EAORC BULLETIN 1,090 – 5 May 2024

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 – World Heritage and the evolution of modern human behaviour

In N. Sanz & P. Keenan (eds.), Human Evolution: Adaptations, Dispersals and Social Developments (HEADS) World Heritage Thematic Programme. World Heritage Papers 29. UNESCO World Heritage Center, Paris (2011).

NICHOLAS J. CONARD – World Heritage and the evolution of modern human behaviour

When over the long course of human evolution did people become like ourselves? This question, which helps to define our species, warrants examination in the context of defining cultural World Heritage sites. Which sites and groups of sites providing key evidence for documenting the path toward the development of people with our cultural capacities should be considered for candidacy for the status of World Heritage? Or, in the framework of the World Heritage Convention, which sites or groups of sites are of 'Outstanding Universal Value'? This paper considers several key issues related to the evolution of modern humans and discusses a number of sites and regions that have provided key evidence in documenting this evolution.
https://www.academia.edu/37148329/World_heritage_and_the_evolution_of_modern_human_behavior

ACADEMIA.EDU – Prehistory, anti-Cartesianism, and the first-person viewpoint

Phenomenology and the Cognitive Sciences (2024)

CORIJN VAN MAZIJK – Prehistory, anti-Cartesianism, and the first-person viewpoint

The concept of mind is widely used in today's debates on the lives, behavior, and cognition of prehistoric hominins. It is therefore presumably an important concept. Yet it is very rarely defined, and in most cognitive-archaeological literature, it does not seem to point to anything distinctive. In recent years, talk of minds has also been criticized as being internalistic and dualistic, in supposed contrast to new materialistic and externalistic approaches. In this paper, I aim to defend a different concept of mind which can be used in theorizing about prehistoric hominin cognition. In short, my concept is simply that of the first-person viewpoint, understood in a naturalized manner, and as characterized by intentionality. The discussion proceeds by examining what I perceive to be three prevailing misconceptions about minds, which I derive mainly from the archaeological literature. I use this discussion to outline my own concept of mind, as well as to defend it against the frequently heard criticisms of dualism and internalism. In the final parts, I briefly discuss some potential practical applications of an intentional approach to past minds. Here I focus on certain conceptual problems in debates on symbolic cognition.
https://www.academia.edu/118363280/Prehistory_anti_Cartesianism_and_the_first_person_viewpoint_2024_Phenomenology_and_the_Cognitive_Sciences

NEWS

FRONTIERS NEWS – How much do you talk with your hands?

According to research published in Frontiers in Communication, Italian and Swedish participants used gesture to very different degrees. So could nationality influence how much we talk with our hands?
https://www.newscientist.com/article/2424069-your-nationality-may-influence-how-much-you-talk-with-your-hands/

NATURE BRIEFING – Doctor orangutan, I presume?

For the first time, a wild animal has been documented using a medicinal plant to treat a wound. Rakus, a Sumatran orangutan (Pongo abelii), sustained a gash in his cheek, probably by fighting other males for status. Two days later, scientists noticed him eating the leaves of a vine known for its medicinal properties. He also applied a poultice of chewed leaves to his injury. Just eight days later, his wound was fully closed. Self-medication of other kinds has been observed in some animals,

but this "shows that orangutans and humans share knowledge," says primatologist Caroline Schuppli, who co-authored a study on the event. "Since they live in the same habitat, I would say that's quite obvious, but still intriguing to realize."
https://www.nature.com/articles/s41598-024-58988-7

SCIAM NEWS – People Keep Secrets Because They Overestimate Harsh Judgments

Research suggests that people tend to exaggerate how critically they will be viewed if they reveal negative information about themselves to others.
https://www.scientificamerican.com/article/people-keep-secrets-because-they-overestimate-harsh-judgments/

SCIENCEADVISER – Orangutan plays doctor, heals himself

Orangutans use tools, put roofs over their nests, and even build umbrellas. Now, researchers have documented another stunning similarity to humans: an orangutan using a medicinal poultice to heal a wound.
Apes and other animals are known to self-medicate by eating medicinal plants. A startling observation in a research reserve in Sumatra takes the behavior to another level. Rakus, an aggressive young male, got caught in a fight that left him with wounds on his face. Not long afterward he was spotted chewing the leaves of Fibraurea tinctoria, a climbing liana that is used throughout Southeast Asia and China as a painkiller, fever reducer, and diuretic. He scooped mashed green pulp from his mouth and dabbed it onto his injury "like a wound plaster," says Isabelle Laumer, lead author of the study.
Sure enough, the wound closed within 8 days and fully healed within 1 month, leaving only a faint scar. Orangutans are social learners, and the researchers speculate that wound treatment might be cultural knowledge spread from one ape to another—and that human ancestors may have had similar practices.
https://www.science.org/content/article/orangutan-plays-doctor-heals-himself

SCIENCE DAILY – More plants on the menu of ancient hunter-gatherers

It has long been thought that meat played an important role in the diet of hunter-gatherers before the Neolithic transition. However, due to the scarcity of well-preserved human remains from Paleolithic sites, little information exists about the dietary habits of pre-agricultural human groups. A new study challenges this notion by presenting compelling isotopic evidence of a strong preference for plants among 15,000-year-old hunter-gatherers from Morocco. This is the first time a significant amount of plant consumption has been measured for a pre-agricultural population, shedding new light on the dietary practices of ancient human societies.
https://www.sciencedaily.com/releases/2024/04/240429115900.htm

SCIENCE DAILY – Wild orangutan treats wound with pain-relieving plant

A wild orangutan was observed applying a plant with known medicinal properties to a wound, a first for a wild animal.
https://www.sciencedaily.com/releases/2024/05/240502113715.htm

SCIENCE DAILY – Physics confirms that the enemy of your enemy is, indeed, your friend

The famous axiom 'the enemy of my enemy is my friend' is part of Austrian psychologist Fritz Heider's social balance theory, introduced in the 1940s. Previous studies have tried to model social networks based in famous theory but results remained controversial. New model takes into account two key pieces simultaneously: Not everyone knows everyone else in a social network, and some people are friendlier than others. With those two constraints, large-scale social networks consistently align with social balance theory. Model has broad applications for exploring political polarization, neural networks, drug interactions and more.
https://www.sciencedaily.com/releases/2024/05/240503172621.htm

PUBLICATIONS

American Journal of Biological Anthropology

PAPERS

NIINA KORPINEN – Differences in vertebral bone density between African apes

Low-energy vertebral fractures are a common health concern, especially in elderly people. Interestingly, African apes do not seem to experience as many vertebral fractures and the low-energy ones are even rarer. One potential explanation for this difference is the lower bone density in humans. Yet, only limited research has been done on the vertebral bone density of the great apes and these have mainly included only single vertebrae. Hence the study aim is to expand our understanding of the vertebral microstructure of African apes in multiple spinal segments.
Bone density in the vertebral body of C7, T12, and L3 was measured from 32 Pan troglodytes and 26 Gorilla gorilla using peripheral quantitative computed tomography (pQCT).
There was a clear difference between the three individual vertebrae and consequently the spinal segments in terms of trabecular density and cortical density and thickness. The variation of these bone parameters between the vertebrae differed

between the apes but was also different from those reported for humans. The chimpanzees were observed to have overall higher trabecular density, but gorillas had higher cortical density and thickness. Cortical thickness had a relatively strong association with the vertebral size.
Despite the similarity in locomotion and posture, the results show slight differences in the bone parameters and their variation between spinal segments in African apes. This variation also differs from humans and appears to indicate a complex influence of locomotion, posture, and body size on the different spinal segments.
https://onlinelibrary.wiley.com/doi/full/10.1002/ajpa.24937

Behavioral and Brain Sciences

PAPERS

R.I.M. DUNBAR – Structural and Cognitive Mechanisms of Group Cohesion in Primates
Group-living creates stresses that, all else equal, naturally lead to group fragmentation, and hence loss of the benefits that group-living provides. How species that live in large stable groups counteract these forces is not well understood. I use comparative data on grooming networks and cognitive abilities in primates to show that living in large, stable groups has involved a series of structural solutions designed to create chains of 'friendship' (friends-of-friends effects), increased investment in bonding behaviours (made possible by dietary adjustments) to ensure that coalitions work effectively, and neuronally expensive cognitive skills of the kind known to underpin social relationships in humans. The first ensures that individuals synchronise their activity cycles; the second allows the stresses created by group-living to be defused; and the third allows a large number of weak ties to be managed. Between them, these create a form of multilevel sociality based on strong versus weak ties similar to that found in human social networks. In primates, these strategies appear successively at quite specific group sizes, suggesting that they are solutions to 'glass ceilings' that would otherwise limit the range of group sizes that animals can live in (and hence the habitats they can occupy). This sequence maps closely onto the grades now known to underpin the Social Brain Hypothesis and the fractal pattern that is known to optimise information flow round networks.
https://www.cambridge.org/core/journals/behavioral-and-brain-sciences/article/structural-and-cognitive-mechanisms-of-group-cohesion-in-primates/CAD5A879AE579178988DF5DE98531F48

Biology Letters

PAPERS

CAROLA BORRIES & ANDREAS KOENIG – Female-biased birth sex ratio in a female dispersal primate suggests local resource competition
Group living may entail local resource competition (LRC) which can be reduced if the birth sex ratio (BSR) is biased towards members of the dispersing sex who leave the group and no longer compete locally with kin. In primates, the predicted relationship between dispersal and BSR is generally supported although data for female dispersal species are rare and primarily available from captivity. Here, we present BSR data for Phayre's leaf monkeys (Trachypithecus phayrei crepusculus) at the Phu Khieo Wildlife Sanctuary, Thailand (N = 104). In this population, nearly all natal females dispersed, while natal males stayed or formed new groups nearby. The slower reproductive rate in larger groups suggests that food can be a limiting resource. In accordance with LRC, significantly more females than males were born (BSR 0.404 males/all births) thus reducing future competition with kin. This bias was similar in 2-year-olds (no sex-differential mortality). It became stronger in adults, supporting our impression of particularly fierce competition among males. To better evaluate the importance of BSR, more studies should report sex ratios throughout the life span, and more data for female dispersal primates need to be collected, ideally for multiple groups of different sizes and for several years.
https://royalsocietypublishing.org/doi/10.1098/rsbl.2024.0002

eLife

ARTICLES

KENNETH CHIOU & NOAH SNYDER-MACKLER – Genetic Chimerism: Marmosets contain multitudes
Single-cell RNA sequencing reveals the extent to which marmosets carry genetically distinct cells from their siblings.
https://elifesciences.org/articles/97866

Frontiers in Communication

PAPERS

MARÍA FERNANDA LARA-DÍAZ et al – Visual attention and phonological processing in children with developmental language disorder
Objective: To characterize visual attention during phonological processing tasks in Colombian children with DLD. Developmental Language Disorder (DLD) is a neurobiological condition characterized by insufficient language and communication development, with no underlying physical, sensory, or cognitive explanations. A prominent feature among children with DLD is their struggle with phonological processing, a pivotal skill for later reading proficiency. Recent research

suggests that children with DLD may also exhibit impairments in various non-linguistic cognitive abilities, including memory, attention, and perception. Of particular importance is visual attention, which plays a critical role in integrating visual perceptual information with diverse cognitive and linguistic processes.
This study employed a cross-sectional descriptive experimental design involving 20 children diagnosed with Developmental Language Disorder (DLD) and 20 children without language difficulties. All participants underwent language, vocabulary, and phonological awareness tests. Additionally, an experimental task utilizing the eye-tracking method was designed and administered to measure phonological processing with phonological and lexical distractors.
Children with DLD exhibited diminished performance on phonological awareness tasks, as evidenced by their lower scores. This was further supported by the experimental phonological processing task, where an interference effect was observed in the presence of lexical distractors for word recognition, but not with phonological distractors.
Children with DLD demonstrated deficiencies in both phonological awareness and visual attention skills during linguistic and phonological processing tasks. They also exhibit reduced sensitivity in identifying phonological relations such as rhyme. The study discusses these findings along with their clinical implications, emphasizing the importance of assessing online processing abilities in children with DLD and considering the influence of other cognitive abilities on their linguistic performance.
https://www.frontiersin.org/articles/10.3389/fcomm.2024.1386279/full

NYNAEVE PERKINS BOOKER, MICHELLE COHN & GEORGIA ZELLOU – Linguistic patterning of laughter in human-socialbot interactions
Laughter is a social behavior that conveys a variety of emotional states and is also intricately intertwined with linguistic communication. As people increasingly engage with voice-activated artificially intelligent (voice-AI) systems, an open question is how laughter patterns during spoken language interactions with technology. In Experiment 1, we collected a corpus of recorded short conversations (~10 min in length) between users (n = 76) and Amazon Alexa socialbots (a voice-AI interface designed to mimic human conversational interactions) and analyzed the interactional and pragmatic contexts in which laughter occurred. Laughter was coded for placement in the interaction relative to various speech acts, as well as for phonetic patterning such as duration and voicing. Our analyses reveal that laughter is most commonly found when the content of Alexa's speech is considered inappropriate for the discourse context. Laughter in the corpus was also largely short in length and unvoiced– characteristics which are commonly associated with negative social valence. In Experiment 2, we found that a separate group of listeners did not distinguish between positive and negative laughter from our dataset, though we find that laughs rated as more positive are also rated as more excited and authentic. Overall, we discuss our findings for models of human-computer interaction and applications for the use of laughter in socialbot conversations.
https://www.frontiersin.org/articles/10.3389/fcomm.2024.1346738/full

Frontiers in Neurology

PAPERS

CHANGJIANG ZHAO et al – Location matters: altered interhemispheric homotopic connectivity in post-stroke dyskinesia
Motor impairment is the most prevalent consequence following a stroke. Interhemispheric homotopic connectivity, which varies regionally and hierarchically along the axis of the somatomotor-association cortex, plays a critical role in sustaining normal motor functions. However, the impact of strokes occurring in various locations on homotopic connectivity is not fully understood. This study aimed to explore how motor deficits resulting from acute strokes in different locations influence homotopic connectivity.
Eighty-four acute ischemic stroke patients with dyskinesia were recruited and divided into four demographically-matched subgroups based on stroke locations: Group 1 (G1; frontoparietal, n = 15), Group 2 (G2; radiation coronal, n = 16), Group 3 (G3; basal ganglia, n = 30), and Group 4 (G4; brain stem, n = 23). An additional 37 demographically-matched healthy controls were also recruited in the study. Multimodal MRI data, motor function assessments, and cognitive tests were gathered for analysis. Interhemispheric homotopic functional and structural connectivity were measured using resting-state functional MRI and diffusion tensor imaging, respectively. These measurements were then correlated with motor function scores to investigate the relationships.
Voxel-mirrored homotopic connectivity (VMHC) analysis showed that strokes in the frontoparietal and basal ganglia regions led to diminished homotopic connectivity in the somatosensory/motor cortex. In contrast, strokes in the radiation coronal and brainstem regions affected subcortical motor circuits. Structural homotopic connectivity analysis using diffusion tensor imaging showed that frontoparietal and basal ganglia strokes predominantly affected association fibers, while radiation coronal and brainstem strokes caused widespread disruption in the integrity of both cortical-cortical and cortical-subcortical white matter fibers. Correlation analyses demonstrated significant associations between the Fugl-Meyer Assessment (FMA), Modified Barthel Index (MBI), and National Institutes of Health Stroke Scale (NIHSS) scores with the VMHC in the inferior temporal gyrus for G1 (G1; $r = 0.838$, $p < 0.001$; $r = 0.793$, $p < 0.001$; and $r = -0.834$, $p < 0.001$, respectively). No statistically significant associations were observed in Groups 2, 3, and 4.
Our results suggest that motor deficits following strokes in various regions involve distinct pathways from cortical to subcortical areas. Alterations in lesion topography and regional functional homotopy provide new insights into the understanding of neural underpinnings of post-stroke dyskinesia.

https://www.frontiersin.org/journals/neurology/articles/10.3389/fneur.2024.1308058/full

Frontiers in Psychology

PAPERS

STEVEN PHILLIPS – A category theory perspective on the Language of Thought: LoT is universal

The Language of Thought (LoT) hypothesis proposes that some collections of mental states and processes are symbol systems to explain language-like systematic properties of thought. Recent proponents of this hypothesis point to additional LoT-like properties in non-linguistic domains to claim that LoT remains the "best game in town" in terms of explanatory coverage. Nonetheless, LoT assumes but does not explain why/how symbolic representations connect to other (non-symbolic) formats. The perspective presented here is supposed to bridge this gap as a duality in a category theoretical sense: (perceptual) data are projected onto a base (conceptual) space in one direction, and in the opposite direction, these data are referenced by that space. Accordingly, perception is dual to conception. These constructions follow from a universal mapping principle affording an explanation for why/how symbolic and non-symbolic formats are connected: as the "best" possible transformation between the two forms— so the slogan, LoT is universal. This view also sheds some light on the apparent pervasiveness of logic-like capacities across age-groups and species, and these constructions constitute special types of categories called toposes (topoi), and every topos has an interpretation in first-order logic.
https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1361580/full

YAN YU et al – Conventionality matters in Chinese metaphor but not simile comprehension: evidence from event-related potentials

Metaphor and simile, two prevalent forms of figurative language widely employed in daily communication, serve as significant research subjects in linguistics. The Career of Metaphor Theory in cognitive linguistics posits that as conventionality increases, the cognitive mechanisms of metaphor comprehension shift from "comparison" to "categorization." In line with this notion, prior electrophysiological investigations have revealed that novel metaphors elicit a stronger N400 brain response compared to conventional metaphors. However, the observed N400 difference between conventional and novel metaphors may merely stem from the familiarity contrast between them, as conventional metaphors are typically more familiar than novel ones. To address this dichotomy, the present study not only compared the N400 responses between conventional and novel metaphors but also between conventional and novel similes. While conventional and novel similes differ in familiarity, similar to conventional and novel metaphors, both are processed via "comparison" mechanisms. The results revealed that novel metaphors elicited larger N400 amplitudes compared to conventional metaphors, aligning with previous findings. In contrast, no significant N400 differences were observed between conventional and novel similes, suggesting that familiarity disparity is unlikely to account for N400 distinctions. Our findings imply that conventional and novel metaphors undergo distinct cognitive processing mechanisms ("comparison" versus "categorization"), thereby providing further empirical validation for the Career of Metaphor Theory.
https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1404498/full

TYLER MALLOY & CLEOTILDE GONZALEZ – Applying Generative Artificial Intelligence to cognitive models of decision making

Generative Artificial Intelligence has made significant impacts in many fields, including computational cognitive modeling of decision making, although these applications have not yet been theoretically related to each other. This work introduces a categorization of applications of Generative Artificial Intelligence to cognitive models of decision making.
This categorization is used to compare the existing literature and to provide insight into the design of an ablation study to evaluate our proposed model in three experimental paradigms. These experiments used for model comparison involve modeling human learning and decision making based on both visual information and natural language, in tasks that vary in realism and complexity. This comparison of applications takes as its basis Instance-Based Learning Theory, a theory of experiential decision making from which many models have emerged and been applied to a variety of domains and applications.
The best performing model from the ablation we performed used a generative model to both create memory representations as well as predict participant actions. The results of this comparison demonstrates the importance of generative models in both forming memories and predicting actions in decision-modeling research.
In this work, we present a model that integrates generative and cognitive models, using a variety of stimuli, applications, and training methods. These results can provide guidelines for cognitive modelers and decision making researchers interested in integrating Generative AI into their methods.
https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1387948/full

ENRIQUE GARCÍA-MARCO et al – Negation and social avoidance in language recruits the right inferior frontal gyrus: a tDCS study

In the process of comprehension, linguistic negation induces inhibition of negated scenarios. Numerous studies have highlighted the role of the right Inferior Frontal Gyrus (rIFG) - a key component of the inhibitory network - in negation processing. Social avoidance can be linguistically portrayed using attitudinal verbs such as "exclude" vs. "include", which

inherently carry negative connotations. Consequently, we hypothesize that the interplay between explicit negation and the implicit negativity of avoidance verbs can be modulated via transcranial direct current stimulation (tDCS) targeting the rIFG. In our study, sixty-four participants read approach/avoidance sentences, which were either affirmative or negative, such as "Anne included (did not include) meat in her diet" vs. "Anne excluded (did not exclude) meat in her diet". This reading task followed a 20-minute tDCS session. The sentences were sequentially displayed, and at 1500 ms post-sentence, a verb was shown – either the one previously mentioned or its semantic alternative counterpart (e.g., included vs. excluded).
Findings revealed that anodal stimulation intensifies the inhibitory impact of negation during sentence comprehension. Under anodal conditions, negative sentences led to extended reading times for the mentioned verbs compared to their affirmative counterparts, suggesting an increased inhibitory effect on the verb. Furthermore, in avoidance sentences, anodal stimulation resulted in reduced reading times for alternative verbs (e.g. "included") in negative sentences compared to alternative verbs (e.g. "excluded") in negated approach sentences.
As "avoidance" is semantically equivalent to "non-approach", the inhibitory effect of negation is primarily applied to the implicit negation: NOT EXCLUDED = NOT→NOT (INCLUDED), which consequently activates the representation of the alternative verb making it more available. We further discuss these findings in light of the rIFG's pivotal role in processing attitudinal verbs and linguistic negation. This discussion is framed within the overarching context of the two-step model of negation processing, highlighting its significance in the realm of social communication.
https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1356030/full

COMMENTARIES

GABRIËL J.L. BECKERS et al with MARTIN B.H. EVERAERT & JOHAN J. BOLHUIS – No evidence for language syntax in songbird vocalizations

The evolutionary origins of human language remain poorly understood and hotly debated. In a recent study published in Nature Communications (Suzuki and Matsumoto, 2022), the authors claim to have found evidence for what they call "Core-Merge" in the vocal communication of Japanese tits (Parus minor, a passerine bird species). As the authors suggest that Core-Merge—allowing senders to combine two words and receivers to recognize them as a single unit—is a cognitive capacity underlying human language, their findings would have important implications for the study of the evolution of language (Bolhuis et al., 2014). Here we argue that a role for Core-Merge in language evolution is not evident and that their study does not demonstrate Core-Merge in birds. Instead, we argue that their findings can be explained as differential responsiveness to distinctive vocalizations, based on concatenation of vocal utterances.
https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1393895/full

Frontiers in Sports and Active Living

PAPERS

JUN-PENG ZHANG et al – Sports promote brain evolution: a resting-state fMRI study of volleyball athlete

Long-term skill learning can lead to structure and function changes in the brain. Different sports can trigger neuroplasticity in distinct brain regions. Volleyball, as one of the most popular team sports, heavily relies on individual abilities such as perception and prediction for high-level athletes to excel. However, the specific brain mechanisms that contribute to the superior performance of volleyball athletes compared to non-athletes remain unclear.
We conducted a study involving the recruitment of ten female volleyball athletes and ten regular female college students, forming the athlete and novice groups, respectively. Comprehensive behavioral assessments, including Functional Movement Screen and audio-visual reaction time tests, were administered to both groups. Additionally, resting-state magnetic resonance imaging (MRI) data were acquired for both groups. Subsequently, we conducted in-depth analyses, focusing on the amplitude of low-frequency fluctuations (ALFF), regional homogeneity (ReHo), and functional connectivity (FC) in the brain for both the athlete and novice groups.
No significant differences were observed in the behavioral data between the two groups. However, the athlete group exhibited noteworthy enhancements in both the ALFF and ReHo within the visual cortex compared to the novice group. Moreover, the functional connectivity between the visual cortex and key brain regions, including the left primary sensory cortex, left supplementary motor cortex, right insula, left superior temporal gyrus, and left inferior parietal lobule, was notably stronger in the athlete group than in the novice group.
This study has unveiled the remarkable impact of volleyball athletes on various brain functions related to vision, movement, and cognition. It indicates that volleyball, as a team-based competitive activity, fosters the advancement of visual, cognitive, and motor skills. These findings lend additional support to the early cultivation of sports talents and the comprehensive development of adolescents. Furthermore, they offer fresh perspectives on preventing and treating movement-related disorders.
{Of course, it's just one person's opinion but … what a load of old boldilocks. Vision improves when you play volleyball - check. Hand-eye coordination is enhanced when you play volleyball – check. ALFF is enhanced when you play volleyball: as it measures spontaneous neuronal activity, which increases with any sublimation of kinaesthetic cognition – check. ReHo is enhanced when you play volleyball: as is measures functional connectivity between neighbouring nodes – check, but so what? And all this promotes "brain evolution"? For an idiosyncratic (i.e. wrong) meaning of "evolution", maybe. Either this paper will stimulate a flurry of papers showing that chess, stamp-collecting, hairdressing, WhatsApp messaging, self-harm

and every other habituated activity "promotes brain evolution"; or it will never be heard of again, allowing the soft dust of time to accumulate in a gently obscuring pile over it. Rant over.}
https://www.frontiersin.org/articles/10.3389/fspor.2024.1393988/full

Heliyon

PAPERS

ZHIYONG WANG et al – Evolutionary profiles and complex admixture landscape in East Asia: New insights from modern and ancient Y chromosome variation perspectives

Human Y-chromosomes are characterized by nonrecombination and uniparental inheritance, carrying traces of human history evolution and admixture. Large-scale population-specific genomic sources based on advanced sequencing technologies have revolutionized our understanding of human Y chromosome diversity and its anthropological and forensic applications. Here, we reviewed and meta-analyzed the Y chromosome genetic diversity of modern and ancient people from China and summarized the patterns of founding lineages of spatiotemporally different populations associated with their origin, expansion, and admixture. We emphasized the strong association between our identified founding lineages and language-related human dispersal events correlated with the Sino-Tibetan, Altaic, and southern Chinese multiple-language families related to the Hmong-Mien, Tai-Kadai, Austronesian, and Austro-Asiatic languages. We subsequently summarize the recent advances in translational applications in forensic and anthropological science, including paternal biogeographical ancestry inference (PBGAI), surname investigation, and paternal history reconstruction. Whole-Y sequencing or high-resolution panels with high coverage of terminal Y chromosome lineages are essential for capturing the genomic diversity of ethnolinguistically diverse East Asians. Generally, we emphasized the importance of including more ethnolinguistically diverse, underrepresented modern and spatiotemporally different ancient East Asians in human genetic research for a comprehensive understanding of the paternal genetic landscape of East Asians with a detailed time series and for the reconstruction of a reference database in the PBGAI, even including new technology innovations of Telomere-to-Telomere (T2T) for new genetic variation discovery.
https://www.cell.com/heliyon/fulltext/S2405-8440(24)06098-5

FRANCESCA MARINA BOSCO et al – A machine-learning approach to investigating the complexity of Theory of Mind in individuals with schizophrenia

Individuals with schizophrenia have difficulty attributing mental states to themselves and to others - Theory of Mind (ToM). ToM is a complex, multifaceted theoretical construct comprising first and second order, first and third person, egocentric and allocentric perspective, and cognitive and affective ToM. Most studies addressing ToM deficit in people with schizophrenia consider it an "all-or-nothing" ability and use a classical statistical methodology to test a null hypothesis. With the present study, we investigated ToM in individuals with schizophrenia, considering its complex nature and degrees of impairment. To do this, we used a machine-learning approach to detect patterns in heterogeneous and multivariate data. Our findings highlight the complex nature of ToM deficit in individuals with schizophrenia and reveal the relationship between various different aspects of ToM.
https://www.cell.com/heliyon/fulltext/S2405-8440(24)06724-0

iScience

PAPERS

MONICA K. THIEU et al – Visual looming is a primitive for human emotion

The neural computations for looming detection are strikingly similar across species. In mammals, information about approaching threats is conveyed from the retina to the midbrain superior colliculus, where approach variables are computed to enable defensive behavior. Although neuroscientific theories posit that midbrain representations contribute to emotion through connectivity with distributed brain systems, it remains unknown whether a computational system for looming detection can predict both defensive behavior and phenomenal experience in humans. Here, we show that a shallow convolutional neural network based on the Drosophila visual system predicts defensive blinking to looming objects in infants and superior colliculus responses to optical expansion in adults. Further, the neural network's responses to naturalistic video clips predict self-reported emotion largely by way of subjective arousal. These findings illustrate how a simple neural network architecture optimized for a species-general task relevant for survival explains motor and experiential components of human emotion.
https://www.cell.com/iscience/fulltext/S2589-0042(24)01108-8

OREN KOBO, YAARA YESHURUN & TOM SCHONBERG – Reward-related regions play a role in natural story comprehension.

The reward system was shown to be involved in a wide array of processes. Nevertheless, the exploration of the involvement of the reward system during language processing has not yet been directly tested. We investigated the role of reward-processing regions while listening to a natural story. We utilized a published dataset in which half of the participants listened to a natural story and the others listened to a scrambled version of it to compare the functional MRI signals in the reward

system between these conditions and discovered a distinct pattern between conditions. This suggests that the reward system is activated during the comprehension of natural stories. We also show evidence that the fMRI signals in reward-related areas might potentially correlate with predictability level of processed sentences. Further research is needed to determine the nature of the involvement and the way the activity interacts with various aspects of the sentences.
https://www.cell.com/iscience/fulltext/S2589-0042(24)01066-6

Language and Cognition

ARTICLES

JILL HOHENSTEIN, XINYAN KOU & EFSTATHIA SOROLI – Developments in event conceptualisation and event integration in language and mind

This essay is the introduction to the Special Issue 'Events in language and mind: Theoretical and empirical advances in the event integration theory'. We first review Leonard Talmy's event integration theory in addition to some critiques of this framework. Following this, we point to some empirical research inspired by this framework, which explores the interaction between language and cognition. We then briefly introduce the papers in this volume and discuss their contributions to the event integration framework. We conclude with some limitations, questions and future directions.
https://www.cambridge.org/core/journals/language-and-cognition/article/developments-in-event-conceptualisation-and-event-integration-in-language-and-mind/7E13431C180C705D6FD77A2301D66032

Nature Communications

PAPERS

QUIRIN GEHMACHER et al – Eye movements track prioritized auditory features in selective attention to natural speech

Over the last decades, cognitive neuroscience has identified a distributed set of brain regions that are critical for attention. Strong anatomical overlap with brain regions critical for oculomotor processes suggests a joint network for attention and eye movements. However, the role of this shared network in complex, naturalistic environments remains understudied. Here, we investigated eye movements in relation to (un)attended sentences of natural speech. Combining simultaneously recorded eye tracking and magnetoencephalographic data with temporal response functions, we show that gaze tracks attended speech, a phenomenon we termed ocular speech tracking. Ocular speech tracking even differentiates a target from a distractor in a multi-speaker context and is further related to intelligibility. Moreover, we provide evidence for its contribution to neural differences in speech processing, emphasizing the necessity to consider oculomotor activity in future research and in the interpretation of neural differences in auditory cognition.
https://www.nature.com/articles/s41467-024-48126-2

JUNYI GE et al with MICHAEL D. PETRAGLIA – New Late Pleistocene age for the Homo sapiens skeleton from Liujiang southern China

The emergence of Homo sapiens in Eastern Asia is a topic of significant research interest. However, well-preserved human fossils in secure, dateable contexts in this region are extremely rare, and often the subject of intense debate owing to stratigraphic and geochronological problems. Tongtianyan cave, in Liujiang District of Liuzhou City, southern China is one of the most important fossils finds of H. sapiens, though its age has been debated, with chronometric dates ranging from the late Middle Pleistocene to the early Late Pleistocene. Here we provide new age estimates and revised provenience information for the Liujiang human fossils, which represent one of the most complete fossil skeletons of H. sapiens in China. U-series dating on the human fossils and radiocarbon and optically stimulated luminescence dating on the fossil-bearing sediments provided ages ranging from ~33,000 to 23,000 years ago (ka). The revised age estimates correspond with the dates of other human fossils in northern China, at Tianyuan Cave (~40.8–38.1 ka) and Zhoukoudian Upper Cave (39.0–36.3 ka), indicating the geographically widespread presence of H. sapiens across Eastern Asia in the Late Pleistocene, which is significant for better understanding human dispersals and adaptations in the region.
https://www.nature.com/articles/s41467-024-47787-3

Nature Communications Biology

PAPERS

FEDERICA SANTACROCE et al – Human intraparietal sulcal morphology relates to individual differences in language and memory performance

The sulco-gyral pattern is a qualitative feature of the cortical anatomy that is determined in utero, stable throughout lifespan and linked to brain function. The intraparietal sulcus (IPS) is a nodal associative brain area, but the relation between its morphology and cognition is largely unknown. By labelling the left and right IPS of 390 healthy participants into two patterns, according to the presence or absence of a sulcus interruption, here we demonstrate a strong association between the morphology of the right IPS and performance on memory and language tasks. We interpret the results as a morphological advantage of a sulcus interruption, probably due to the underlying white matter organization. The right-hemisphere specificity of this effect emphasizes the neurodevelopmental and plastic role of sulcus morphology in cognition prior to

lateralisation processes. The results highlight a promising area of investigation on the relationship between cognitive performance, sulco-gyral pattern and white matter bundles.
https://www.nature.com/articles/s42003-024-06175-9

Nature Ecology & Evolution

PAPERS

ZINEB MOUBTAHIJ et al with JEAN-JACQUES HUBLIN – Isotopic evidence of high reliance on plant food among Later Stone Age hunter-gatherers at Taforalt, Morocco

The transition from hunting-gathering to agriculture stands as one of the most important dietary revolutions in human history. Yet, due to a scarcity of well-preserved human remains from Pleistocene sites, little is known about the dietary practices of pre-agricultural human groups. Here we present the isotopic evidence of pronounced plant reliance among Late Stone Age hunter-gatherers from North Africa (15,000–13,000 cal BP), predating the advent of agriculture by several millennia. Employing a comprehensive multi-isotopic approach, we conducted zinc (δ66Zn) and strontium (87Sr/86Sr) analysis on dental enamel, bulk carbon (δ13C) and nitrogen (δ15N) and sulfur (δ34S) isotope analysis on dentin and bone collagen, and single amino acid analysis on human and faunal remains from Taforalt (Morocco). Our results unequivocally demonstrate a substantial plant-based component in the diets of these hunter-gatherers. This distinct dietary pattern challenges the prevailing notion of high reliance on animal proteins among pre-agricultural human groups. It also raises intriguing questions surrounding the absence of agricultural development in North Africa during the early Holocene. This study underscores the importance of investigating dietary practices during the transition to agriculture and provides insights into the complexities of human subsistence strategies across different regions.
https://www.nature.com/articles/s41559-024-02382-z

Nature Mental Health

PAPERS

YIGE YIN et al – Awe fosters positive attitudes toward solitude

Research in psychological science has predominantly focused on the importance of social interaction to health and well-being, neglecting how solitude relates to optimal functioning. Although solitude is sometimes perceived as an aversive state associated with loneliness and ostracism, solitude can also serve as a time for self-reflection and spiritual awakening. The aim of the current set of studies was to examine if the experience of awe might serve as an important state influencing people's attitudes toward solitude. We propose that experiencing awe makes people feel alone but not lonely—dispelling the myth that solitude incurs loneliness—and, importantly, that awe leads to positive attitudes toward solitude. Here eight studies, using complementary designs (big data analytics, experiments, experience sampling and intervention), tested and supported these hypotheses. We found that these effects of awe were mediated by self-transcendence. Furthermore, we probed the downstream consequences of these effects, showing that a brief awe intervention enhanced spiritual well-being and peace of mind by augmenting positive attitudes toward solitude.
https://www.nature.com/articles/s44220-024-00244-y

Nature Neuroscience

PAPERS

ALLY DWORETSKY et al – Two common and distinct forms of variation in human functional brain networks

The cortex has a characteristic layout with specialized functional areas forming distributed large-scale networks. However, substantial work shows striking variation in this organization across people, which relates to differences in behavior. While most previous work treats individual differences as linked to boundary shifts between the borders of regions, here we show that cortical 'variants' also occur at a distance from their typical position, forming ectopic intrusions. Both 'border' and 'ectopic' variants are common across individuals, but differ in their location, network associations, properties of subgroups of individuals, activations during tasks, and prediction of behavioral phenotypes. Border variants also track significantly more with shared genetics than ectopic variants, suggesting a closer link between ectopic variants and environmental influences. This work argues that these two dissociable forms of variation—border shifts and ectopic intrusions—must be separately accounted for in the analysis of individual differences in cortical systems across people.
https://www.nature.com/articles/s41593-024-01618-2

Nature NPJ Science of Learning

PAPERS

BÁRBARA MALCORRA et al – Speech connectedness predicts reading performance three months in advance: a longitudinal experiment

Aiming to verify the predictive value of oral narrative structure on reading acquisition, we followed 253 children (first and second graders) during an entire school year, assessing oral narratives and reading performances in five sessions. Transcriptions of oral narratives were represented as word-recurrence graphs to measure connectedness attributes.

Connectedness predicted performance in phonological awareness, reading comprehension, and word reading accuracy 3–4 months in advance.
https://www.nature.com/articles/s41539-024-00248-4

Nature Scientific Reports

PAPERS

JULIANA WALLNER WERNECK MENDES et al – Dogs understand the role of a human partner in a cooperative task
Humans are exceptionally flexible in cooperation, partly due to our ability to recognize the roles of cooperative partners. While some non-human animals understand the need for a partner in such interactions, it is unclear whether they grasp the consequences of their partner's actions and adjust accordingly. Previous studies utilizing economic games with non-human animals yielded mixed results. We investigated dogs, known for their close cooperation with humans, in a stag hunt game. Dogs could cooperate for better rewards or defect for lower ones, while their human partners would either cooperate, never cooperate, or act randomly. We control for attraction to food, side bias, and local enhancement. Dogs were more likely to coordinate with their partners when it led to better rewards, suggesting that they understood their partner's actions. By highlighting this cognitive skill in dogs, we advance our knowledge of the intricate mechanisms driving cooperative behavior in non-human animals.
https://www.nature.com/articles/s41598-024-60772-6

ANASTASIA MALYSHEVSKAYA et al – Horizontal mapping of time-related words in first and second language
The existence of a consistent horizontal spatial-conceptual mapping for words denoting time is a well-established phenomenon. For example, words related to the past or future (e.g., yesterday/tomorrow) facilitate respective leftward/rightward attentional shifts and responses, suggesting the visual-spatial grounding of temporal semantics, at least in the native language (L1). To examine whether similar horizontal bias also accompanies access to time-related words in a second language (L2), we tested 53 Russian-English (Experiment 1) and 48 German-English (Experiment 2) bilinguals, who classified randomly presented L1 and L2 time-related words as past- or future-related using left or right response keys. The predicted spatial congruency effect was registered in all tested languages and, furthermore, was positively associated with higher L2 proficiency in Experiment 2. Our findings (1) support the notion of horizontal spatial-conceptual mapping in diverse L1s, (2) demonstrate the existence of a similar spatial bias when processing temporal words in L2, and (3) show that the strength of time-space association in L2 may depend on individual L2 proficiency.
https://www.nature.com/articles/s41598-024-60062-1

Neuron

PAPERS

GIULIO TONONI, MELANIE BOLY & CHIARA CIRELLI – Consciousness and sleep
Sleep is a universal, essential biological process. It is also an invaluable window on consciousness. It tells us that consciousness can be lost but also that it can be regained, in all its richness, when we are disconnected from the environment and unable to reflect. By considering the neurophysiological differences between dreaming and dreamless sleep, we can learn about the substrate of consciousness and understand why it vanishes. We also learn that the ongoing state of the substrate of consciousness determines the way each experience feels regardless of how it is triggered—endogenously or exogenously. Dreaming consciousness is also a window on sleep and its functions. Dreams tell us that the sleeping brain is remarkably lively, recombining intrinsic activation patterns from a vast repertoire, freed from the requirements of ongoing behavior and cognitive control.
https://www.cell.com/neuron/abstract/S0896-6273(24)00272-1

KENJI KOBAYASHI & JOSEPH W. KABLE – Neural mechanisms of information seeking
We ubiquitously seek information to make better decisions. Particularly in the modern age, when more information is available at our fingertips than ever, the information we choose to collect determines the quality of our decisions. Decision neuroscience has long adopted empirical approaches where the information available to decision-makers is fully controlled by the researchers, leaving neural mechanisms of information seeking less understood. Although information seeking has long been studied in the context of the exploration-exploitation trade-off, recent studies have widened the scope to investigate more overt information seeking in a way distinct from other decision processes. Insights gained from these studies, accumulated over the last few years, raise the possibility that information seeking is driven by the reward system signaling the subjective value of information. In this piece, we review findings from the recent studies, highlighting the conceptual and empirical relationships between distinct literatures, and discuss future research directions necessary to establish a more comprehensive understanding of how individuals seek information as a part of value-based decision-making.
https://www.cell.com/neuron/abstract/S0896-6273(24)00246-0

One Earth

PAPERS

MADELINE JUDGE et al – Accelerating social tipping points in sustainable behaviors: Insights from a dynamic model of moralized social change

To address the climate crisis, it is important to accelerate social tipping points in the adoption of sustainable behaviors. Social tipping points describe the process whereby small changes trigger self-perpetuating feedback loops and produce a fundamental transformation in the social system. The current literature does not adequately address how the moralized nature of sustainable behaviors could lead to unique tipping trajectories. In this Perspective, we propose a dynamic model of moralized social change that provides insights on how novel sustainable behaviors spread over society and how to speed up this process. Although moralization may initially generate social friction that delays tipping points, it can accelerate change at later stages by increasing social pressure on laggards. By implementing early system-level changes, policymakers can help reduce the initial inertia created by moralization and accelerate social tipping points. We discuss how our model can inform the decisions of activists, policymakers, professionals, and researchers.
https://www.cell.com/one-earth/fulltext/S2590-3322(24)00147-7

PLoS One

PAPERS

JASMINE HEURLIN, GYÖRGY BARABÁS & LINA S. V. ROTH – Behavioural synchronisation between different groups of dogs and wolves and their owners/handlers: Exploring the effect of breed and human interaction

Dogs have previously been shown to synchronise their behaviour with their owner and the aim of this study was to test the effect of immediate interactions, breed, and the effects of domestication. The behavioural synchronisation test was conducted in outdoor enclosures and consisted of 30 s where the owner/handler was walking and 30 s of standing still. Three studies were conducted to explore the effect of immediate interaction (study A), the effect of breed group (study B), and the effect of domestication (study C). In study A, a group of twenty companion dogs of various breeds were tested after three different human interaction treatments: Ignore, Pet, and Play. The results showed that dogs adjusted their movement pattern to align with their owner's actions regardless of treatment. Furthermore, exploration, eye contact, and movement were all influenced by the owners moving pattern, and exploration also decreased after the Play treatment. In study B, the synchronisation test was performed after the Ignore treatment on three groups: 24 dogs of ancient dog breeds, 17 solitary hunting dogs, and 20 companion dogs (data from study A). Irrespective of the group, all dogs synchronised their moving behaviour with their owner. In addition, human walking positively influenced eye contact behaviour while simultaneously decreasing exploration behaviour. In study C, a group of six socialised pack-living wolves and six similarly socialised pack-living dogs were tested after the Ignore treatment. Interestingly, these animals did not alter their moving behaviour in response to their handler. In conclusion, dogs living together with humans synchronise with their owner's moving behaviour, while wolves and dogs living in packs do not. Hence, the degree of interspecies behavioural synchronisation may be influenced by the extent to which the dogs are immersed in everyday life with humans.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0302833

ALEKSANDRA ZLATKOVIC et al – Structure of resilience: A Machiavellian contribution or 'paddle your own canoe'

According to biobehavioral synchronicity model, empathy—a fundamental requirement for reciprocal and prosocial behavior—is at the core of rebound from stress, an essential feature of resilience. However, there are also reports on antagonistic traits—characterized by empathic deficit—bolstering immunity to stress. In the literature there is also inconclusive evidence regarding gender-related differences in resilience. In separate female and male subsamples we analyzed the network constellation entailing resilience (assessed as rebound from stress), empathic (cognitive empathy, affective resonance, and affective dissonance) and antagonistic personality traits (Machiavellianism, grandiose- and vulnerable narcissism). For both genders, Machiavellian agency instigated by narcissistic admiration occupied the central position in the network indicating that personality's resources for proactivity and control are essential for successful rebound. Empathy, and in particular its affective component, occupied only a peripheral position in the network. Machiavellian antagonism in men and grandiose narcissism in females bridged prosocial mechanism of resilience with antagonistic nodes of the network. In the female subsample both types of malign narcissism (rivalry and vulnerable narcissism) directly thwarted rebound. This process was not detected in the male subsample network dominated by antagonism. That is, gender-related differences were associated with the avoidance strategies rather than with the proactive strategies. Thus, resilience assessed as rebounding from stress primarily involves personality resources which modulate proactive- and prosocial- but not necessarily reciprocal behavior.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0302257

Proceedings of the Royal Society B

PAPERS

OLLI J. LOUKOLA et al – Evidence for socially influenced and potentially actively coordinated cooperation by bumblebees

Cooperation is common in animals, yet the specific mechanisms driving collaborative behaviour in different species remain unclear. We investigated the proximate mechanisms underlying the cooperative behaviour of bumblebees in two different tasks, where bees had to simultaneously push a block in an arena or a door at the end of a tunnel for access to reward. In both tasks, when their partner's entry into the arena/tunnel was delayed, bees took longer to first push the block/door compared with control bees that learned to push alone. In the tunnel task, just before gaining access to reward, bees were more likely to face towards their partner than expected by chance or compared with controls. These results show that bumblebees' cooperative behaviour is not simply a by-product of individual efforts but is socially influenced. We discuss how bees' turning behaviours, e.g. turning around before first reaching the door when their partner was delayed and turning back towards the door in response to seeing their partner heading towards the door, suggest the potential for active coordination. However, because these behaviours could also be interpreted as combined responses to social and secondary reinforcement cues, future studies are needed to help clarify whether bumblebees truly use active coordination.
https://royalsocietypublishing.org/doi/10.1098/rspb.2024.0055

Royal Society Open Science

PAPERS

HAAVARD KOPPANG et al – Physical and social warmth

The concept of a warm person has played a key role in western social psychological research, particularly in how people perceive others. Williams and Bargh (2008; Study 1) found that individuals holding a cup of warm beverage perceived the individuals they faced as psychologically warmer than those who held a cup of cold beverage. In this article, we set out to replicate and extend these findings by exploring whether various factors modify the effect of physical and social warmth. Specifically, we tested three moderating variables: participants' awareness of the purpose of the experiment, warmth of participants' personality and the target person's gender. We found no main effect of physical warmth, and very little evidence for any moderating effects. It is clear from this and other recent studies that the embodiment effect is not simple to replicate and, therefore, is difficult to exploit for practical purposes.
https://royalsocietypublishing.org/doi/10.1098/rsos.231575

Science

NEWS

Brain activity seems to be more complex in baby girls than boys

When fetuses and babies were exposed to sound stimuli, their brains' subsequent activity appeared to be more complicated in the females than the males.
https://www.newscientist.com/article/2427098-brain-activity-seems-to-be-more-complex-in-baby-girls-than-boys/

OBITUARIES

BARUCH FISCHHOFF – Daniel Kahneman (1934–2024): Pioneer in the psychology of judgment and decision-making

Daniel Kahneman, world-renowned psychologist, died on 27 March 2024, not long after his 90th birthday. His fabled collaboration with the late psychologist Amos Tversky in the 1970s and early 1980s changed how people thought about decision-making. For some, Kahneman and Tversky's accounts brought order to seemingly chaotic processes. For others, those accounts brought disorder to overly tidy views of people as either rational or instinctive actors. Their joint work typified Kahneman's approach to science: reading broadly, thinking deeply, and making no claims stronger than the available evidence. He shared that life of the mind in his 2011 book, Thinking, Fast and Slow, describing the painstakingly slow science needed to identify fast research insights that are worth keeping.
https://www.science.org/doi/10.1126/science.adp6405

Trends in Cognitive Sciences

ARTICLES

HAOZHOU JIANG & JULIA SLIWA – Practicing cooperative skills shapes brain-wide networks

Humans and other primates skillfully navigate the complex cognitive interplay of cooperative behaviors. However, the neural resources we rely on to do so are poorly understood. Franch et al. found that neuronal activity in a visual-frontal domain general cortical network is shaped during the training of a cooperative behavior to highlight relevant sensory inputs.
https://www.cell.com/trends/cognitive-sciences/abstract/S1364-6613(24)00104-9

Trends in Genetics

PAPERS

RONG-CHIEN LIN, BIANCA T. FERREIRA & YAO-WU YUAN – The molecular basis of phenotypic evolution: beyond the usual suspects

It has been well documented that mutations in coding DNA or cis-regulatory elements underlie natural phenotypic variation in many organisms. However, the development of sophisticated functional tools in recent years in a wide range of traditionally non-model systems have revealed many 'unusual suspects' in the molecular bases of phenotypic evolution, including upstream open reading frames (uORFs), cryptic splice sites, and small RNAs. Furthermore, large-scale genome sequencing, especially long-read sequencing, has identified a cornucopia of structural variation underlying phenotypic divergence and elucidated the composition of supergenes that control complex multi-trait polymorphisms. In this review article we highlight recent studies that demonstrate this great diversity of molecular mechanisms producing adaptive genetic variation and the panoply of evolutionary paths leading to the 'grandeur of life'.
https://www.cell.com/trends/genetics/abstract/S0168-9525(24)00097-0

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