs from Africa to Eurasia. All non-sub-Saharan African AMHs have genomic regions genetically similar to Neanderthals that descend from this introgression. Regions of the genome with Neanderthal similarities have also been identified in sub-Saharan African populations, but their origins have been unclear. To better understand how these regions are distributed across sub-Saharan Africa, the source of their origin, and what their distribution within the genome tells us about early AMH and Neanderthal evolution, we analyzed a dataset of high-coverage, whole-genome sequences from 180 individuals from 12 diverse sub-Saharan African populations. In sub-Saharan African populations with non-sub-Saharan African ancestry, as much as 1% of their genomes can be attributed to Neanderthal sequence introduced by recent migration, and subsequent admixture, of AMH populations originating from the Levant and North Africa. However, most Neanderthal homologous regions in sub-Saharan African populations originate from migration of AMH populations from Africa to Eurasia ~250 kya, and subsequent admixture with Neanderthals, resulting in ~6% AMH ancestry in Neanderthals. These results indicate that there have been multiple migration events of AMHs out of Africa and that Neanderthal and AMH gene flow has been bi-directional. Observing that genomic regions where AMHs show a depletion of Neanderthal introgression are also regions where Neanderthal genomes show a depletion of AMH introgression points to deleterious interactions between introgressed variants and background genomes in both groups—a hallmark of incipient speciation.
https://www.cell.com/current-biology/fulltext/S0960-9822(23)01315-5

Evolutionary Anthropology

REVIEWS

SCOTT A. WILLIAMS – The wrong ape for early human origins

Review of 'The wrong ape for early human origins: The chimpanzee as a skewed ancestral model' by M. Kay Martin, Lexington Books (2023).
https://onlinelibrary.wiley.com/doi/abs/10.1002/evan.22007?campaign=wolearlyview

Frontiers in Artificial Intelligence

PAPERS

LEONIE WEISSWEILER et al – Explaining pretrained language models' understanding of linguistic structures using construction grammar

Construction Grammar (CxG) is a paradigm from cognitive linguistics emphasizing the connection between syntax and semantics. Rather than rules that operate on lexical items, it posits constructions as the central building blocks of language, i.e., linguistic units of different granularity that combine syntax and semantics. As a first step toward assessing the

compatibility of CxG with the syntactic and semantic knowledge demonstrated by state-of-the-art pretrained language models (PLMs), we present an investigation of their capability to classify and understand one of the most commonly studied constructions, the English comparative correlative (CC). We conduct experiments examining the classification accuracy of a syntactic probe on the one hand and the models' behavior in a semantic application task on the other, with BERT, RoBERTa, and DeBERTa as the example PLMs. Our results show that all three investigated PLMs, as well as OPT, are able to recognize the structure of the CC but fail to use its meaning. While human-like performance of PLMs on many NLP tasks has been alleged, this indicates that PLMs still suffer from substantial shortcomings in central domains of linguistic knowledge.
https://www.frontiersin.org/articles/10.3389/frai.2023.1225791/full

Frontiers in Developmental Psychology

PAPERS

ALEXUS G. RAMIREZ, ELANA HERBST & ROBERTA MICHNICK GOLINKOFF – Maternal beliefs about infant-directed speech misalign with interactions with their infants

Infant-directed speech (IDS) refers to how people in many societies talk with young children. Compared to speech directed to an adult (ADS), IDS includes a slower rate, fewer words per utterance, higher-than-average pitch, and elongated vowels. Although many benefits are associated with using IDS, there is little information on what parents think about IDS. The current study asked: (1) How do mothers conceptualize IDS; (2) Is there an alignment between mothers' IDS beliefs and their speech register when teaching a new word to their child; and (3) How do mothers' IDS beliefs associate with children's expressive language and performance on a word learning task?
Fifty-three mothers and their 15- to 21-month-old monolingual English-reared infants (Mage = 17.92, SD = 1.99, 23 males) participated. Mothers were asked to teach their child a novel word and to complete the Parent Language Belief Questionnaire (PLBQ). Mothers' IDS was recorded as they taught their child a novel word and was compared to their ADS from interacting with the experimenter.
Findings revealed that mothers had mixed beliefs about their use of IDS. Yet, most mothers used IDS as they taught their child a novel word. Lastly, mothers' IDS beliefs did not predict children's language skills or word learning at test.
The current study is the first to explore whether mothers' beliefs about their use of infant-directed speech align with their actual use of IDS. As the positive benefits between IDS and children's language development have been documented, identifying the barriers surrounding why parents may not use IDS with their children is essential.
https://www.frontiersin.org/articles/10.3389/fdpys.2023.1235621/full

Frontiers in Human Neuroscience

PAPERS

BELÉN ABARRATEGUI et al – Language lateralization mapping (reversibly) masked by non-dominant focal epilepsy: a case report

Language lateralization in patients with focal epilepsy frequently diverges from the left-lateralized pattern that prevails in healthy right-handed people, but the mechanistic explanations are still a matter of debate. Here, we debate the complex interaction between focal epilepsy, language lateralization, and functional neuroimaging techniques by introducing the case of a right-handed patient with unaware focal seizures preceded by aphasia, in whom video-EEG and PET examination suggested the presence of focal cortical dysplasia in the right superior temporal gyrus, despite a normal structural MRI. The functional MRI for language was inconclusive, and the neuropsychological evaluation showed mild deficits in language functions. A bilateral stereo-EEG was proposed confirming the right superior temporal gyrus origin of seizures, revealing how ictal aphasia emerged only once seizures propagated to the left superior temporal gyrus and confirming, by cortical mapping, the left lateralization of the posterior language region. Stereo-EEG-guided radiofrequency thermocoagulations of the (right) focal cortical dysplasia not only reduced seizure frequency but led to the normalization of the neuropsychological assessment and the “restoring” of a classical left-lateralized functional MRI pattern of language. This representative case demonstrates that epileptiform activity in the superior temporal gyrus can interfere with the functioning of the contralateral homologous cortex and its associated network. In the case of presurgical evaluation in patients with epilepsy, this interference effect must be carefully taken into consideration. The multimodal language lateralization assessment reported for this patient further suggests the sensitivity of different explorations to this interference effect. Finally, the neuropsychological and functional MRI changes after thermocoagulations provide unique cues on the network pathophysiology of focal cortical dysplasia and the role of diverse techniques in indexing language lateralization in complex scenarios.
https://www.frontiersin.org/articles/10.3389/fnhum.2023.1254779/full

Frontiers in Mammal Science

PAPERS

SHELLY MASI – Tool use, or not tool use, that is the question: is the necessity hypothesis really inconsequential for the African great apes?

Investigating the drivers of tool use in animals has recently received great attention because of its implication in understanding animals’ cognition and the evolution of tool use in hominins. The necessity hypothesis posits tool use as a

necessary response to food scarcity, but its role is an ongoing debate. The largest body of literature comparing animal tool use frequencies is with regard to primates, particularly comparisons between the Pan species. This supports the hypothesis that tool use is rarer in wild bonobos because of differential manipulation abilities of chimpanzees rather than different ecological needs. In this article, I aim to enrich the discussion concerning the necessity hypothesis and the ecological drivers of tool use in apes. The higher feeding flexibility of bonobos may be a key aspect to explaining the lower use of feeding tools than that observed in chimpanzees. The diet flexibility of bonobos is similar to that of the lowest level of tool users among the wild great apes: the gorilla. Gorillas can thus help to shed further light on this debate. When fruit is scarce, Western gorillas and bonobos rely more on widely available proteinaceous herbs than chimpanzees, who remain highly frugivorous. Chimpanzees may thus face a greater necessity to search for an alternative to obtain high-quality food: tool-assisted feeding. An indirect piece of evidence for this higher level of herbivory is that the prevalence of gut ciliates in bonobos is double that of chimpanzees. In each animal species, a different combination of necessity, opportunities, predisposition, and learning processes are likely to be at play in the emergence of flexible tool use in animals.
https://www.frontiersin.org/articles/10.3389/fmamm.2023.1281030/full

Frontiers in Psychology

PAPERS

GABRIELA-ALINA SAUCIUC & TOMAS PERSSON – Empirical challenges from the comparative and developmental literature to the Shared Intentionality Theory – a review of alternative data on recursive mind reading, prosociality, imitation and cumulative culture

Humans have an irresistible inclination to coordinate actions with others, leading to species-unique forms of cooperation. According to the highly influential Shared Intentionality Theory (SITh), human cooperation is made possible by shared intentionality (SI), typically defined as a suite of socio-cognitive and motivational traits for sharing psychological states with others, thereby enabling individuals to engage in joint action in the mutually aware pursuit of shared goals. SITh theorises that SI evolved as late as 400,000 years ago, when our ancestors (in particular, Homo heidelbergensis) turned to a kind of food procurement that obligatorily required joint coordinated action. SI is, thus, hypothesized to be absent in other extant species, including our closest genetic relatives, the nonhuman great apes ("apes"). According to SITh, ape psychology is exclusively driven by individualistic motivations, as opposed to human psychology which is uniquely driven by altruistic motivations. The evolutionary scenario proposed by SITh builds on a series of findings from socio-cognitive research with apes and human children, and on the assumption that abilities expressed early in human development are human universals, unlikely to have been shaped by socio-cultural influences. Drawing on the primatological and developmental literature, we provide a systematic – albeit selective – review of SITh-inconsistent findings concerning psychological and behavioural traits theorised to be constitutive of SI. The findings we review pertain to all three thematic clusters typically addressed in SITh: (i) recursive mind reading; (ii) prosociality; (iii) imitation and cumulative culture. We conclude that such alternative data undermine two core SITh claims: the late evolutionary emergence of SI and the radical divide between ape and human psychology. We also discuss several conceptual and methodological limitations that currently hamper reliable comparative research on SI, in particular those engendered by Western-centric biases in the social sciences, where an overreliance on Western samples has promoted the formulation of Western-centric conceptualisations, operationalisations and methodologies.
https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1157137/full

iScience

PAPERS

ANDREY ANIKIN et al – Beyond speech: exploring diversity in the human voice

Humans have evolved voluntary control over vocal production for speaking and singing, while preserving the phylogenetically older system of spontaneous nonverbal vocalizations such as laughs and screams. To test for systematic acoustic differences between these vocal domains, we analyzed a broad, cross-cultural corpus representing over two hours of speech, singing, and nonverbal vocalizations. We show that, while speech is relatively low-pitched and tonal with mostly regular phonation, singing and especially nonverbal vocalizations vary enormously in pitch and often display harsh-sounding, irregular phonation owing to nonlinear phenomena. The evolution of complex supralaryngeal articulatory spectro-temporal modulation has been critical for speech, yet has not significantly constrained laryngeal source modulation. In contrast, articulation is very limited in nonverbal vocalizations, which predominantly contain minimally articulated open vowels and rapid temporal modulation in the roughness range. We infer that vocal source modulation works best for conveying affect, while vocal filter modulation mainly facilitates semantic communication.
https://www.cell.com/iscience/fulltext/S2589-0042(23)02281-2

MARIA CLEMENCIA ORTIZ-BARAJAS, RAMÓN GUEVARA & JUDIT GERVAIN – Neural Oscillations and Speech Processing at Birth

Are neural oscillations biologically endowed building blocks of the neural architecture for speech processing from birth, or do they require experience to emerge? In adults, delta, theta, and low-gamma oscillations support the simultaneous processing of phrasal, syllabic, and phonemic units in the speech signal, respectively. Using electroencephalography to investigate neural

oscillations in the newborn brain we reveal that delta and theta oscillations differ for rhythmically different languages, suggesting that these bands underlie newborns' universal ability to discriminate languages on the basis of rhythm. Additionally, higher theta activity during post-stimulus as compared to pre-stimulus rest suggests that stimulation after-effects are present from birth.
https://www.cell.com/iscience/fulltext/S2589-0042(23)02264-2

SÉBASTIEN BALLESTA & HÉLÈNE MEUNIER – Is this worth the trouble? Strategic conflict management in Tonkean macaques
Conflict management entails preventing and repairing damages resulting from social conflicts. While previous research has emphasized post-conflict actions like reconciliation, the understanding of how primates weigh the costs and benefits of conflict remains limited. Uncovering this hidden but fundamental aspect of conflict management requires addressing actively avoided social conflicts. In a study involving semi-free ranging Tonkean macaques, individuals were presented with social dilemmas: displacing a peer to access a preferred juice reward or opting for a peer-free but less preferred one to avoid conflict. The results showed that subjects attributed a cost to the social conflict and did not demonstrate a systematic drive to dominate. Decision modelling revealed integration of peer hierarchy and reward subjective value, with subjects' own social rank impacting the balance between these social and economic dimensions. Overall, this research highlights how primates strategically address group cohesion and peacekeeping, sometimes at the expense of personal preferences.
https://www.cell.com/iscience/fulltext/S2589-0042(23)02253-8

Nature

ARTICLES

GEMMA CONROY – How ChatGPT and other AI tools could disrupt scientific publishing
A world of AI-assisted writing and reviewing might transform the nature of the scientific paper.
https://www.nature.com/articles/d41586-023-03144-w

Nature Communications Biology

PAPERS

MARIA GUARDIOLA-RIPOLL et al – Human-specific evolutionary markers linked to foetal neurodevelopment modulate brain surface area in schizophrenia
Schizophrenia may represent a trade-off in the evolution of human-specific ontogenetic mechanisms that guide neurodevelopment. Human Accelerated Regions (HARs) are evolutionary markers functioning as neurodevelopmental transcription enhancers that have been associated with brain configuration, neural information processing, and schizophrenia risk. Here, we have investigated the influence of HARs' polygenic load on neuroanatomical measures through a case-control approach (128 patients with schizophrenia and 115 controls). To this end, we have calculated the global schizophrenia Polygenic Risk Score (Global PRSSZ) and that specific to HARs (HARs PRSSZ). We have also estimated the polygenic burden restricted to the HARs linked to transcriptional regulatory elements active in the foetal brain (FB-HARs PRSSZ) and the adult brain (AB-HARs PRSSZ). We have explored the main effects of the PRSs and the PRSs x diagnosis interactions on brain regional cortical thickness (CT) and surface area (SA). The results indicate that a higher FB-HARs PRSSZ is associated with patients' lower SA in the lateral orbitofrontal cortex, the superior temporal cortex, the pars triangularis and the paracentral lobule. While noHARs-derived PRSs show an effect on the risk, our neuroanatomical findings suggest that the human-specific transcriptional regulation during the prenatal period underlies SA variability, highlighting the role of these evolutionary markers in the schizophrenia genomic architecture.
https://www.nature.com/articles/s42003-023-05356-2

PIERRE FAUX et mul – Neanderthal introgression in SCN9A impacts mechanical pain sensitivity
The Nav1.7 voltage-gated sodium channel plays a key role in nociception. Three functional variants in the SCN9A gene (encoding M932L, V991L, and D1908G in Nav1.7), have recently been identified as stemming from Neanderthal introgression and to associate with pain symptomatology in UK BioBank data. In 1000 genomes data, these variants are absent in Europeans but common in Latin Americans. Analysing high-density genotype data from 7594 Latin Americans, we characterized Neanderthal introgression in SCN9A. We find that tracts of introgression occur on a Native American genomic background, have an average length of ~123 kb and overlap the M932L, V991L, and D1908G coding positions. Furthermore, we measured experimentally six pain thresholds in 1623 healthy Colombians. We found that Neanderthal ancestry in SCN9A is significantly associated with a lower mechanical pain threshold after sensitization with mustard oil and evidence of additivity of effects across Nav1.7 variants. Our findings support the reported association of Neanderthal Nav1.7 variants with clinical pain, define a specific sensory modality affected by archaic introgression in SCN9A and are consistent with independent effects of the Neanderthal variants on Nav1.7 function.
https://www.nature.com/articles/s42003-023-05286-z

Nature Computational Science

ARTICLES

ANANYA RASTOGI – Moving towards better communication

Dr Diyi Yang, Assistant Professor of computer science at Stanford University, talks to Nature Computational Science about understanding human communication in a social context, building natural language processing systems that are human-centered, and the challenges that female researchers face in the field.

https://www.nature.com/articles/s43588-023-00538-8

Nature Scientific Reports

PAPERS

PRISCILLA ACHAA-AMANKWAA et al – Multilingualism is associated with small task-specific advantages in cognitive performance of older adults

The protective effects of multiple language knowledge on the maintenance of cognitive functions in older adults have been discussed controversially, among others, because of methodological inconsistencies between studies. In a sample of N = 528 German monolinguals and multilinguals (speaking two or more languages) older than 60 years, this study examined (1) whether speaking multiple languages is positively related to performance on tasks of interference suppression, working memory, concept shifting, and phonemic and semantic fluency, and (2) whether language proficiency and age of second language acquisition (AoA) are associated with cognitive performance of multilinguals. Controlling for education and daily activity, we found small cognitive benefits of speaking multiple languages on interference suppression, working memory, and phonemic fluency, but not on concept shifting and semantic fluency. Furthermore, no substantive correlations were found between language proficiency or AoA and cognitive performance. In conclusion, multilingualism appears to have small incremental effects on cognitive performance beyond education and daily activity in older age that are task-specific and widely independent of proficiency and AoA.

https://www.nature.com/articles/s41598-023-43961-7

GABRIELE RUSSO et al – First direct evidence of lion hunting and the early use of a lion pelt by Neanderthals

During the Upper Paleolithic, lions become an important theme in Paleolithic art and are more frequent in anthropogenic faunal assemblages. However, the relationship between hominins and lions in earlier periods is poorly known and primarily interpreted as interspecies competition. Here we present new evidence for Neanderthal-cave lion interactions during the Middle Paleolithic. We report new evidence of hunting lesions on the 48,000 old cave lion skeleton found at Siegsdorf (Germany) that attest to the earliest direct instance of a large predator kill in human history. A comparative analysis of a partial puncture to a rib suggests that the fatal stab was delivered with a wooden thrusting spear. We also present the discovery of distal lion phalanges at least 190,000 old from Einhornhöhle (Germany), representing the earliest example of the use of cave lion skin by Neanderthals in Central Europe. Our study provides novel evidence on a new dimension of Neanderthal behavioral complexity.

https://www.nature.com/articles/s41598-023-42764-0

DIEGO GARATE et al – Unravelling the skills and motivations of Magdalenian artists in the depths of Atxurra Cave (Northern Spain)

Atxurra cave has a decorated assemblage composed of more than a hundred engraved animal depictions. All of them are located in deep parts of the cave and most of them are hidden in raised areas, away from the main path. The main sector is the “Ledge of the Horses”, located at 330 m from the entrance of the cave. It is a space of 12 m long and 1.5 m wide, elevated 4 m above the cave floor. This area includes almost fifty engraved and painted animals accompanied by a dozen flint tools, three fireplaces, and around one hundred charcoal fragments from torches. This extraordinary archaeological record allows us to value the complexity of the artistic production inside the caves during the Upper Palaeolithic. Our study has confirmed that there is planning prior to artistic production, both in terms of the iconographic aspects (themes, techniques, formats), its location (visibility, capacity), and the lighting systems. Furthermore, the data indicates the panel was decorated to be seen by third parties from different positions and was expressly illuminated for this purpose. This evidence supports the role of rock art as a visual communication system in Upper Palaeolithic societies.

https://www.nature.com/articles/s41598-023-44520-w

PLoS One

PAPERS

ALDO RUSTICHINI et al – Working memory and attention in choice

We study the role of attention and working memory in choices where options are presented sequentially rather than simultaneously. We build a model where a costly attention effort is chosen, which can vary over time. Evidence is accumulated proportionally to this effort and the utility of the reward. Crucially, the evidence accumulated decays over time. Optimal attention allocation maximizes expected utility from final choice; the optimal solution takes the decay into account, so attention is preferentially devoted to later times; but convexity of the flow attention cost prevents it from being

concentrated near the end. We test this model with a choice experiment where participants observe sequentially two options. In our data the option presented first is, everything else being equal, significantly less likely to be chosen. This recency effect has a natural explanation with appropriate parameter values in our model of leaky evidence accumulation, where the decline is stronger for the option observed first. Analysis of choice, response time and brain imaging data provide support for the model. Working memory plays an essential role. The recency bias is stronger for participants with weaker performance in working memory tasks. Also activity in parietal areas, coding the stored value in working, declines over time as predicted.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0284127

DIEGO E. ANGELUCCI, MARIANA NABAIS & JOÃO ZILHÃO – Formation processes, fire use, and patterns of human occupation across the Middle Palaeolithic (MIS 5a-5b) of Gruta da Oliveira (Almonda karst system, Torres Novas, Portugal)
Gruta da Oliveira features a c. 13 m-thick infilling that includes a c. 6.5 m-thick archaeological deposit (the "Middle Palaeolithic sequence" complex), which Bayesian modelling of available dating results places in MIS 5a (layers 7–14) and MIS 5b (layers 15–25), c. 71,000–93,000 years ago. The accumulation primarily consists of sediment washed in from the slope through gravitational processes and surface dynamics. The coarse fraction derives from weathering of the cave's limestone bedrock. Tectonic activity and structural instability caused the erosional retreat of the scarp face, explaining the large, roof-collapsed rock masses found through the stratification. The changes in deposition and diagenesis observed across the archaeological sequence are minor and primarily controlled by local factors and the impact of humans and other biological agents. Pulses of stadial accumulation—reflected in the composition of the assemblages of hunted ungulates, mostly open-country and rocky terrain taxa (rhino, horse, ibex)—alternate with interstadial hiatuses—during which carbonate crusts and flowstone formed. Humans were active at the cave throughout, but occupation was intermittent, which allowed for limited usage by carnivores when people visited less frequently. During the accumulation of layers 15–25 (c. 85,000–93,000 years ago), the carnivore guild was dominated by wolf and lion, while brown bear and lynx predominate in layers 7–14 (c. 71,000–78,000 years ago). In the excavated areas, conditions for residential use were optimal during the accumulation of layers 20–22 (c. 90,000–92,000 years ago) and 14 (c. 76,000–78,000 years ago), which yielded dense, hearth-focused scatters of stone tools and burnt bones. The latter are ubiquitous, adding to the growing body of evidence that Middle Palaeolithic Neandertals used fire in regular, consistent manner. The patterns of site usage revealed at Gruta da Oliveira are no different from those observed 50,000 years later in comparable early Upper Palaeolithic and Solutrean cave sites of central Portugal.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0292075

Proceedings of the Royal Society B

PAPERS

THOMAS W. SCOTT & GEOFF WILD – How to make an inclusive-fitness model
Social behaviours are typically modelled using neighbour-modulated fitness, which focuses on individuals having their fitness altered by neighbours. However, these models are either interpreted using inclusive fitness, which focuses on individuals altering the fitness of neighbours, or not interpreted at all. This disconnect leads to interpretational mistakes and obscures the adaptive significance of behaviour. We bridge this gap by presenting a systematic methodology for constructing inclusive-fitness models. We find a behaviour's 'inclusive-fitness effect' by summing primary and secondary deviations in reproductive value. Primary deviations are the immediate result of a social interaction; for example, the cost and benefit of an altruistic act. Secondary deviations are compensatory effects that arise because the total reproductive value of the population is fixed; for example, the increased competition that follows an altruistic act. Compared to neighbour-modulated fitness methodologies, our approach is often simpler and reveals the model's inclusive-fitness narrative clearly. We implement our methodology first in a homogeneous population, with supplementary examples of help under synergy, help in a viscous population and Creel's paradox. We then implement our methodology in a class-structured population, where the advantages of our approach are most evident, with supplementary examples of altruism between age classes, and sex-ratio evolution.
https://royalsocietypublishing.org/doi/full/10.1098/rspb.2023.1310

P. FERNANDEZ-VELASCO et al – No link between handedness and spatial navigation: evidence from over 400 000 participants in 41 countries
There is an active debate concerning the association of handedness and spatial ability. Past studies used small sample sizes. Determining the effect of handedness on spatial ability requires a large, cross-cultural sample of participants and a navigation task with real-world validity. Here, we overcome these challenges via the mobile app Sea Hero Quest. We analysed the navigation performance from 422 772 participants from 41 countries and found no reliable evidence for any difference in spatial ability between left- and right-handers across all countries. A small but growing gap in performance appears for participants over 64 years old, with left-handers outperforming right-handers. Further analysis, however, suggests that this gap is most likely due to selection bias. Overall, our study clarifies the factors associated with spatial ability and shows that left-handedness is not associated with either a benefit or a deficit in spatial ability.
https://royalsocietypublishing.org/doi/10.1098/rspb.2023.1514

ANDREW F. G. BOURKE – Conflict and conflict resolution in the major transitions
Conflict and conflict resolution have been argued to be fundamental to the major transitions in evolution. These were key events in life's history in which previously independently living individuals cooperatively formed a higher-level individual, such as a multicellular organism or eusocial colony. Conflict has its central role because, to proceed stably, the evolution of individuality in each major transition required within-individual conflict to be held in check. This review revisits the role of conflict and conflict resolution in the major transitions, addressing recent work arguing for a minor role. Inclusive fitness logic suggests that differences between the kin structures of clones and sexual families support the absence of conflict at the origin of multicellularity but, by contrast, suggest that key conflicts existed at the origin of eusociality. A principal example is conflict over replacing the founding queen (queen replacement). Following the origin of each transition, conflict remained important, because within-individual conflict potentially disrupts the attainment of maximal individuality (organismality) in the system. The conclusion is that conflict remains central to understanding the major transitions, essentially because conflict arises from differences in inclusive fitness optima while conflict resolution can help the system attain a high degree of coincidence of inclusive fitness interests.
https://royalsocietypublishing.org/doi/10.1098/rspb.2023.1420

Science

PAPERS

EMELIE BRAUN et al – Comprehensive cell atlas of the first-trimester developing human brain
The adult human brain comprises more than a thousand distinct neuronal and glial cell types, a diversity that emerges during early brain development. To reveal the precise sequence of events during early brain development, we used single-cell RNA sequencing and spatial transcriptomics and uncovered cell states and trajectories in human brains at 5 to 14 postconceptional weeks (pcw). We identified 12 major classes that are organized as ~600 distinct cell states, which map to precise spatial anatomical domains at 5 pcw. We described detailed differentiation trajectories of the human forebrain and midbrain and found a large number of region-specific glioblasts that mature into distinct pre-astrocytes and pre–oligodendrocyte precursor cells. Our findings reveal the establishment of cell types during the first trimester of human brain development.
https://www.science.org/doi/full/10.1126/science.adf1226

NIKOLAS L. JORSTAD et mul – Comparative transcriptomics reveals human-specific cortical features
The cognitive abilities of humans are distinctive among primates, but their molecular and cellular substrates are poorly understood. We used comparative single-nucleus transcriptomics to analyze samples of the middle temporal gyrus (MTG) from adult humans, chimpanzees, gorillas, rhesus macaques, and common marmosets to understand human-specific features of the neocortex. Human, chimpanzee, and gorilla MTG showed highly similar cell-type composition and laminar organization as well as a large shift in proportions of deep-layer intratelencephalic-projecting neurons compared with macaque and marmoset MTG. Microglia, astrocytes, and oligodendrocytes had more-divergent expression across species compared with neurons or oligodendrocyte precursor cells, and neuronal expression diverged more rapidly on the human lineage. Only a few hundred genes showed human-specific patterning, suggesting that relatively few cellular and molecular changes distinctively define adult human cortical structure.
https://www.science.org/doi/full/10.1126/science.ade9516

Science Advances

PAPERS

IRENE COSTANTINI et mul – A cellular resolution atlas of Broca's area
Brain cells are arranged in laminar, nuclear, or columnar structures, spanning a range of scales. Here, we construct a reliable cell census in the frontal lobe of human cerebral cortex at micrometer resolution in a magnetic resonance imaging (MRI)–referenced system using innovative imaging and analysis methodologies. MRI establishes a macroscopic reference coordinate system of laminar and cytoarchitectural boundaries. Cell counting is obtained with a digital stereological approach on the 3D reconstruction at cellular resolution from a custom-made inverted confocal light-sheet fluorescence microscope (LSFM). Mesoscale optical coherence tomography enables the registration of the distorted histological cell typing obtained with LSFM to the MRI-based atlas coordinate system. The outcome is an integrated high-resolution cellular census of Broca's area in a human postmortem specimen, within a whole-brain reference space atlas.
{OK, but is a sample size of n=1 sufficient?}
https://www.science.org/doi/10.1126/sciadv.adg3844

Trends in Cognitive Sciences

ARTICLES

LI WANG & YI JIANG – Action observation network: domain-specific or domain-general?
The action observation network (AON) has traditionally been thought to be dedicated to recognizing animate actions. A recent study by Karakose-Akbiyik et al. invites rethinking this assumption by demonstrating that the AON contains a shared neural code for general events, regardless of whether those events involve animate or inanimate entities.
https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00208-5

TIM BAYNE et al – Consciousness in the cradle: on the emergence of infant experience
Although each of us was once a baby, infant consciousness remains mysterious and there is no received view about when, and in what form, consciousness first emerges. Some theorists defend a 'late-onset' view, suggesting that consciousness requires cognitive capacities which are unlikely to be in place before the child's first birthday at the very earliest. Other theorists defend an 'early-onset' account, suggesting that consciousness is likely to be in place at birth (or shortly after) and may even arise during the third trimester. Progress in this field has been difficult, not just because of the challenges associated with procuring the relevant behavioral and neural data, but also because of uncertainty about how best to study consciousness in the absence of the capacity for verbal report or intentional behavior. This review examines both the empirical and methodological progress in this field, arguing that recent research points in favor of early-onset accounts of the emergence of consciousness.
https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00214-0

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