EAORC BULLETIN 1,084 – 24 March 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 – Mind, Time, and Material Engagement

In Ivan Gaskell & Sarah Anne Carter (eds.), The Oxford Handbook of History and Material Culture, Oxford University Press, Ch6 105-120 (2020).

LAMBROS MALAFOURIS & CHRIS GOSDEN – Mind, Time, and Material Engagement

The study of material culture is changing the way we perceive and study the past, as well as how we understand the process of human becoming. This chapter proposes that a focus on the phenomenon of material engagement provides a productive means to situate and integrate evolutionary, historical, and developmental processes. The material engagement approach brings with it a relational conceptualization of human cognition as profoundly embodied, enacted, extended, and distributed. This conceptualisation opens the way to, on the one hand, reanimate the importance of history and development in the study of human cognitive evolution, and on the other hand, allow a new approach to historical analysis, one in which minds and things play a more central role. Specifically, we explore some of the implications of the view that humans and things coconstitute each other for understanding the processes by which human cognitive abilities develop and change in different cultural and historical contexts.
https://www.academia.edu/97954213/Mind_Time_and_Material_Engagement

OTHER PUBLICATIONS – Last Common Ancestor of African apes and humans and divergence of Pan and Homo

Ideas in Ecology and Evolution 17, 1-21 (2024).

FRANCES A. M. MANSFIELD & MARIO VANEECHOUTTE – Current evidence indicates a Eurasian origin for the Last Common Ancestor of African apes and humans, and supports a new hypothesis suggesting that the Zanclean Megaflood (5.3 Ma) may have played a role in the ultimate divergence of Pan and Homo.

While the established paradigm of human evolution asserts that the lineages leading to the extant great apes and Homo arose in Africa, the large number of fossil discoveries from Europe in recent decades support arguments for a European origin of the Hominidae (all great apes) and plausibly, also a European common ancestor of the Homininae (African great apes, Australopithecus species, and the genus Homo). Meanwhile, a lack of consensus remains regarding the phylogenetic placement of australopithecine fossil species in Africa, with substantial evidence indicating that some of them may align more closely to extant African great apes than to Homo. Based on a novel interpretation of existing fossil, genetic, paleogeographic and paleoclimatic evidence, this paper aims to put forward a new hypothesis regarding the separate divergences of Gorilla, Pan, and Homo. We support existing arguments that the last common ancestor of African great apes and Homo may have lived in Europe in the late Miocene, and we put forward a new hypothesis as to where, when, and why the separate lineages may have started to diverge. Extreme conditions during the Vallesian Crisis (11.6-8.0 Ma) and the Messinian Salinity Crisis (6.0-5.3 Ma) may have forced separate branches of European hominids to migrate out of the Mediterranean region. We argue that the lineages leading to Gorilla and Pan independently migrated into Africa, while the lineage leading to Homo went in another direction. Thereafter, the Zanclean Megaflood (5.3 Ma)--which caused the Mediterranean to refill very quickly--may have cut off the migration route between Eurasia and Africa at the Sinai Peninsula, isolating a small population (the putative Homo lineage) on the Arabian Peninsula / Red Sea coast during a period of hyperaridity. The other group (Pan lineage) crossed into Africa, where it subsequently diversified into various species of Australopithecus.
https://ojs.library.queensu.ca/index.php/IEE/article/view/17224

NEWS

GUARDIAN SCIENCE – Empire of the ants: what insect supercolonies can teach us

People have long drawn comparisons between ant societies and human ones – but in fact they are a reminder of how limited our influence on the world really is.
https://www.theguardian.com/environment/2024/mar/19/empire-of-the-ants-what-insect-supercolonies-can-teach-us

NATURE BRIEFING – How much do babies remember?

People have no memories from before about three years old, and no one knows why. "It's a paradox in a sense," says neuroscientist Flavio Donato. "In the moment that the brain is learning at a rate it will never show again during the whole lifetime, those memories seem not to stick in the brain." New research suggests that maybe those memories aren't gone after all — we just can't consciously access them. Scientists are swapping lab rats and mazes for playrooms and plush toys to reveal what's going on inside tiny tots' heads.
https://www.science.org/content/article/are-your-earliest-childhood-memories-still-lurking-your-mind-or-gone-forever

THE CONVERSATION – The mystery of consciousness shows limit to what science alone can achieve

What if there's no experiment to work out which theory of consciousness is correct?
https://theconversationuk.cmail20.com/t/r-l-tiklijlt-khhlilahh-w/

THE CONVERSATION – Elephant calves have been found buried – what does that mean?

Recent reports of burials of elephant calves are intriguing but it's impossible to confirm that this was intentional.
https://theconversationuk.cmail20.com/t/r-l-tiklijlt-khhlilahh-u/

THE CONVERSATION – Conspiracy theorists seem to favour an intuitive thinking style – why it's important

The pros and pitfalls of this type of thinking.
https://theconversation.com/conspiracy-theorists-seem-to-favour-an-intuitive-thinking-style-heres-why-thats-important-222303

OTHER NEWS – EMORY UNIVERSITY – Frans de Waal brought apes 'a little closer to humans'

Emory University primatologist Frans de Waal — who pioneered studies of animal cognition while also writing best-selling books that helped popularize the field around the globe — passed away March 14, 2024, from stomach cancer.
https://news.emory.edu/features/2024/03/er_frans_de_waal_16-03-2024/index.html

PUBLICATIONS

Current Biology

PAPERS

MARIANNA BOROS et al – Neural evidence for referential understanding of object words in dogs

Using words to refer to objects in the environment is a core feature of the human language faculty. Referential understanding assumes the formation of mental representations of these words. Such understanding of object words has not yet been demonstrated as a general capacity in any non-human species, despite multiple behavior-based case reports. In human event-related potential (ERP) studies, object word knowledge is typically tested using the semantic violation paradigm, where words are presented either with their referent (match) or another object (mismatch). Such mismatch elicits an N400 effect, a well-established neural correlate of semantic processing. Reports of preverbal infant N400 evoked by semantic violations assert the use of this paradigm to probe mental representations of object words in nonverbal populations. Here, measuring dogs' (Canis familiaris) ERPs to objects primed with matching or mismatching object words, we found a mismatch effect at a frontal electrode, with a latency (206–606 ms) comparable to the human N400. A greater difference for words that dogs knew better, according to owner reports, further supported a semantic interpretation of this effect. Semantic expectations emerged irrespective of vocabulary size, demonstrating the prevalence of referential understanding in dogs. These results provide the first neural evidence for object word knowledge in a non-human animal.
https://www.cell.com/current-biology/fulltext/S0960-9822(24)00171-4

eLife

NEWS

Separate ways

Studying differences in middle-aged and older individuals sheds light on the relationships between a filtering mechanism in the brain and listening behavior.
https://elifesciences.org/digests/92079/separate-ways

PAPERS

MOHSEN SADEGHI et al – Inferring control objectives in a virtual balancing task in humans and monkeys

Natural behaviors have redundancy, which implies that humans and animals can achieve their goals with different control objectives. Given only observations of behavior, is it possible to infer the control strategy that the subject is employing? This challenge is particularly acute in animal behavior because we cannot ask or instruct the subject to use a particular control strategy. This study presents a three-pronged approach to infer an animal's control strategy from behavior. First, both humans and monkeys performed a virtual balancing task for which different control objectives could be utilized. Under matched experimental conditions, corresponding behaviors were observed in humans and monkeys. Second, a generative model was developed that represented two main control strategies to achieve the task goal. Model simulations were used to identify aspects of behavior that could distinguish which control objective was being used. Third, these behavioral signatures allowed us to infer the control objective used by human subjects who had been instructed to use one control objective or the other. Based on this validation, we could then infer strategies from animal subjects. Being able to positively identify a subject's control objective from behavior can provide a powerful tool to neurophysiologists as they seek the neural mechanisms of sensorimotor coordination.
https://elifesciences.org/reviewed-preprints/88514

CHIARA BULGARELLI et al with THE BRIGHT STUDY TEAM – Growth in early infancy drives optimal brain functional connectivity which predicts cognitive flexibility in later childhood

Functional brain network organization, measured by functional connectivity (FC), reflects key neurodevelopmental processes for healthy development. Early exposure to adversity, e.g. undernutrition, affects neurodevelopment, observable via disrupted FC, and leads to poorer outcomes from preschool age onward. We assessed longitudinally the impact of early growth trajectories on developmental FC in a rural Gambian population from age 5 to 24 months. To investigate how these early trajectories relate to later childhood outcomes, we assessed cognitive flexibility at 3-5 years. We observed that early physical growth before the fifth month of life drove optimal developmental trajectories of FC that in turn predicted cognitive flexibility at pre-school age. In contrast to previously studied developmental populations, this Gambian sample exhibited long-range interhemispheric FC that decreased with age. Our results highlight the measurable effects that poor growth in early infancy has on brain development and the subsequent impact on pre-school age cognitive development, underscoring the need for early life interventions throughout global settings of adversity.
https://elifesciences.org/reviewed-preprints/94194

MIGUEL BARRETTO GARCÍA et al – Causal evidence for a domain-specific role of left superior frontal sulcus in human perceptual decision making

Humans and animals can flexibly choose their actions based on different information, ranging from objective states of the environment (e.g., apples are bigger than cherries) to subjective preferences (e.g., cherries are tastier than apples). Whether the brain instantiates these different choices by recruiting either specialised or shared neural circuitry remains debated. Specifically, domain-general accounts of prefrontal cortex (PFC) function propose that prefrontal areas flexibly process either perceptual or value-based evidence depending on what is required for the present choice, whereas domain-specific theories posit that PFC sub-areas, such as the left superior frontal sulcus (SFS), selectively integrate evidence relevant for perceptual decisions. Here we comprehensively test the functional role of the left SFS for choices based on perceptual and value-based evidence, by combining fMRI with a behavioural paradigm, computational modelling, and transcranial magnetic stimulation. Confirming predictions by a sequential sampling model, we show that TMS-induced excitability reduction of the left SFS selectively changes the processing of decision-relevant perceptual information and associated neural processes. In contrast, value-based decision making and associated neural processes remain unaffected. This specificity of SFS function is evident at all levels of analysis (behavioural, computational, and neural, including functional connectivity), demonstrating that the left SFS causally contributes to evidence integration for perceptual but not value-based decisions.
https://elifesciences.org/reviewed-preprints/94576

Frontiers in Psychology

PAPERS

MAWA DAFREVILLE, MICHÈLE GUIDETTI & MARIE BOURJADE – Attention-sensitive signalling by 7- to 20-month-old infants in a comparative perspective

Attention-sensitive signalling is the pragmatic skill of signallers who adjust the modality of their communicative signals to their recipient's attention state. This study provides the first comprehensive evidence for its onset and development in 7-to 20-month-olds human infants, and underlines its significance for language acquisition and evolutionary history. Mother-infant dyads (N = 30) were studied in naturalistic settings, sampled according to three developmental periods (in months); [7–10], [11–14], and [15–20]. Infant's signals were classified by dominant perceptible sensory modality and proportions compared according to their mother's visual attention, infant-directed speech and tactile contact. Maternal visual attention and infant-directed speech were influential on the onset and steepness of infants' communicative adjustments. The ability to inhibit silent-visual signals towards visually inattentive mothers (unimodal adjustment) predated the ability to deploy

audible-or-contact signals in this case (cross-modal adjustment). Maternal scaffolding of infant's early pragmatic skills through her infant-directed speech operates on the facilitation of infant's unimodal adjustment, the preference for oral over gestural signals, and the audio-visual combinations of signals. Additionally, breakdowns in maternal visual attention are associated with increased use of the audible-oral modality/channel. The evolutionary role of the sharing of attentional resources between parents and infants into the emergence of modern language is discussed.
https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1257324/full

Frontiers in Public Health

PAPERS

MARISA VALENTINI et al – Artificial intelligence large language model ChatGPT: is it a trustworthy and reliable source of information for sarcoma patients?

Since its introduction in November 2022, the artificial intelligence large language model ChatGPT has taken the world by storm. Among other applications it can be used by patients as a source of information on diseases and their treatments. However, little is known about the quality of the sarcoma-related information ChatGPT provides. We therefore aimed at analyzing how sarcoma experts evaluate the quality of ChatGPT's responses on sarcoma-related inquiries and assess the bot's answers in specific evaluation metrics.

The ChatGPT responses to a sample of 25 sarcoma-related questions (5 definitions, 9 general questions, and 11 treatment-related inquiries) were evaluated by 3 independent sarcoma experts. Each response was compared with authoritative resources and international guidelines and graded on 5 different metrics using a 5-point Likert scale: completeness, misleadingness, accuracy, being up-to-date, and appropriateness. This resulted in maximum 25 and minimum 5 points per answer, with higher scores indicating a higher response quality. Scores ≥21 points were rated as very good, between 16 and 20 as good, while scores ≤15 points were classified as poor (11–15) and very poor (≤10).

The median score that ChatGPT's answers achieved was 18.3 points (IQR, i.e., Inter-Quartile Range, 12.3–20.3 points). Six answers were classified as very good, 9 as good, while 5 answers each were rated as poor and very poor. The best scores were documented in the evaluation of how appropriate the response was for patients (median, 3.7 points; IQR, 2.5–4.2 points), which were significantly higher compared to the accuracy scores (median, 3.3 points; IQR, 2.0–4.2 points; $p = 0.035$). ChatGPT fared considerably worse with treatment-related questions, with only 45% of its responses classified as good or very good, compared to general questions (78% of responses good/very good) and definitions (60% of responses good/very good). The answers ChatGPT provided on a rare disease, such as sarcoma, were found to be of very inconsistent quality, with some answers being classified as very good and others as very poor. Sarcoma physicians should be aware of the risks of misinformation that ChatGPT poses and advise their patients accordingly.
https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2024.1303319/full

Frontiers in Sociology

PAPERS

JENNIFER PATTERSON – Into the wild: uncertain frontiers and sustainable human–nature interactions

Humans seldom consider themselves as animals, and that humans are animals is a truth frequently turned into an insulting metaphor indicating "uncivilized" behavior in many cultures. Interestingly, the "civilizing" aspects of Western Culture in the Global North are historically derived from traditions of democracy based on living in cities from which the wild has been banished. This is embedded in the English language since civilizing and civilization come from the Latin for city, civitas, the place where citizens hold voting rights. Beyond the gates of civilization is the wild. How the wild and nature have been constructed and demarcated is an enormously complex and enduring challenge in western philosophy as it relates to knowledge-making, existence, truth, and reality. Indeed, whilst people generally believe they know what nature means, they rarely realize that little in nature is wild. Furthermore, the concept of uncertainty, central to the pandemic, is compounded by climate instability and a potentially disastrous future. This is breaking down what is known, requiring porous and flexible conceptual frontiers and a transdisciplinary approach. This article traces the linguistic separation of humans from their animal origins and wilder environments for political and increasingly greedy economic purposes. It explores the acknowledged complexity of healthy human–nature interactions, juxtaposing information mainly from the humanities and social sciences. Demonstrating how unhealthy the current paradigm has proven to be for humans and the natural world, it brings together conflicting information to disrupt traditional certainties using an innovative bricolage methodology. It weaves and combines different ways of knowing as it considers forms of knowledge-making, rewilding, foraging, the place of magical thinking, and vital force. It concludes that a new paradigm is needed to enable a way of working toward any vision of healthy human–nature interaction.
https://www.frontiersin.org/articles/10.3389/fsoc.2024.1325963/full

Heliyon

PAPERS

BIN YIN & CHENG-YANG FEI – The effects of self-other overlap and group efficacy on group-based anger and collective action tendency: An online experimental study

Collective emotions and actions represent foundational constructs in social psychology, significantly influencing societal dynamics and responses. Within this framework, the Self-Other Overlap (SOO) - wherein individuals perceive minimal distinction between their own and others' identities - has been identified as an impactful factor at the interpersonal level. However, the extrapolation of SOO's implications at the collective, group level remains an underexplored domain in contemporary research.

In addressing this lacuna, the present research endeavors to elucidate the multifaceted implications of SOO on group emotions and actions, contextualized within societal challenges such as “food hygiene problems”. Utilizing validated instruments including the Self-Other Overlap Scale, Group-Based Anger Scale, Collective Action Tendency Scale, and Group Efficacy Scale for Coping Situations, this study adopts a tripartite situational experiment, engaging a collective sample of 359 participants, systematically recruited via the Credamo smart research platform to ensure representativeness.

Study 1 examined the potential influence of variable SOO degrees on Group-Based Anger (GA) and Collective Action Tendency (CAT). Study 2 further refined the exploration, discerning the differential impacts of SOO targets on GA and CAT. Conclusively, Study 3 sought to ascertain the potential moderating role of Group Efficacy (GE) within the SOO-GA-CAT relationship.

The empirical findings yielded several salient insights: notably, an augmentation in SOO levels corresponded with an amplification of GA and CAT. Furthermore, a delineation in SOO targets, specifically from external to ingroup entities, manifested in a pronounced augmentation of GA and CAT. Intriguingly, while elevated SOO predisposed heightened CAT, the modulatory effect of GE on CAT manifested predominantly in lower SOO contexts.

In summation, the present study underscores the pivotal role of SOO magnitude and orientation as determinants of GA and CAT. The nuanced interplay between SOO degree and GE, particularly vis-à-vis CAT, provides a fresh scholarly perspective, contributing to the enriched understanding of group dynamics and collective behavioral paradigms.

https://www.cell.com/heliyon/fulltext/S2405-8440(24)04377-9

Interface: Journal of the Royal Society

PAPERS

JONATHAN WARRELL et al – Latent evolutionary signatures: a general framework for analysing music and cultural evolution

Cultural processes of change bear many resemblances to biological evolution. The underlying units of non-biological evolution have, however, remained elusive, especially in the domain of music. Here, we introduce a general framework to jointly identify underlying units and their associated evolutionary processes. We model musical styles and principles of organization in dimensions such as harmony and form as following an evolutionary process. Furthermore, we propose that such processes can be identified by extracting latent evolutionary signatures from musical corpora, analogously to identifying mutational signatures in genomics. These signatures provide a latent embedding for each song or musical piece. We develop a deep generative architecture for our model, which can be viewed as a type of variational autoencoder with an evolutionary prior constraining the latent space; specifically, the embeddings for each song are tied together via an energy-based prior, which encourages songs close in evolutionary space to share similar representations. As illustration, we analyse songs from the McGill Billboard dataset. We find frequent chord transitions and formal repetition schemes and identify latent evolutionary signatures related to these features. Finally, we show that the latent evolutionary representations learned by our model outperform non-evolutionary representations in such tasks as period and genre prediction.

https://royalsocietypublishing.org/doi/10.1098/rsif.2023.0647

Mind & Language

PAPERS

SARAH A. FISHER – That's not what you said! Semantic constraints on literal speech

According to some philosophers, a sentence's semantics can fail to constitute a complete propositional content, imposing mere constraints on such a content. Recently, Daniel Harris has begun developing a formal constraint semantics. He claims that the semantic values of sentences constrain what speakers can literally say with them—and what hearers can know about what was said. However, that claim is undermined by his conception of semantics as the study of a psychological module. I argue instead that semantic constraints should be understood as properties of public languages.

https://onlinelibrary.wiley.com/doi/full/10.1111/mila.12508

Nature

ARTICLES

JOHAN J. BOLHUIS et al – Three reasons why AI doesn't model human language

Artificial intelligence (AI) is being used to develop large language models (LLMs) with considerable success. But they should not be seen as being models of how human language works and is acquired.
https://www.nature.com/articles/d41586-024-00824-z

PAPERS

JOHN KAPPELMAN et mul – Adaptive foraging behaviours in the Horn of Africa during Toba supereruption

Although modern humans left Africa multiple times over 100,000 years ago, those broadly ancestral to non-Africans dispersed less than 100,000 years ago1. Most models hold that these events occurred through green corridors created during humid periods because arid intervals constrained population movements2. Here we report an archaeological site—Shinfa-Metema 1, in the lowlands of northwest Ethiopia, with Youngest Toba Tuff cryptotephra dated to around 74,000 years ago—that provides early and rare evidence of intensive riverine-based foraging aided by the likely adoption of the bow and arrow. The diet included a wide range of terrestrial and aquatic animals. Stable oxygen isotopes from fossil mammal teeth and ostrich eggshell show that the site was occupied during a period of high seasonal aridity. The unusual abundance of fish suggests that capture occurred in the ever smaller and shallower waterholes of a seasonal river during a long dry season, revealing flexible adaptations to challenging climatic conditions during the Middle Stone Age. Adaptive foraging along dry-season waterholes would have transformed seasonal rivers into 'blue highway' corridors, potentially facilitating an out-of-Africa dispersal and suggesting that the event was not restricted to times of humid climates. The behavioural flexibility required to survive seasonally arid conditions in general, and the apparent short-term effects of the Toba supereruption in particular were probably key to the most recent dispersal and subsequent worldwide expansion of modern humans.
https://www.nature.com/articles/s41586-024-07208-3

Nature Anthropology (SCIEPublish)

PAPERS

MARIO VANEECHOUTTE et al with MARC VERHAEGEN – Have We Been Barking up the Wrong Ancestral Tree? Australopithecines Are Probably Not Our Ancestors

The dominant paradigm regarding human evolution since the split with Pan considers australopithecines as hominins, i.e., the closest relatives and/or direct ancestors of Homo. Historically, this paradigm started from the assumption that the Homo/Pan/Gorilla last common ancestor was a knuckle-walking ape that evolved into the fully upright (orthograde), obligate bipedal genus Homo, whereas Pan and Gorilla remained knuckle-walkers. Obligate terrestrial upright bipedalism, unique for our species, is an odd locomotor behaviour for a primate. Therefore, it had become generally accepted that a cooler and drier African climate had caused deforestation, which had forced our ancestors to develop upright bipedalism as an adaptation to living on open grassland savannah. This view, already held by Lamarck and Darwin, appeared most parsimonious in the almost complete absence of fossils. The discovery in the 20th century of australopithecine fossils, bipedal apes with small brains, in open country in southern and eastern Africa corroborated the savannah paradigm. Therefore, australopithecines are considered hominins. However, it is now recognized that most australopithecines instead lived in a mosaic of forests, grasslands and wetlands, and better knowledge of their fossils clearly indicates that they possessed several climbing adaptations. Moreover, none of the extinct ape species older than Australopithecus and Paranthropus for which postcranial remains have been described (e.g., Morotopithecus, Sahelanthropus, Orrorin, Ardipithecus) were knuckle-walking. On the other hand, upright posture/gait is already present to different degrees even in Miocene apes. Moreover, the notion that hominoid orthogrady is a primitive characteristic is corroborated by the growing consensus that knuckle-walking is not a primitive trait but has evolved in parallel, independently in both Pan and Gorilla. Consequently, it is possible that australopithecines are not transitional between a semi-erect ancestor and upright bipedal humans, but to the contrary, are intermediate between a more upright ancestor and extant semi-erect African apes. In summary, hypotheses that attempt to explain how a semi-erect Homo/Pan last common ancestor transitioned into the bipedal australopithecines as an adaptation to life on the savannah appear to be ill-conceived and moreover seem to have been superfluous from the very start. We review the numerous similarities between australopithecines and extant African apes, suggesting that they are possibly not hominins and therefore not our direct ancestors. We suggest that we may have been barking up the wrong ancestral tree, for almost a century.
https://www.sciepublish.com/article/pii/94

Nature Human Behaviour

ARTICLES

RICHARD HEERSMINK – Use of large language models might affect our cognitive skills

Large language models can generate sophisticated text or code with little input from a user, which has the potential to impoverish our own writing and thinking skills. We need to understand the effect of this technology on our cognition and to decide whether this is what we want.

https://www.nature.com/articles/s41562-024-01859-y

Nature Humanities & Social Sciences Communications

PAPERS

SONG ZHOU et al – Parental emotional warmth and adolescent internet altruism behavior: a moderated mediation model

As a double-edged sword, the Internet is prone to breed cyber violence and bullying on the one hand, on the other hand, it can promote the expansion of altruistic behavior in cyberspace. Exploring the mechanism of generating Internet altruistic behaviors can help improve adolescents' adaptive development and build a harmonious online environment. In light of this, this study constructed a hypothetical model of parental emotional warmth and adolescents' Internet altruistic behaviors with gratitude trait as the mediating variable and belief in a just world as the moderating variable, in order to investigate how personal experiences, personality, and social cognition affect the practice of Internet altruistic behavior. A total of 1004 adolescents from two middle schools in China were selected for the survey. The results showed that parental emotional warmth significantly and positively affects adolescents' Internet altruistic behaviors, while gratitude mediated this path between the two, with the mediating effect accounting for 27.07% and 24.27% of the total effect in the model of paternal and maternal emotional warmth, respectively. Moreover, in the paternal emotional warmth model, this indirect effect was moderated by belief in a just world, and the indirect effect was stronger for adolescents with lower beliefs in a just world relative to those with higher beliefs. Relative to paternal emotional warmth, belief in a just world was not significant in moderating the indirect effects of maternal emotional warmth on Internet altruistic behavior through gratitude. This research aims to provide more empirical research on the mechanisms of adolescents' Internet altruistic behaviors and to provide more insights into the promotion of responsible and appropriate Internet use among adolescents.
https://www.nature.com/articles/s41599-024-02870-4

Nature Neuroscience

PAPERS

REIDAR RIVELAND & ALEXANDRE POUGET – Natural language instructions induce compositional generalization in networks of neurons

A fundamental human cognitive feat is to interpret linguistic instructions in order to perform novel tasks without explicit task experience. Yet, the neural computations that might be used to accomplish this remain poorly understood. We use advances in natural language processing to create a neural model of generalization based on linguistic instructions. Models are trained on a set of common psychophysical tasks, and receive instructions embedded by a pretrained language model. Our best models can perform a previously unseen task with an average performance of 83% correct based solely on linguistic instructions (that is, zero-shot learning). We found that language scaffolds sensorimotor representations such that activity for interrelated tasks shares a common geometry with the semantic representations of instructions, allowing language to cue the proper composition of practiced skills in unseen settings. We show how this model generates a linguistic description of a novel task it has identified using only motor feedback, which can subsequently guide a partner model to perform the task. Our models offer several experimentally testable predictions outlining how linguistic information must be represented to facilitate flexible and general cognition in the human brain.
https://www.nature.com/articles/s41593-024-01607-5

Nature NPJ Science of Learning

PAPERS

TIMOTHY A. KELLER et al – The neural and cognitive basis of expository text comprehension

As science and technology rapidly progress, it becomes increasingly important to understand how individuals comprehend expository technical texts that explain these advances. This study examined differences in individual readers' technical comprehension performance and differences among texts, using functional brain imaging to measure regional brain activity while students read passages on technical topics and then took a comprehension test. Better comprehension of the technical passages was related to higher activation in regions of the left inferior frontal gyrus, left superior parietal lobe, bilateral dorsolateral prefrontal cortex, and bilateral hippocampus. These areas are associated with the construction of a mental model of the passage and with the integration of new and prior knowledge in memory. Poorer comprehension of the passages was related to greater activation of the ventromedial prefrontal cortex and the precuneus, areas involved in autobiographical and episodic memory retrieval. More comprehensible passages elicited more brain activation associated with establishing links among different types of information in the text and activation associated with establishing conceptual coherence within the text representation. These findings converge with previous behavioral research in their implications for teaching technical learners to become better comprehenders and for improving the structure of instructional texts, to facilitate scientific and technological comprehension.
https://www.nature.com/articles/s41539-024-00232-y

Nature Scientific Reports

PAPERS

MELISSA THYE, PAUL HOFFMAN & DANIEL MIRMAN – The neural basis of naturalistic semantic and social cognition

Decoding social environments and engaging meaningfully with other people are critical aspects of human cognition. Multiple cognitive systems, including social and semantic cognition, work alongside each other to support these processes. This study investigated shared processing between social and semantic systems using neuroimaging data collected during movie-viewing, which captures the multimodal environment in which social knowledge is exchanged. Semantic and social content from movie events (event-level) and movie transcripts (word-level) were used in parametric modulation analyses to test (1) the degree to which semantic and social information is processed within each respective network and (2) engagement of the same cross-network regions or the same domain-general hub located within the semantic network during semantic and social processing. Semantic word and event-level content engaged the same fronto-temporo-parietal network and a portion of the semantic hub in the anterior temporal lobe (ATL). Social word and event-level content engaged the supplementary motor area and right angular gyrus within the social network, but only social words engaged the domain-general semantic hub in left ATL. There was evidence of shared processing between the social and semantic systems in the dorsolateral portion of right ATL which was engaged by word and event-level semantic and social content. Overlap between the semantic and social word and event results was highly variable within and across participants, with the most consistent loci of overlap occurring in left inferior frontal, bilateral precentral and supramarginal gyri for social and semantic words and in bilateral superior temporal gyrus extending from ATL posteriorly into supramarginal gyri for social and semantic events. These results indicate a complex pattern of shared and distinct regions for social and semantic cognition during naturalistic processing.
https://www.nature.com/articles/s41598-024-56897-3

REIJI SUZUKI & TAKAYA ARITA – An evolutionary model of personality traits related to cooperative behavior using a large language model

This study aims to demonstrate that Large Language Models (LLMs) can empower research on the evolution of human behavior, based on evolutionary game theory, by using an evolutionary model positing that instructing LLMs with high-level psychological and cognitive character descriptions enables the simulation of human behavior choices in game-theoretical scenarios. As a first step towards this objective, this paper proposes an evolutionary model of personality traits related to cooperative behavior using a large language model. In the model, linguistic descriptions of personality traits related to cooperative behavior are used as genes. The deterministic strategies extracted from LLM that make behavioral decisions based on these personality traits are used as behavioral traits. The population is evolved according to selection based on average payoff and mutation of genes by asking LLM to slightly modify the parent gene toward cooperative or selfish. Through experiments and analyses, we clarify that such a model can indeed exhibit evolution of cooperative behavior based on the diverse and higher-order representation of personality traits. We also observed repeated intrusion of cooperative and selfish personality traits through changes in the expression of personality traits. The words that emerged in the evolved genes reflected the behavioral tendencies of their associated personalities in terms of semantics, thereby influencing individual behavior and, consequently, the evolutionary dynamics.
https://www.nature.com/articles/s41598-024-55903-y

CLÉMENCE BERTRAND PILON & MARTIN ARGUIN – The processing of spatial frequencies through time in visual word recognition

This study examined the temporal profile of spatial frequency processing in a word reading task in 16 normal adult readers. They had to report the word presented in a 200 ms display using a four-alternative forced-choice task (4AFC). The stimuli were made of an additive combination of the signal (i.e. the target word) and of a visual white noise patch wherein the signal-to-noise ratio varied randomly across stimulus duration. Four spatial frequency conditions were defined for the signal component of the stimulus (bandpass Butterworth filters with center frequencies of 1.2, 2.4, 4.8 and 9.6 cycles per degree). In contrast to the coarse-to-fine theory of visual recognition, the results show that the highest spatial frequency range dominates early processing, with a shift toward lower spatial frequencies at later points during stimulus exposure. This pattern interacted in a complex way with the temporal frequency content of signal-to-noise oscillations. The outcome of individual data patterns classification by a machine learning algorithm according to the corresponding spatial frequency band further shows that the most salient spatial frequency signature is obtained when the time dimension within data patterns is recoded into its Fourier transform.
https://www.nature.com/articles/s41598-024-57219-3

MANUEL DOMÍNGUEZ-RODRIGO et al – Computer vision enables taxon-specific identification of African carnivore tooth marks on bone

Taphonomic works aim at discovering how paleontological and archaeofaunal assemblages were formed. They also aim at determining how hominin fossils were preserved or destroyed. Hominins and other mammal carnivores have been co-evolving, at least during the past two million years, and their potential interactions determined the evolution of human behavior. In order to understand all this, taxon-specific carnivore agency must be effectively identified in the fossil record. Until now, taphonomists have been able to determine, to some degree, hominin and carnivore inputs in site formation, and

their interactions in the modification of part of those assemblages. However, the inability to determine agency more specifically has hampered the development of taphonomic research, whose methods are virtually identical to those used several decades ago (lagged by a high degree of subjectivity). A call for more objective and agent-specific methods would be a major contribution to the advancement of taphonomic research. Here, we present one of these advances. The use of computer vision (CV) on a large data set of images of tooth marks has enabled the objective discrimination of taxon-specific carnivore agency up to 88% of the testing sample. We highlight the significance of this method in an interdisciplinary interplay between traditional taphonomic-paleontological analysis and artificial intelligence-based computer science. The new questions that can be addressed with this will certainly bring important changes to several ideas on important aspects of the human evolutionary process.
https://www.nature.com/articles/s41598-024-57015-z

GIUSEPPE BRIATICO et al – The Pleistocene high-elevation environments between 2.02 and 0.6 Ma at Melka Kunture (Upper Awash Valley, Ethiopia) based upon stable isotope analysis

Pleistocene environments are among the most studied issues in paleoecology and human evolution research in eastern Africa. Many data have been recorded from archaeological sites located at low and medium elevations (≤ 1500 m), whereas few contexts are known at 2000 m and above. Here, we present a substantial isotopic study from Melka Kunture, a complex of prehistoric sites located at 2000—2200 m above sea level in the central Ethiopian highlands. We analyzed the stable carbon and oxygen isotopic composition of 308 faunal tooth enamel samples from sites dated between 2.02 and 0.6 Ma to investigate the animal diets and habitats. The carbon isotopic results indicate that the analyzed taxa had C4-dominated and mixed C3-C4 diets with no significant diachronic changes in feeding behavior with time. This is consistent with faunal and phytolith analyses, which suggested environments characterized by open grasslands (with both C3 and C4 grasses), patches of bushes and thickets, and aquatic vegetation. However, palynological data previously documented mountain forests, woodlands, and high-elevation grasslands. Additionally, the carbon isotopic comparison with other eastern African localities shows that differences in elevation did not influence animal feeding strategies and habitat partitioning, even though plant species vary according to altitudinal gradients. In contrast, the oxygen isotopic comparison suggests significant differences consistent with the altitude effect. Our approach allows us to detect diverse aspects of animal behavior, habitat, and vegetation that should be considered when reconstructing past environments.
https://www.nature.com/articles/s41598-024-56768-x

BEATRICE MAGISTRO et al – Identifying American climate change free riders and motivating sustainable behavior

Free riders, who benefit from collective efforts to mitigate climate change but do not actively contribute, play a key role in shaping behavioral climate action. Using a sample of 2096 registered American voters, we explore the discrepancy between two groups of free riders: cynics, who recognize the significance of environmental issues but do not adopt sustainable behaviors, and doubters, who neither recognize the significance nor engage in such actions. Through statistical analyses, we show these two groups are different. Doubters are predominantly male, younger, with lower income and education, exhibit stronger conspiracy beliefs, lower altruism, and limited environmental knowledge, are more likely to have voted for Trump and lean towards conservative ideology. Cynics are younger, religious, higher in socioeconomic status, environmentally informed, liberal-leaning, and less likely to support Trump. Our research provides insights on who could be most effectively persuaded to make climate-sensitive lifestyle changes and provides recommendations to prompt involvement in individual sustainability behaviors. Our findings suggest that for doubters, incentivizing sustainability through positive incentives, such as financial rewards, may be particularly effective. Conversely, for cynics, we argue that engaging them in more community-driven and social influence initiatives could effectively translate their passive beliefs into active participation.
https://www.nature.com/articles/s41598-024-57042-w

REIJI SUZUKI & TAKAYA ARITA – An evolutionary model of personality traits related to cooperative behavior using a large language model

This study aims to demonstrate that Large Language Models (LLMs) can empower research on the evolution of human behavior, based on evolutionary game theory, by using an evolutionary model positing that instructing LLMs with high-level psychological and cognitive character descriptions enables the simulation of human behavior choices in game-theoretical scenarios. As a first step towards this objective, this paper proposes an evolutionary model of personality traits related to cooperative behavior using a large language model. In the model, linguistic descriptions of personality traits related to cooperative behavior are used as genes. The deterministic strategies extracted from LLM that make behavioral decisions based on these personality traits are used as behavioral traits. The population is evolved according to selection based on average payoff and mutation of genes by asking LLM to slightly modify the parent gene toward cooperative or selfish. Through experiments and analyses, we clarify that such a model can indeed exhibit evolution of cooperative behavior based on the diverse and higher-order representation of personality traits. We also observed repeated intrusion of cooperative and selfish personality traits through changes in the expression of personality traits. The words that emerged in the evolved genes reflected the behavioral tendencies of their associated personalities in terms of semantics, thereby influencing individual behavior and, consequently, the evolutionary dynamics.
https://www.nature.com/articles/s41598-024-55903-y

SUMER S. VAID et al – Variation in social media sensitivity across people and contexts
Social media impacts people's wellbeing in different ways, but relatively little is known about why this is the case. Here we introduce the construct of "social media sensitivity" to understand how social media and wellbeing associations differ across people and the contexts in which these platforms are used. In a month-long large-scale intensive longitudinal study (total n = 1632; total number of observations = 120,599), we examined for whom and under which circumstances social media was associated with positive and negative changes in social and affective wellbeing. Applying a combination of frequentist and Bayesian multilevel models, we found a small negative average association between social media use AND subsequent wellbeing, but the associations were heterogenous across people. People with psychologically vulnerable dispositions (e.g., those who were depressed, lonely, not satisfied with life) tended to experience heightened negative social media sensitivity in comparison to people who were not psychologically vulnerable. People also experienced heightened negative social media sensitivity when in certain types of places (e.g., in social places, in nature) and while around certain types of people (e.g., around family members, close ties), as compared to using social media in other contexts. Our results suggest that an understanding of the effects of social media on wellbeing should account for the psychological dispositions of social media users, and the physical and social contexts surrounding their use. We discuss theoretical and practical implications of social media sensitivity for scholars, policymakers, and those in the technology industry.
https://www.nature.com/articles/s41598-024-55064-y

New Scientist

NEWS

Chimp mothers play with their youngsters even when times are tough
Ten years' worth of observations of a wild chimpanzee community show that most adults stop playing when food is short, but not mothers and their young.
https://www.newscientist.com/article/2422397-chimp-mothers-play-with-their-youngsters-even-when-times-are-tough/

PeerJ

PAPERS

KAR-SENG LOKE – A novel approach to texture recognition combining deep learning orthogonal convolution with regional input features
Textures provide a powerful segmentation and object detection cue. Recent research has shown that deep convolutional nets like Visual Geometry Group (VGG) and ResNet perform well in non-stationary texture datasets. Non-stationary textures have local structures that change from one region of the image to the other. This is consistent with the view that deep convolutional networks are good at detecting local microstructures disguised as textures. However, stationary textures are textures that have statistical properties that are constant or slow varying over the entire region are not well detected by deep convolutional networks. This research demonstrates that simple seven-layer convolutional networks can obtain better results than deep networks using a novel convolutional technique called orthogonal convolution with pre-calculated regional features using grey level co-occurrence matrix. We obtained an average of 8.5% improvement in accuracy in texture recognition on the Outex dataset over GoogleNet, ResNet, VGG and AlexNet.
https://peerj.com/articles/cs-1927/

PLoS One

PAPERS

SOLVEIG FLATEBØ, GABRIELLA ÓTURAI & MIKOŁAJ HERNIK – No evidence for adult smartphone use affecting attribution of communicative intention in toddlers: Online imitation study using the Sock Ball Task
Adults infer others' communicative intentions, or lack thereof, from various types of information. Young children may be initially limited to attributions based on a small set of ostensive signals. It is unknown when richer pragmatic inferences about communicative intentions emerge in development. We sought novel type of evidence for such inferences in 17-to-19-month-olds. We hypothesized that toddlers recognize adults' smartphone use in face-to-face interactions as incongruous with ostension and would rely on this interpretation when inferring the communicative intention of a model in a new imitation task conducted entirely online, dubbed the Sock Ball Task. In Experiment 1 with a between-subject design, we tested the hypothesis by assessing toddlers' (N = 48) imitation of sub-efficient means and the goal-outcome presented by a model, who interrupted her ostensive demonstration either by using a smartphone or by fiddling with her wristwatch, depending on the condition. We expected toddlers to imitate the sub-efficient means more faithfully in the wristwatch condition than in the smartphone condition. But there was no significant effect of condition on imitation of neither means nor goal. Thus, our hypothesis was not borne out by the results. In Experiment 2, using a within-subject design, we first assessed toddlers' (N = 24) performance in a no-demonstration baseline and then again after a no-disruption ostensive demonstration. In all three conditions with ostensive demonstration (Experiment 1: smartphone, wristwatch; Experiment 2: no-disruption), toddlers produced the demonstrated sub-efficient means significantly above the baseline level. In the no-disruption condition, goals were also imitated significantly above the baseline level. We conclude that the Sock Ball Task is a

valid research tool for studying toddler imitation of novel means actions with objects. We end by discussing suggestions for improving the task in future studies.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0300874

DANIELA HEDWIG & ANNA KOHLBERG – Call combination in African forest elephants Loxodonta cyclotis
Syntax, the combination of meaning-devoid phonemes into meaningful words, which in turn are combined in structurally and semantically complex sentences, is fundamental to the unlimited expressiveness of human languages. Studying the functions of call combinations in non-human species provides insights into the evolution of such syntactic capabilities. Here, we investigated the combination of high amplitude broadband calls with low frequency rumble vocalizations in a highly social species, the African forest elephant Loxodonta cyclotis. Rumbles play an integral role in coordinating social interactions by transmitting socially relevant information, including individual identity. By contrast, broadband calls, such as roars, are thought to function as signals of distress and urgency as they are typically produced in situations of high emotional intensity. Functional changes associated with the combination of these calls remain little understood. We found that call combinations were produced by all age-sex classes but were most prevalent in immature individuals. We found that rumbles used singularly occurred in all five investigated social contexts, whereas single broadband calls were restricted to two resource-related contexts. Call combinations also occurred in all five contexts, suggesting an increase in the functional use of broadband calls when combined with rumbles, analogous to the generativity brought about through syntax in human speech. Moreover, combining calls appeared to lead to functional shifts towards high-stake contexts. Call combinations were more likely in competition contexts compared to single rumbles, and more likely in separation contexts compared to single broadband calls. We suggest that call combination in forest elephants may aide to reduce message ambiguity in high-stake situation by simultaneously communicating distress and individual identity, which may be critical to secure access to resources, reduce the risk of injury and to reunite with or recruit the support of the family group.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0299656

JUAN F. GIBAJA et al – The first Neolithic boats in the Mediterranean: The settlement of La Marmotta (Anguillara Sabazia, Lazio, Italy)
Navigation in the Mediterranean in the Neolithic is studied here through the boats that were used, the degree of technical specialisation in their construction and, above all, their chronology. After a brief explanation of the exceptional site of La Marmotta, the characteristics and chronology of the five canoes found at the settlement and one of the nautical objects linked to Canoe 1 are discussed. This will allow a reflection on the capability of Neolithic societies for navigation owing to their high technological level. This technology was an essential part in the success of their expansion, bearing in mind that in a few millennia they occupied the whole Mediterranean from Cyprus to the Atlantic seaboard of the Iberian Peninsula.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0299765

Royal Society Open Science

PAPERS

ELIZABETH M. SPEECHLEY et al – Heritability of cognitive performance in wild Western Australian magpies
Individual differences in cognitive performance can have genetic, social and environmental components. Most research on the heritability of cognitive traits comes from humans or captive non-human animals, while less attention has been given to wild populations. Western Australian magpies (Gymnorhina tibicen dorsalis, hereafter magpies) show phenotypic variation in cognitive performance, which affects reproductive success. Despite high levels of individual repeatability, we do not know whether cognitive performance is heritable in this species. Here, we quantify the broad-sense heritability of associative learning ability in a wild population of Western Australian magpies. Specifically, we explore whether offspring associative learning performance is predicted by maternal associative learning performance or by the social environment (group size) when tested at three time points during the first year of life. We found little evidence that offspring associative learning performance is heritable, with an estimated broad-sense heritability of just −0.046 ± 0.084 (confidence interval: −0.234/0.140). However, complementing previous findings, we find that at 300 days post-fledging, individuals raised in larger groups passed the test in fewer trials compared with individuals from small groups. Our results highlight the pivotal influence of the social environment on cognitive development.
https://royalsocietypublishing.org/doi/full/10.1098/rsos.231399

JULIA M. ZEH et al – Caller identification and characterization of individual humpback whale acoustic behaviour
Acoustic recording tags provide fine-scale data linking acoustic signalling with individual behaviour; however, when an animal is in a group, it is challenging to tease apart calls of conspecifics and identify which individuals produce each call. This, in turn, prohibits a robust assessment of individual acoustic behaviour including call rates and silent periods, call bout production within and between individuals, and caller location. To overcome this challenge, we simultaneously instrumented small groups of humpback whales on a western North Atlantic feeding ground with sound and movement recording tags. This approach enabled a comparison of the relative amplitude of each call across individuals to infer caller identity for 97% of calls. We recorded variable call rates across individuals (mean = 23 calls/h) and groups (mean = 55 calls/h). Calls were produced throughout dives, and most calls were produced in bouts with short inter-call intervals of 2.2 s. Most calls received

a likely response from a conspecific within 100 s. This caller identification (ID) method facilitates studying both individual- and group-level acoustic behaviour, yielding novel results about the nature of sequence production and vocal exchanges in humpback whale social calls. Future studies can expand on these caller ID methods for understanding intra-group communication across taxa.
https://royalsocietypublishing.org/doi/full/10.1098/rsos.231608

ERDEM PULCU – Individualistic attitudes in Iterated Prisoner's Dilemma undermine evolutionary fitness and may drive cooperative human players to extinction
Inarguably, humans perform the richest plethora of prosocial behaviours in the animal kingdom, and these are important for understanding how humans navigate their social environment. The success and failure of strategies human players devise also have implications for determining long-term socio-economic/evolutionary fitness. Following the footsteps of Press and Dyson (2012), I implemented their evolutionary game-theoretic modelling from Iterated Prisoner's Dilemma (a behavioural economic probe of interpersonal cooperation) and re-analysed already published data on human proposer behaviour in the Ultimatum Game (a behavioural economic probe of altruistic punishment) involving 50 human participants versus stochastic computerized opponents with prosocial and individualistic social value orientations. Although the results indicate that it is more likely to break cycles of mutual defection in ecosystems in which humans interact with individualistic opponents, analysis of social-economic fitness at the Markov stationary states suggested that this comes at an evolutionary cost. Overall, human players acted in a significantly more cooperative manner than their opponents, but they failed to overcome extortion from individualistic agents, risking 'extinction' in 70% of the cases. These findings demonstrate human players might be short-sighted, and social interactive decision strategies they devise while adjusting to different types of opponents may not be optimal in the long run.
https://royalsocietypublishing.org/doi/full/10.1098/rsos.230867

Science

ARTICLES

MELANIE MITCHELL – Debates on the nature of artificial general intelligence
Given the pervasiveness of AGI talk in business, government, and the media, one could not be blamed for assuming that the meaning of the term is established and agreed upon. However, the opposite is true: What AGI means, or whether it means anything coherent at all, is hotly debated in the AI community. And the meaning and likely consequences of AGI have become more than just an academic dispute over an arcane term. The world's biggest tech companies and entire governments are making important decisions on the basis of what they think AGI will entail. But a deep dive into speculations about AGI reveals that many AI practitioners have starkly different views on the nature of intelligence than do those who study human and animal cognition—differences that matter for understanding the present and predicting the likely future of machine intelligence.
{Not surprising. Take three underdefined words ("general" even means underdefined), smush them together and you've got … well, whatever it is, there will be disagreements.}
https://www.science.org/doi/10.1126/science.ado7069

Trends in Cognitive Sciences

PAPERS

KLÁRA GREGOROVÁ et al – A cognitive-computational account of mood swings in adolescence
Teenagers have a reputation for being fickle, in both their choices and their moods. This variability may help adolescents as they begin to independently navigate novel environments. Recently, however, adolescent moodiness has also been linked to psychopathology. Here, we consider adolescents' mood swings from a novel computational perspective, grounded in reinforcement learning (RL). This model proposes that mood is determined by surprises about outcomes in the environment, and how much we learn from these surprises. It additionally suggests that mood biases learning and choice in a bidirectional manner. Integrating independent lines of research, we sketch a cognitive-computational account of how adolescents' mood, learning, and choice dynamics influence each other, with implications for normative and psychopathological development.
https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(24)00033-0

KYLE MAHOWALD et al with NANCY KANWISHER & EVELINA FEDORENKO – Dissociating language and thought in large language models
Large language models (LLMs) have come closest among all models to date to mastering human language, yet opinions about their linguistic and cognitive capabilities remain split. Here, we evaluate LLMs using a distinction between formal linguistic competence (knowledge of linguistic rules and patterns) and functional linguistic competence (understanding and using language in the world). We ground this distinction in human neuroscience, which has shown that formal and functional competence rely on different neural mechanisms. Although LLMs are surprisingly good at formal competence, their performance on functional competence tasks remains spotty and often requires specialized fine-tuning and/or coupling with external modules. We posit that models that use language in human-like ways would need to master both of these

competence types, which, in turn, could require the emergence of separate mechanisms specialized for formal versus functional linguistic competence.
https://www.cell.com/trends/cognitive-sciences/abstract/S1364-6613(24)00027-5

COMMENTARIES

HENRY TAYLOR & ANDREW J. BREMNER – Cluster kinds and the developmental origins of consciousness

There is a clue in the name. 'Infant' is derived from the Latin in fans (without speech). Human babies cannot report their experiences and are uncooperative (to say the least) when it comes to experimental task instructions. For these reasons, it has been difficult to establish when babies become conscious. Bayne and colleagues propose a cluster-based methodology for overcoming these issues, arguing that consciousness emerges in the last prenatal trimester [1.]. We are heartily enthusiastic about this approach but consider some complications. While Bayne et al. identify behavioural and neural markers of consciousness commensurate with an 'early emergence' view, we note that other markers point to a 'late emergence' view. In the spirit of optimism, we suggest how the cluster-based methodology may overcome this problem.
https://www.cell.com/trends/cognitive-sciences/abstract/S1364-6613(24)00007-X

TIM BAYNE et al – Infants and markers: reply to Taylor and Bremner

In a recent paper, we suggested that the question of when consciousness emerges is best answered by asking when markers of consciousness that have been validated in adults might first appear. Taking four such markers, we argued in favour of an 'early onset' view, suggesting that consciousness is likely to be in place by 3–4 months of age and perhaps even arises before birth. Taylor and Bremner share our commitment to a marker-based approach, but argue that we were too quick to come down in favour of an early-onset account. They note that many of the other putative markers of consciousness, for example, protodeclarative pointing, intentional control ('intentional means-ends coordination of actions'), and explicit memory, emerge only much later in development. In arguing that the cluster-based approach supports an early-emergence view of infant consciousness, aren't we unjustifiably privileging some markers (those that favour early-onset accounts) over others?
https://www.cell.com/trends/cognitive-sciences/abstract/S1364-6613(24)00052-4

Original article: EAORC Bulletin 1,083

TIM BAYNE et al with ANIL K. SETH, MARCELLO MASSIMINI & AXEL CLEEREMANS – Tests for consciousness in humans and beyond
https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(24)00010-X

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