

## EAORC BULLETIN 1,113 – 13 October 2024

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## NOTICES

### PUBLICATION ALERTS

If you have had a paper or book published, or you see something which would be of interest to the group, 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.

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### EDITORIAL INTERJECTIONS

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

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### ACADEMIA.EDU – Hunter-gatherer studies and human evolution: a very selective review

*American Journal of Physical Anthropology*, 165:4, 777-800. (2018).

#### **KRISTEN HAWKES, JAMES O’CONNELL & NICHOLAS BLURTON JONES – Hunter-gatherer studies and human evolution: a very selective review**

The century long publication of this journal overlapped major changes in the sciences it covers. We have been eyewitnesses to vast changes during the final third of the last century and beginning of this one, momentous enough to fundamentally alter our work separately and collectively. One (NBJ) from animal ethology, another from western North American archaeology (JOC), and a third (KH) from cultural anthropology came to longtime collaboration as evolutionary ecologists

with shared focus on studying modern hunter-gatherers to guide hypotheses about human evolution. Our findings have radically revised hypotheses each of us took for granted when we began. Our (provisional) conclusions are not the consensus among hunter-gatherer specialists; but grateful that personal reflections are invited, we aim to explain how and why we continue to bet on them.

[https://www.academia.edu/81125714/Hunter\\_gatherer\\_studies\\_and\\_human\\_evolution\\_A\\_very\\_selective\\_review](https://www.academia.edu/81125714/Hunter_gatherer_studies_and_human_evolution_A_very_selective_review)

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## NEWS

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### JOHN TEMPLETON FOUNDATION – Is the Private Self an Illusion?

When we start to reflect on our own minds, we can quickly be drawn to a mesmerising picture. This picture presents the mind as sort of inner world: a private landscape within which our thoughts, sensations, emotions, and other mental phenomena are located.

One interesting feature of this inner landscape is that it appears to be inaccessible to others. No one else can enter my mind and access my thoughts and feelings along with me. Rather, they must infer how things are with me from observation of my outward behaviour.

Another feature of these private worlds is that they are inescapable. In effect, we each live out our life in solitary confinement. No one can step outside the world of their own private experience and encounter the world as it is in itself. Rather, we must infer how things outside from observation of our inner experience.

<https://www.templeton.org/news/is-the-private-self-an-illusion>

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### SAPIENS – The Distant Origins of a Stonehenge Stone

After two decades of research, scholars find that Stonehenge's giant Altar Stone came from northeast Scotland.

<https://www.sapiens.org/archaeology/stonehenge-altar-stone-origins-discovery/>

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### SCIENCEADVISER – Elephant wrinkles act like hands and elbows

Scientists are still debating why the zebra has its stripes, but they may have solved the mystery of how the elephant got its wrinkles. Now, researchers say they have figured out where the famed creases come from and how they make the pachyderms' trunks so versatile.

The scientists examined differences between Asian elephants and African elephants, which are known to use their trunks in different ways. Asian elephant trunks, which lack a second cartilaginous projection at the tip, contain more wrinkles: 126 of them, on average, compared to the 83 of African elephants. The extra creases might give the Asian species more flexibility to make up for not having that extra "finger." In both species, the wrinkles were concentrated at a pivot point, which works like a muscular elbow to allow the trunk to wrap around objects.

The wrinkles themselves begin appearing as soon as the trunk does—about 20 days into the elephant's 22-month gestation—and then increase exponentially. Wrinkling also appears after birth. Elephants are either left- or right-trunked, meaning that they consistently bend the appendage to one side to put food in that side of the mouth—bending that creates more wrinkles on one side than the other over time.

It isn't yet clear whether "trunkedness" is controlled by the brain like human handedness, or whether wrinkle patterns make it easier to use one side, says John Hutchinson, an expert on animal locomotion who wasn't involved in the paper. Even so, the work sheds new light on "the most unbelievable grasping organ on the planet," says study author and computational neuroscientist Michael Brecht.

<https://www.science.org/content/article/how-elephant-got-its-wrinkles>

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### SCIENCE DAILY – Bottlenose dolphins 'smile' at each other while playing

Dolphins are extremely playful, but little is known about how they -- and other marine mammals -- communicate during playtime. New research shows that bottlenose dolphins (*Tursiops truncatus*) use the 'open mouth' facial expression -- analogous to a smile -- to communicate during social play. The dolphins almost always use the facial expression when they are in their playmate's field of view, and when playmates perceived a 'smile,' they responded in kind 33% of the time.

<https://www.sciencedaily.com/releases/2024/10/241002123030.htm>

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### SCIENCE DAILY – One-time cooperation decisions unaffected by increased benefits to society

Until now, it was considered certain that people are more likely to cooperate if the benefits from cooperation are higher. A recently published, large-scale study has now called this finding into question: in over 2000 study participants, the researchers found no relationship between benefits from cooperation and willingness to cooperate.

<https://www.sciencedaily.com/releases/2024/10/241008122350.htm>

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### SCIENCE DAILY – Fossils and fires: Early modern human activity in the jungles of Southeast Asia

Studying microscopic layers of dirt dug from the Tam Pa Ling cave site in northeastern Laos has provided a team of archaeologists further insights into some of the earliest evidence of *Homo sapiens* in mainland Southeast Asia. The site,

which has been studied for the past 14 years, has produced some of the earliest fossil evidence of our direct ancestors in Southeast Asia but now a new study has reconstructed the ground conditions in the cave between 52,000 and 10,000 years ago.

<https://www.sciencedaily.com/releases/2024/10/241010002142.htm>

### SCIENCE DAILY – One-time cooperation decisions unaffected by increased benefits to society

Until now, it was considered certain that people are more likely to cooperate if the benefits from cooperation are higher. A recently published, large-scale study has now called this finding into question: in over 2000 study participants, the researchers found no relationship between benefits from cooperation and willingness to cooperate.

<https://www.sciencedaily.com/releases/2024/10/241008122350.htm>

### SCIENCE DAILY – Dance, gibbon, dance!

Female crested gibbons display jerky, almost geometric patterns of movement. Researchers have studied these conspicuous movements, which are comparable to human dances. They describe the structure of the dances, their rhythm and the contexts in which the dances occur.

<https://www.sciencedaily.com/releases/2024/10/241011141154.htm>

### SCIENCE.ORG NEWS – Our ancestors didn't take the easy road—and that may be why we're here today

According to the poet Robert Frost, there are benefits to taking the road less traveled. Our ancestors may have agreed. By comparing archaeological and anthropological records with topographical data as well as climate and biodiversity models, researchers have discovered that our lineage of humans repeatedly sought out rougher terrain. Ultimately, that may have made us more versatile and resilient.

Over the past three million years, our genus—Homo—has made itself comfortable in a wide variety of habitats. As a 2023 Science paper posits, that may be because we prefer diversity. A new Science Advances paper further supports this idea, finding that humans extensively and repeatedly sought topographically rougher terrain. In turn, area roughness correlated strongly with biome diversity—which, because of overlapping habitats, tends to make areas into “biodiversity hotspots.” The authors suggest our ancestors sought uncomfortable habitats because “areas with medium and high roughness are particularly abundant with diverse food resources, environmental niches, and potential natural shelters to mitigate weather and climate extremes.” That may have meant traveling less for necessities, allowing ancient humans to devote “more time and resources to other activities, such as social interactions or tool production.” So ultimately, taking the road less traveled “may have contributed to the survival and overall evolution of the genus Homo.”

<https://www.science.org/doi/10.1126/sciadv.adq3613>

## PUBLICATIONS

### Academia Biology

#### PAPERS

#### **HANS-FERDINAND ANGEL & RÜDIGER J. SEITZ – Credition and the neurobiology of belief: the brain function in believing**

Credition, derived from the Latin credere (to believe), has been advocated recently as a central brain function accommodating the multifaceted processes of believing. These processes occur predominantly outside conscious awareness and determine a person's spontaneous as well as controlled actions in a complex and ever-changing environment. The interdisciplinary advancement in understanding the processes of believing paves the way for new research horizons in the sciences and humanities.

<https://www.academia.edu/2837-4010/2/4/10.20935/AcadBiol7359>

### American Journal of Biological Anthropology

#### PAPERS

#### **ALANNAH PEARSON & P. DAVID POLLY – Temporal lobe evolution in Hominidae and the origin of human lobe proportions**

Evolutionary changes in hominin social complexity have been associated with increases in absolute brain size. The temporal lobes are nestled in the middle cranial fossae (MCF) of the skull, the dimensions of which allow estimation of temporal lobe volume (TLV) in extant and fossil taxa.

The main aim of this study is to determine where along the hominid phylogeny, major temporal lobe size transitions occurred. We used computed tomography (CT) scans of crania, 3D photogrammetry data, and laser surface scans of endocranial casts to measure seven MCF metrics in 11 extant anthropoid taxa using multiple regressions to estimate TLV in 5 extant hominids and 10 fossil hominins. Phylogenetic comparative methods mapped temporal lobe size, brain size, and temporal lobe proportions onto phylogenetic trees broadly for Hominidae and specifically for Hominini.

Extant Homo sapiens were not an outlier in relative brain size, temporal lobe size, or proportions of the temporal lobes, but some proportions within the lobe were uniquely altered. The most notable changes in relative temporal lobe size and

proportions saw a decrease in relative temporal lobe size and proportions in the genus *Pan* compared to other extant great apes and fossil hominins while there was a relative increase in the temporal lobe width and length in *Australopithecus*–*Paranthropus* clade compared to the genus *Homo* and other extant great apes including modern humans. We do not find support for the social brain, environmental or functional craniology hypotheses alone but think it prudent to consider the implications of cerebral reorganization between the temporal lobes and other regions of the brain within the context of these hypotheses and with future investigation is warranted.

<https://onlinelibrary.wiley.com/doi/full/10.1002/ajpa.25027>

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## Current Biology

### ARTICLES

#### **MOSTAFA EL-KALLINY & ZOE R. DONALDSON – Social neuroscience: When more is merrier**

Spiny mice are gregarious animals that prefer to socialize with large groups. A new pioneering study reveals an underlying neural circuit governing this social preference.

[https://www.cell.com/current-biology/abstract/S0960-9822\(24\)01171-0](https://www.cell.com/current-biology/abstract/S0960-9822(24)01171-0)

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## Frontiers in Psychology

### PAPERS

#### **TAO GAO et al – Family function and adolescent altruistic behavior: the chain mediating role of extraversion personality and perceived social support**

This study aimed to explore the relationship between family function and altruistic behavior in adolescents, while also investigating the potential mediating roles of extraverted personality and perceived social support.

Surveys were administered to high school students across various schools in Guangdong Province, utilizing the Family APGAR Questionnaire, Extraversion Personality Scale, Perceived Social Support Scale, and Altruistic Behavior Scale. A total of 972 valid questionnaires were collected for analysis.

The findings revealed that family function did not directly predict altruistic behavior. However, extraverted personality and perceived social support were identified as mediators between family function and altruistic behavior. Furthermore, both extraverted personality and perceived social support acted as chain mediators in this relationship.

These results emphasize the importance of considering family dynamics in understanding adolescent altruistic behavior and highlight the potential pathways through which family function influences altruistic tendencies. Promoting positive family environments and enhancing extraverted personality and perceived social support may facilitate the cultivation of altruistic behavior in adolescents.

<https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1431978/full>

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## Interface: Journal of the Royal Society

### PAPERS

#### **AXEL CONSTANT et al with ANDY CLARK – A computational approach to selective attention in embodied approaches to cognitive archaeology**

This article proposes a novel computational approach to embodied approaches in cognitive archaeology called computational cognitive archaeology (CCA). We argue that cognitive archaeology, understood as the study of the human mind based on archaeological findings such as artefacts and material remains excavated and interpreted in the present, can benefit from the integration of novel methods in computational neuroscience interested in modelling the way the brain, the body and the environment are coupled and parameterized to allow for adaptive behaviour. We discuss the kind of tasks that CCA may engage in with a narrative example of how one can model the cumulative cultural evolution of the material and cognitive components of technologies, focusing on the case of knapping technology. This article thus provides a novel theoretical framework to formalize research in cognitive archaeology using recent developments in computational neuroscience.

<https://royalsocietypublishing.org/doi/10.1098/rsif.2024.0508>

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## iScience

### PAPERS

#### **VINCENT WEBER et al – Correlates of Implicit Semantic Processing as Revealed by Representational Similarity Analysis Applied to EEG**

Most researchers agree that some stages of object recognition can proceed implicitly. Implicit recognition occurs when an object is automatically and unintentionally encoded and represented in the brain even though the object is irrelevant to the current task. No consensus has been reached as to what level of semantic abstraction processing can go implicitly. A informative method to explore the level of abstraction and the time courses of informational content in neural representations is representational similarity analysis (RSA). Here we apply RSA to EEG data recorded while participants processed semantics of visually presented objects. Explicit focus on semantics was given when participants classified images of objects as manmade or natural. For implicit processing of semantics, participants judged the location of images on the

screen. The category animate/inanimate as well as more concrete categories (e.g., birds, fruit, musical instruments, ...) are processed implicitly whereas the category manmade/natural is not processed implicitly.

[https://www.cell.com/iscience/fulltext/S2589-0042\(24\)02374-5](https://www.cell.com/iscience/fulltext/S2589-0042(24)02374-5)

### **PETER LEHMANN et al – Going Against the Family: Perturbation of a Greenbeard Pathway Leads to Falsebeard Cheating**

Greenbeards facilitate cooperation by encoding a perceptible signal, the ability to detect it, and a tendency to help others that display it. Falsebeards are hypothetical cheaters that display the signal without being altruistic. Despite many examples of greenbeards, evidence for falsebeards is scarce. The *Dictyostelium discoideum* tgrB1-tgrC1 allorecognition pathway encodes a greenbeard. It allows development, which yields fruiting bodies with altruistic stalks that increase spore dispersal. Here we show that cells lacking rapgapB, a tgrB1-tgrC1 signaling element, cheat by avoiding the stalk fate and generating more spores in chimeras than in pure populations. rapgapB<sup>-</sup> cells cheat only on partners with compatible tgrB1-tgrC1 allotypes, suggesting that beard display and recognition are intact but decoupled from altruism. The rapgapB<sup>-</sup> falsebeard provides a model to study greenbeard maintenance and subversion.

[https://www.cell.com/iscience/fulltext/S2589-0042\(24\)02350-2](https://www.cell.com/iscience/fulltext/S2589-0042(24)02350-2)

## Journal of Linguistics

### PAPERS

#### **THOMAS BERG – Gender marking in the first-person singular: A case of paradigm (in)consistency**

Since the sex of the speaker is normally as obvious as can be, there is no point in coding first-person singular gender – or so it may seem. This typological study examines the extent of sex-based gender marking in personal pronouns, possessive determiners, predicative adjectives, and verbs across first-, second-, and third-person singular. A worldwide perusal of grammars in addition to data elicitation yields a total of 115 languages with first-person gender. The paradigms of pronouns and possessives are found to be highly inconsistent, whereas those of verbs show a tendency towards consistency. Gender marking on adjectives is fully consistent. The likelihood of first-person gender is increased by a general sensitivity to gender and a dedicated gender morpheme. A distinction is made between pronouns and possessives as referential units and gender markers on verbs and adjectives as grammatical units. By their very nature, referential markers are sensitive to the contingencies of the extralinguistic world and subject to communicative constraints such as redundancy and economy. They therefore end up being organized in inconsistent paradigms. By contrast, grammatical units are largely untouched by these extraneous influences and may therefore develop consistent paradigms.

<https://www.cambridge.org/core/journals/journal-of-linguistics/article/gender-marking-in-the-firstperson-singular-a-case-of-paradigm-inconsistency/D4C39F8774E829C87484F1EA2943F8E3>

#### **BRETT REYNOLDS – Why more and less are never adverbs**

I argue that more and less are always determinatives, contrary to the categorization in The Cambridge Grammar of the English Language (CGEL), which treats them as adverbs in analytic comparatives. Evidence is presented of contrasts between more/less and much/little in various contexts, challenging CGEL's empirical claim that such contrasts never occur in analytic comparatives. The observed distributional patterns can largely be explained by the semantics of more/-er and much without positing a category distinction: more/-er establishes a salient scale-internal reference point, while much requires such a point to already be present. Furthermore, mere distributional differences should not be relied upon for category assignment, following arguments by Payne, Huddleston & Pullum (2010). For these reasons, analyzing more and less as adverbs in any context is unnecessary and unparsimonious. The determinative analysis can account for all the relevant data. Beyond the narrow point about categorization, the paper illustrates the contributions of semantic, pragmatic, and distributional evidence in resolving category assignment.

*{in the sentence, “he should think more and declaim less”, what is being qualified if not the verbs?}*

<https://www.cambridge.org/core/journals/journal-of-linguistics/article/why-more-and-less-are-never-adverbs/F680274AB9D526743F8721B23E992398>

## Language and Cognition

### PAPERS

#### **ANGELA XIAOXUE HE & SUDHA ARUNACHALAM – Event end-state encoding in 13-month-olds—completed and non-completed events are different**

Young children sometimes incorrectly interpret verbs that have a “result” meaning, such as understanding ‘fill’ to refer to adding liquid to a cup rather than filling it to a particular level. Given cross-linguistic differences in how event components are realized in language, past research has attributed such errors to non-adultlike event-language mappings. In the current study, we explore whether these errors have a non-linguistic origin. That is, when children view an event, is their encoding of the event end-state too imprecise to discriminate between events that do versus do not arrive at their intended endpoints? Using a habituation paradigm, we tested whether 13-month-old English-learning infants (N = 86) discriminated events with different degrees of completion (e.g., draw a complete triangle versus draw most of a triangle). Results indicated successful

discrimination, suggesting that sensitivity to the precise event end-state is already in place in early infancy. Thus, our results rule out one possible explanation for children's errors with change-of-state predicates—that they do not notice the difference between end-states that vary in completion.

<https://www.cambridge.org/core/journals/language-and-cognition/article/event-endstate-encoding-in-13montholdscompleted-and-noncompleted-events-are-different/60BF670C55F91479F92E2BD35FEE563D>

### **PENG LI et al – Musical perception skills predict speech imitation skills: differences between speakers of tone and intonation languages**

The ability to imitate speech is linked to individual cognitive abilities such as working memory and the auditory processing of music. However, little research has focused on the role of specific components of musical perception aptitude in relation to an individual's native language from a crosslinguistic perspective. This study explores the predictive role of four components of musical perception skills and working memory on phonetic language abilities for speakers of two typologically different languages, Catalan (an intonation language) and Chinese (a tone language). Sixty-one Catalan and 144 Chinese participants completed four subtests (accent, melody, pitch and rhythm) of the Profile of Music Perception Skills, a forward digit span task and a speech imitation task. The results showed that for both groups of participants, musical perception skills predicted speech imitation accuracy but working memory did not. Importantly, among the components of musical perception skills, accent was the only predictive factor for Chinese speakers, whereas melody was the only predictive factor for Catalan speakers. These findings suggest that speech imitation ability is predicted by musical perception skills rather than working memory and that the predictive role of specific musical components may depend on the phonological properties of the native language.

<https://www.cambridge.org/core/journals/language-and-cognition/article/musical-perception-skills-predict-speech-imitation-skills-differences-between-speakers-of-tone-and-intonation-languages/E98CBBDBA7252D01595C15A5099A83F1>

## Nature

### NEWS

#### **World's oldest known artwork in Indonesian cave dated using lasers**

Laser-induced imaging of radioactive elements was used to work out the age of an ancient cave painting on the Indonesian island of Sulawesi. The results reveal that the narrative scene is 51,200 years old, making it the earliest known example of representational art. This study challenges previous dating methods and suggests a deeper origin for human image-making and storytelling.

<https://www.nature.com/articles/d41586-024-03248-x>

## Nature Communications Biology

### PAPERS

#### **ZEUS GRACIA-TABUENCA et al – Enhanced efficiency in the bilingual brain through the inter-hemispheric cortico-cerebellar pathway in early second language acquisition**

Bilingualism has a profound impact on the structure and function of the brain, but it is not yet well understood how this experience influences brain functional organization. We examine a large sample (151 participants) of monolinguals and bilinguals with varied age of second language acquisition, who underwent resting-state functional magnetic brain imaging. Whole-brain network analyses reveal higher global efficiency in bilingual individuals than monolinguals, indicating enhanced functional integration in the bilingual brain. Moreover, the age at which the second language was acquired correlated with this increased efficiency, suggesting that earlier exposure to a second language has lasting positive effects on brain functional organization. Further investigation using the network-based statistics approach indicates that this effect is primarily driven by heightened functional connectivity between association networks and the cerebellum. These findings show that the timing of bilingual learning experience alters the brain functional organization at both global and local levels.

<https://www.nature.com/articles/s42003-024-06965-1>

## Nature Scientific Reports

### PAPERS

#### **MUHAMMAD ARIF et al – Analyzing hope speech from psycholinguistic and emotional perspectives**

Hope is a vital coping mechanism, enabling individuals to effectively confront life's challenges. This study proposes a technique employing Natural Language Processing (NLP) tools like Linguistic Inquiry and Word Count (LIWC), NRC-emotion-lexicon, and vaderSentiment to analyze social media posts, extracting psycholinguistic, emotional, and sentimental features from a hope speech dataset. The findings of this study reveal distinct cognitive, emotional, and communicative characteristics and psycholinguistic dimensions, emotions, and sentiments associated with different types of hope shared in social media. Furthermore, the study investigates the potential of leveraging this data to classify different types of hope using machine learning algorithms. Notably, models such as LightGBM and CatBoost demonstrate impressive performance, surpassing traditional methods and competing effectively with deep learning techniques. We employed hyperparameter

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tuning to optimize the models' parameters and compared their performance using both default and tuned settings. The results highlight the enhanced efficiency achieved through hyperparameter tuning for these models.

<https://www.nature.com/articles/s41598-024-74630-y>

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## Neuron

### PAPERS

#### **SEUNGHYUN LEE, UELI RUTISHAUSER & KATALIN M. GOTHARD – Social status as a latent variable in the amygdala of observers of social interactions**

Successful integration into a hierarchical social group requires knowledge of the status of each individual and of the rules that govern social interactions within the group. In species that lack morphological indicators of status, social status can be inferred by observing the signals exchanged between individuals. We simulated social interactions between macaques by juxtaposing videos of aggressive and appeasing displays, where two individuals appeared in each other's line of sight and their displays were timed to suggest the reciprocation of dominant and subordinate signals. Viewers of these videos successfully inferred the social status of the interacting characters. Dominant individuals attracted more social attention from viewers even when they were not engaged in social displays. Neurons in the viewers' amygdala signaled the status of both the attended (fixated) and the unattended individuals, suggesting that in third-party observers of social interactions, the amygdala jointly signals the status of interacting parties.

[https://www.cell.com/neuron/fulltext/S0896-6273\(24\)00658-5](https://www.cell.com/neuron/fulltext/S0896-6273(24)00658-5)

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## New Scientist

### NEWS

#### **Ancient DNA tells story of toddler who lived in Italy 17,000 years ago**

A young boy who lived towards the end of the last glacial period had dark skin, blue eyes and a congenital heart condition, a study of his genome reveals.

<https://www.newscientist.com/article/2450368-ancient-dna-tells-story-of-toddler-who-lived-in-italy-17000-years-ago/>

### ARTICLES

#### **ALISON GEORGE – A cave in France is revealing how the Neanderthals died out**

Discoveries from the genomes of the last Neanderthals are rewriting the story of how our own species came to replace them.

<https://www.newscientist.com/article/mg26435120-800-a-cave-in-france-is-revealing-how-the-neanderthals-died-out/>

#### **THOMAS LEWTON – The physicist who argues that there are no objective laws of physics**

Daniele Oriti's pursuit of a theory of quantum gravity has led him to the startling conclusion that the laws of nature don't exist independently of us – a perspective shift that could yield fresh breakthroughs

<https://www.newscientist.com/article/mg26435120-900-the-physicist-who-argues-that-there-are-no-objective-laws-of-physics/>

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## PeerJ

### PAPERS

#### **JIANYU GUO et al – Constructing Chinese taxonomy trees from understanding and generative pretrained language models**

The construction of hypernym taxonomic trees, a critical task in the field of natural language processing, involves extracting lexical relationships, specifically creating a tree structure that represents hypernym relationships among a given set of words within the same domain. In this work, we present a method for constructing hypernym taxonomy trees in the Chinese language domain, and we named it CHRRM (Chinese Hypernym Relationship Reasoning Model). Our method consists of two main steps: First, we utilize pre-trained models to predict hypernym relationships between pairs of words; second, we regard these relationships as edges to form a maximum spanning tree in the word graph. Our method enhances the effectiveness of constructing hypernym taxonomic trees based on pre-trained models through two key improvements: (1) We optimize the hyperparameter configuration for this task using pre-trained models from the Bert family and provide explanations for the configuration of these hyperparameters. (2) By employing generative large language models such as ChatGPT and ChatGLM to annotate words, we improve the accuracy of hypernym relationship identification and analyze the feasibility of applying generative large language models to the task of constructing taxonomy trees. We trained our model on subtrees of WORDNET and evaluated its performance on non-overlapping subtrees of WORDNET, demonstrating that our enhancements led to a significant relative improvement of 15.67%, achieving an F1 score of 67.9 on the Chinese WORDNET validation dataset compared to the previous score of 58.7. In conclusion, our study reveals the following key findings: (1) The Roberta-wwm-ext-large model consistently delivers outstanding results in constructing taxonomic trees. (2) Generative large language models, while capable of aiding pre-trained models in improving hypernym recognition accuracy, have limitations related to generation quality and computational resources. (3) Generative large language models can serve various NLP tasks either directly or indirectly; it is feasible to improve the downstream NLU task's performance through the generative content.

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<https://peerj.com/articles/cs-2358/>

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## PLoS Biology

### PAPERS

#### **M. FLORENCIA ASSANELO, FERNANDO LIZCANO-CORTÉS & PABLO RIPOLLES – Keeping time: How musical training may boost cognition**

The relationship between musical training and intellect is controversial. A new hypothesis may help resolve the debate by proposing an explanation for how training in rhythmic skills can improve cognitive abilities in some individuals, but not others.

<https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3002810>

#### **DANIEL R. CLEARY et al – Syllable processing is organized in discrete subregions of the human superior temporal gyrus**

Modular organization at approximately 1 mm scale could be fundamental to cortical processing, but its presence in human association cortex is unknown. Using custom-built, high-density electrode arrays placed on the cortical surface of 7 patients undergoing awake craniotomy for tumor excision, we investigated receptive speech processing in the left (dominant) human posterior superior temporal gyrus. Responses to consonant-vowel syllables and noise-vocoded controls recorded with 1,024 channel micro-grids at 200 µm pitch demonstrated roughly circular domains approximately 1.7 mm in diameter, with sharp boundaries observed in 128 channel linear arrays at 50 µm pitch, possibly consistent with a columnar organization. Peak latencies to syllables in different modules were bimodally distributed centered at 252 and 386 ms. Adjacent modules were sharply delineated from each other by their distinct time courses and stimulus selectivity. We suggest that receptive language cortex may be organized in discrete processing modules.

<https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3002774>

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## PLoS One

### PAPERS

#### **ILARIA PATANIA et al – Between land and sea: A multidisciplinary approach to understand the Early Occupation of Sicily (EOS)**

The island of Sicily is considered to be among the first occupied by humans in the European Upper Paleolithic. Studies to understand early occupation of the island are mostly concentrated on the northern shores. Our project, Early Occupation of Sicily (EOS), focuses on southeastern Sicily so to address questions regarding dispersal to Mediterranean islands and Late Pleistocene landscapes and environments. Here, we present the initial results of our terrestrial and underwater surveys in combination with archival work and analyses of museum collections. In SE Sicily very few Upper Paleolithic sites have been excavated and analyzed using scientific methods. We have relocated and assessed ~20 caves and rock shelters identified between the 1870s and 1990s, studied museum collections, and collected raw material to reconstruct procurement patterns. To identify new sites, we conducted land and underwater surveys to reconstruct paleo-shorelines and past environments. We have identified three sites, two on land and one partially submerged, that still contain unexplored archaeological sediments, demonstrated in one instance through seismic tomography. This work shows the potential of re-examining minimally studied sites and materials to reconstruct mobility patterns and environmental impact of the first inhabitants of the island.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0299118>

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## Proceedings of the Royal Society B

### PAPERS

#### **MERLIJN STAPS, CORINA E. TARNITA & MARI KAWAKATSU – Ecological principles for the evolution of communication in collective systems**

Communication allows members of a collective to share information about their environment. Advanced collective systems, such as multicellular organisms and social insect colonies, vary in whether they use communication at all and, if they do, in what types of signals they use, but the origins of these differences are poorly understood. Here, we develop a theoretical framework to investigate the evolution and diversity of communication strategies under collective-level selection. We find that whether communication can evolve depends on a collective's external environment: communication only evolves in sufficiently stable environments, where the costs of sensing are high enough to disfavour independent sensing but not so high that the optimal strategy is to ignore the environment altogether. Moreover, we find that the evolution of diverse signalling strategies—including those relying on prolonged signalling (e.g. honeybee waggle dance), persistence of signals in the environment (e.g. ant trail pheromones) and brief but frequent communicative interactions (e.g. ant antennal contacts)—can be explained theoretically in terms of the interplay between the demands of the environment and internal constraints on the signal. Altogether, we provide a general framework for comparing communication strategies found in nature and uncover simple ecological principles that may contribute to their diversity.

<https://royalsocietypublishing.org/doi/10.1098/rspb.2024.1562>

## Royal Society Open Science

### PAPERS

#### **BOJANA BODROŽA, BOJANA M. DINIĆ & LJUBIŠA BOJIĆ – Personality testing of large language models: limited temporal stability, but highlighted prosociality**

As large language models (LLMs) continue to gain popularity due to their human-like traits and the intimacy they offer to users, their societal impact inevitably expands. This leads to the rising necessity for comprehensive studies to fully understand LLMs and reveal their potential opportunities, drawbacks and overall societal impact. With that in mind, this research conducted an extensive investigation into seven LLMs, aiming to assess the temporal stability and inter-rater agreement on their responses on personality instruments in two time points. In addition, LLMs' personality profile was analysed and compared with human normative data. The findings revealed varying levels of inter-rater agreement in the LLMs' responses over a short time, with some LLMs showing higher agreement (e.g. Llama3 and GPT-4o) compared with others (e.g. GPT-4 and Gemini). Furthermore, agreement depended on used instruments as well as on domain or trait. This implies the variable robustness in LLMs' ability to reliably simulate stable personality characteristics. In the case of scales which showed at least fair agreement, LLMs displayed mostly a socially desirable profile in both agentic and communal domains, as well as a prosocial personality profile reflected in higher agreeableness and conscientiousness and lower Machiavellianism. Exhibiting temporal stability and coherent responses on personality traits is crucial for AI systems due to their societal impact and AI safety concerns.

<https://royalsocietypublishing.org/doi/10.1098/rsos.240180>

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## Science Advances

### PAPERS

#### **ELKE ZELLER & AXEL TIMMERMANN – The evolving three-dimensional landscape of human adaptation**

Over the past 3 million years, humans have expanded their ecological niche and adapted to more diverse environments. The temporal evolution and underlying drivers behind this niche expansion remain largely unknown. By combining archeological findings with landscape topographic data and model simulations of the climate and biomes, we show that human sites clustered in areas with increased terrain roughness, corresponding to higher levels of biodiversity. We find a gradual increase in human habitat preferences toward rough terrains until about 1.1 million years ago (Ma), followed by a 300 thousand-year-long contraction of the ecological niche. This period coincided with the Mid-Pleistocene Transition and previously hypothesized ancestral population bottlenecks. Our statistical analysis further reveals that from 0.8 Ma onward, the human niche expanded again, with human species (e.g., *H. heidelbergensis*, *H. neanderthalensis*, and *H. sapiens*) adapting to rougher terrain, colder and drier conditions, and toward regions of higher ecological diversity.

<https://www.science.org/doi/10.1126/sciadv.adq3613>

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