

## EAORC BULLETIN 1,054 – 27 August 2023

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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 – The Pleistocene Stone Artifact Record of Africa

*In Amanuel Beyin et al (eds.), Handbook of Pleistocene Archaeology in Africa: Hominin behavior, geography, and chronology. Springer, 1821-1883 (2023).*

#### **DEBORAH I. OLSZEWSKI et al – The Pleistocene Stone Artifact Record of Africa: Technologies, Typologies, and Analytic Approaches**

Flaked stone (lithic) artifacts are a ubiquitous cultural material at Pleistocene sites and first appear in the archaeological record 3.3 million years ago (Ma) in East Africa (Harmand et al., 2015). The African stone artifact record thus covers the longest time span of human prehistory compared to other world regions. Lithic artifacts preserve well, and they are often the only cultural materials remaining at a site. Archaeologists have therefore dedicated considerable effort to describing stone artifacts and to developing theory to interpret them in light of the behavioral and biological evolution of hominins. Below we briefly describe the major lithic technologies that appeared in Africa during the Pleistocene. Additionally, this chapter reviews

the common analytical approaches that researchers employ when studying lithic assemblages from diverse contexts. We then discuss how archaeologists have used lithic artifacts to interpret other aspects of hominin evolution and the issues that confound these interpretations. Here, stone “artifacts” are preferred as opposed to stone “tools” to refer to all intentionally flaked stones because the term “artifact” does not presume their use as tools per se.

[https://www.academia.edu/105953485/The\\_Pleistocene\\_Stone\\_Artifact\\_Record\\_of\\_Africa\\_Technologies\\_Typologies\\_and\\_Analytic\\_Approaches](https://www.academia.edu/105953485/The_Pleistocene_Stone_Artifact_Record_of_Africa_Technologies_Typologies_and_Analytic_Approaches)

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## NEWS

### SAPIENS – Dating the Arrival of Modern Humans in Asia

The discovery of a human skull and jawbone is shifting understandings of when modern humans migrated into Southeast Asia.

<https://www.sapiens.org/archaeology/human-migration-asia/>

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### SAPIENS – Tapping Into Ancient Soundscapes

An archaeologist shares the results of new research on musical instruments in Southern Africa.

<https://www.sapiens.org/archaeology/southern-africa-instruments/>

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### SAPIENS – How an Archaeological Experiment Revealed California’s Ancient Past

Complex toolmaking strategies were the heart of survival on San Nicolas Island.

<https://www.sapiens.org/archaeology/experimental-archaeology-california-ancient-past/>

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### SCIENCE.ORG NEWS – If AI becomes conscious, how will we know?

Scientists and philosophers are proposing a checklist based on theories of human consciousness.

<https://www.science.org/content/article/if-ai-becomes-conscious-how-will-we-know>

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## PUBLICATIONS

### Current Biology

#### ARTICLES

**JOSEPH LEDOUX with JONATHAN BIRCH, KRISTIN ANDREWS, NICOLA S. CLAYTON, NATHANIEL D. DAW, CHRIS FRITH, HAKWAN LAU, MEGAN A.K. PETERS, SUSAN SCHNEIDER, ANIL SETH, THOMAS SUDDENDORF & MARIE M.P. VANDEKERCKHOVE – Consciousness beyond the human case**

Artificial intelligence (AI) is barreling forward at breakneck speed, with some proponents bullishly confident that Large Language Models (LLMs) such as chatGPT will soon be conscious. But there is much scope for confusion regarding the meaning of ‘conscious’. If we conflate consciousness with intelligence, then AI is already there, but we need to keep these ideas apart. Similar issues arise in studies of animal consciousness, where consciousness is sometimes said to be manifested in complex behavior (such as the waggle dance of the bee) or in behaviours that resemble human behaviour (if a fish bolts in a situation that would scare a human, the fish must, like the human, feel fear). Such inferences can easily lead us astray. Human research is greatly facilitated by the fact that people can verbally report their experiences. Animals, lacking verbal report, can only respond non-verbally, always leaving some doubt about whether their behaviour was consciously or non-consciously controlled. With LLMs, by contrast, we have an abundance of linguistic data. But these models are trained (on over a trillion words of data) to respond to prompts as a human would respond, so we are left in the dark as to whether their responses reflect genuine consciousness or skillful mimicry.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00852-7](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00852-7)

**KIAH HARDCASTLE – Spatial cognition: Uncovering navigational representations in prefrontal cortices**

A new study identifies representations of navigational variables in six prefrontal regions in freely moving macaques, expanding our view of how the brain represents space outside of the broader hippocampal formation.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00919-3](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00919-3)

#### REVIEWS

**ALAN C. LOVE & GÜNTER P. WAGNER – Telling stories about unseen ancestors**

Review & commentary on ‘Ancestors in Evolutionary Biology: Linear Thinking About Branching Trees’ by Ronald Jenner (2022).

[https://www.cell.com/current-biology/fulltext/S0960-9822\(23\)00756-X](https://www.cell.com/current-biology/fulltext/S0960-9822(23)00756-X)

## eLife

## ARTICLES

**Socializing in the abstract**

The brains of marmoset monkeys and humans respond to animations showing social interactions between abstract shapes in similar ways, indicating that marmosets may have a Theory of Mind.

<https://elifesciences.org/digests/86327/socializing-in-the-abstract>

## PAPERS

**AUDREY DUREUX et al – Gaze patterns and brain activations in humans and marmosets in the Frith-Happé theory-of-mind animation task**

Theory of Mind (ToM) refers to the cognitive ability to attribute mental states to other individuals. This ability extends even to the attribution of mental states to animations featuring simple geometric shapes, such as the Frith-Happé animations in which two triangles move either purposelessly (Random condition), exhibit purely physical movement (Goal-directed condition), or move as if one triangle is reacting to the other triangle's mental states (ToM condition). While this capacity in humans has been thoroughly established, research on nonhuman primates has yielded inconsistent results. This study explored how marmosets (*Callithrix jacchus*), a highly social primate species, process Frith-Happé animations by examining gaze patterns and brain activations of marmosets and humans as they observed these animations. We revealed that both marmosets and humans exhibited longer fixations on one of the triangles in ToM animations, compared to other conditions. However, we did not observe the same pattern of longer overall fixation duration on the ToM animations in marmosets as identified in humans. Furthermore, our findings reveal that both species activated extensive and comparable brain networks when viewing ToM versus Random animations, suggesting that marmosets differentiate between these scenarios similarly to humans. While marmosets did not mimic human overall fixation patterns, their gaze behavior and neural activations indicate a distinction between ToM and non-ToM scenarios. This study expands our understanding of nonhuman primate cognitive abilities, shedding light on potential similarities and differences in ToM processing between marmosets and humans.

<https://elifesciences.org/articles/86327>

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**Frontiers in Artificial Intelligence**

## PAPERS

**LORELLA VIOLA – On the use of sentiment analysis for linguistics research. Observations on sentiment polarity and the use of the progressive in Italian**

This article offers a conceptual and methodological contribution to linguistics by exploring the potential value of using sentiment analysis (SA) for research in this field. Firstly, it discusses the limitations and advantages of using SA for linguistics research including the wider epistemological implications of its application outside of its original conception as a product reviews analysis tool. Methodologically, it tests its applicability against an established linguistic case: the correlation between subjective attitudes such as surprise, irritation and discontent and the use of the progressive. The language example is Italian for which this function of the progressive form has not been analyzed yet. The analysis applies FEEL-IT, a state-of-the-art transformer-based machine learning model for emotion and sentiment classification in Italian on language samples from various sources as collected in Evalita-2014 (238,556 words). The results show statistically significant correlations between negative subjective attitudes and the use of the progressive in line with previous accounts in other languages. The article concludes with a few additional propositions for practitioners and researchers using SA.

<https://www.frontiersin.org/articles/10.3389/frai.2023.1101364/full>

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**Frontiers in Health Services**

## PAPERS

**LARA L. EDER & BERTOLT MEYER – The role of self-endangering cognitions between long-term care nurses' altruistic job motives and exhaustion**

Due to demographic change and staff shortages nurses suffer under high work strain. As a consequence, caregivers' absenteeism due to mental stress, in particular burnout, is high. To explain the development of nurses' burnout more research is needed on nurses' individual resources and coping strategies. Self-endangering is a potentially harmful coping strategy.

To expand the perspective of the Job Demand-Resources Model by including caregivers' intraindividual resources and the coping construct of self-endangering as a mediator between personal resources and nurses' emotional exhaustion.

A longitudinal questionnaire survey was conducted between July 2020—March 2021 among nurses in long-term care in Germany. The final analysis sample consisted of wave 1 = 416 and wave 1,2 = 50. Data were analysed by a multiverse analytic strategy using regression analysis with measurement repetition and cross-lagged-panel design for waves one and two. Variables used for regression analysis and cross-lagged-panel were: Independent variables: An altruistic job motivation, team identification and self-esteem, dependent variables: Exhaustion and disengagement, and mediators: Self-endangering cognitions and behavior tendencies.

A highly altruistic job motivation leads to more self-endangering cognitions and to more self-endangering behavior tendencies. Mixed model analysis and cross-sectional path analysis confirmed mediation effects from altruism over self-endangering to exhaustion.

Our findings are at odds with some research findings about altruism in nursing, such that too much altruism can lead to harmful self-endangering. We also introduce a new instrument to capture self-endangering in nursing care. Future research should investigate various facets of self-endangering in nursing. We assume that leadership behavior could have influence on self-endangering. New health policy structures are needed to improve working conditions in nursing and thus prevent self-endangering.

<https://www.frontiersin.org/articles/10.3389/frhs.2023.1100225/full>

## Frontiers in Language Sciences

### PAPERS

#### **DIETER G. HILLERT – On how “early syntax” came about**

Modern humans are biologically predisposed to the ability to create symbolic elements and to combine them systematically to share feelings, thoughts, or beliefs. In considering paleoanthropological evidence, we hypothesize that this particular innate ability emerged in early members of the Homo group but evolved from (nonhuman) primates. Here, we identify four, closely interconnected evolutionary stages that may have brought about an extended syntax: (a) binary signal binding, (b) symbolic signs, (c) pragmatic grammar and (d) extended syntax. Basic signal binding can be occasionally observed in primates. Various cortical changes in the early hominin lineage enabled the creation of symbolic signs (words) and a pragmatic grammar consisting of two or three words. At this stage, cognitive strategies (e.g., AGENT-first) may have mimicked perceived event-structures and determined asymmetry between these words. Finally, lexical grouping, syntactic frames, argument structures, semantic roles and morphological markers are the outcome of an accumulative cultural process that resulted in an extended syntax. We conclude that the origin of syntax is deeply conceptually rooted and emerged along with an increase of cognitive control, rehearsal and global workspace capacity.

<https://www.frontiersin.org/articles/10.3389/flang.2023.1251498/full>

## Frontiers in Psychology

### PAPERS

#### **XIAOQI DENG et al – Unravelling the relation between altruistic cooperativeness trait, smiles, and cooperation: a mediation analysis**

Human cooperativeness is an important personality trait. However, the mechanism through which people cooperate remains unclear. Previous research suggests that one of the proposed functions of smiling is to advertise altruistic dispositions, leading to successful cooperation. In particular, studies have reported that Duchenne smiles are honest signals of cooperative intent because they are not easy to produce voluntarily. This study aimed to examine the predictive relationships among altruistic cooperativeness traits, Duchenne smiles, and cooperative behavior.

A total of 90 people were randomly assigned to dyads and filmed while they participated in a ten-minute, unstructured conversation followed by a prisoner’s dilemma game to measure their cooperative behaviors. Their smiles during conversations were classified as Duchenne or non-Duchenne. Participants’ altruistic dispositions were measured before the conversation began using an anonymous prisoner’s dilemma game.

The results of our linear regression analyses support previous findings that individual’s Duchenne smiles and their own cooperative behavior are positively correlated. However, when we controlled for altruistic cooperativeness, Duchenne smiles no longer correlated with cooperative behavior. The results of the mediation analyses showed that Duchenne smiles and smile synchrony did not mediate the predictive relationship between altruistic cooperativeness and cooperative behavior. Our results suggest that human cooperative behavior may be predetermined by altruistic cooperativeness. This calls for the reconsideration of the Duchenne smile as an underlying behavioral mechanism that is effective for signaling altruistic cooperative intent.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1227266/full>

#### **MARTIN HASPELMATH – Coexpression and synexpression patterns across languages: Comparative concepts and possible explanations**

Meanings and linguistic shapes (or forms) do not always map onto each other in a unique way, and linguists have used all kinds of different terms for such situations: Ambiguity, polysemy, syncretism, lexicalization, semantic maps; portmanteau, cumulative exponence, feature bundling, underspecification, and so on. In the domain of lexical comparison, the term colexification has become generally established in recent years, and in the present paper, I extend this word formation pattern in a regular way (cogrammatification, coexpression; syllexification, syngrammatification, synexpression). These novel terms allow us to chart the range of relevant phenomena in a systematic way across the grammar-lexicon continuum, and to ask whether highly general explanations of coexpression and synexpression patterns are possible. While there is no new proposal for explaining coexpression here, I will suggest that frequency of occurrence plays a crucial role in explaining synexpression patterns. Linguistic expressions or forms are treated as pairs of a meaning and a shape here. It is more

common to say that linguistic expressions or forms are form-meaning pairs, but the term form is then used in two different meanings ('shape' and 'shape-meaning pair'). This is why I prefer shape to form in the present context. An example of multiple exponence in inflection is Modern Greek *é-kan-a-n* [PST-do-PST-3PL] 'they did', where past tense is signaled by the prefix *é-* and also by the suffix *-a*. Multiple exponence is discussed in detail by Harris (2017). Meanings are associated not only with morphs (i.e. roots and markers), but often also with constructions. This is reflected in the definitions in (4) and (13) below, but otherwise I leave constructions (as well as idioms) out of consideration here for the sake of simplicity.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1236853/abstract>

**HAMAD AL-AZARY & ALBERT N. KATZ – On Choosing the Vehicles of Metaphors 2.0: The interactive effects of semantic neighborhood density and body-object interaction on metaphor production**

In a metaphor, such as language is a bridge, two distinct concepts known as the topic (i.e., language) and vehicle (i.e., bridge) are juxtaposed to produce figurative meaning. Previous work demonstrated that, when creating metaphors, participants choose vehicles that are concrete, rather than abstract, and are also a moderate semantic distance away from the topic. However, little is known about the semantic representations underlying metaphor production beyond topic vehicle semantic distance and vehicle concreteness. Here, we studied the role of two semantic richness variables in metaphor production - semantic neighborhood density (SND), which measures the proximity of a word and its associations in semantic space, and body-object interaction (BOI), which reflects the ease with which a human body can motorically interact with a word's referent. In each trial, participants were presented with an abstract topic, such as miracle, and were instructed to make an apt and comprehensible metaphor by choosing a vehicle word (e.g., lighthouse). All of the topics were abstract but half were high-SND (from dense semantic neighborhoods) and half were low-SND (from sparse semantic neighborhoods). Similarly, half of the potential vehicle words were either high or low in SND and also differed on BOI such that half were high-BOI (e.g., bicycle), whereas half were low-BOI (e.g., rainbow). We observed a three-way interaction such that participants selected low-BOI, rather than high-BOI, vehicle words when topics or vehicles were high-SND. We interpret this finding to suggest that participants attempt to reduce the overall semantic richness of their created metaphors.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1216561/abstract>

## Mind & Language

### PAPERS

**GABOR BRODY & ROMAN FEIMAN – Polysemy does not exist, at least not in the relevant sense**

Based on the existence of polysemy (e.g., lunch can refer to both food and events), it is argued that central tenets of externalist semantics and Fodorian concept atomism, an externalist theory on which words lack semantic structure, are unsound. We evaluate the premise that these arguments rely on—that polysemous words have separate, finer-grained senses. We survey the evidence across psychology and linguistics and argue that it shows that polysemy does not exist, at least not in this “sense”. The upshot is that if polysemy does not exist, it cannot pose a problem for atomism or externalism.

<https://onlinelibrary.wiley.com/doi/abs/10.1111/mila.12474>

## Nature

### PAPERS

**PILLE HALLAST et al with HUMAN GENOME STRUCTURAL VARIATION CONSORTIUM (HGSVC) – Assembly of 43 human Y chromosomes reveals extensive complexity and variation**

The prevalence of highly repetitive sequences within the human Y chromosome has prevented its complete assembly to date and led to its systematic omission from genomic analyses. Here we present *de novo* assemblies of 43 Y chromosomes spanning 182,900 years of human evolution and report considerable diversity in size and structure. Half of the male-specific euchromatic region is subject to large inversions with a greater than twofold higher recurrence rate compared with all other chromosomes. Ampliconic sequences associated with these inversions show differing mutation rates that are sequence context dependent, and some ampliconic genes exhibit evidence for concerted evolution with the acquisition and purging of lineage-specific pseudogenes. The largest heterochromatic region in the human genome, Yq12, is composed of alternating repeat arrays that show extensive variation in the number, size and distribution, but retain a 1:1 copy-number ratio. Finally, our data suggest that the boundary between the recombining pseudoautosomal region 1 and the non-recombining portions of the X and Y chromosomes lies 500 kb away from the currently established boundary. The availability of fully sequence-resolved Y chromosomes from multiple individuals provides a unique opportunity for identifying new associations of traits with specific Y-chromosomal variants and garnering insights into the evolution and function of complex regions of the human genome.

<https://www.nature.com/articles/s41586-023-06425-6>

## Nature Communications Biology

### PAPERS

#### **AYLA SEVIM-EROL et al – A new ape from Türkiye and the radiation of late Miocene hominines**

Fossil apes from the eastern Mediterranean are central to the debate on African ape and human (hominine) origins. Current research places them either as hominines, as hominins (humans and our fossil relatives) or as stem hominids, no more closely related to hominines than to pongines (orangutans and their fossil relatives). Here we show, based on our analysis of a newly identified genus, *Anadoluvius*, from the 8.7 Ma site of Çorakyerler in central Anatolia, that Mediterranean fossil apes are diverse, and are part of the first known radiation of early members of the hominines. The members of this radiation are currently only identified in Europe and Anatolia; generally accepted hominins are only found in Africa from the late Miocene until the Pleistocene. Hominines may have originated in Eurasia during the late Miocene, or they may have dispersed into Eurasia from an unknown African ancestor. The diversity of hominines in Eurasia suggests an in situ origin but does not exclude a dispersal hypothesis.

<https://www.nature.com/articles/s42003-023-05210-5>

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## Nature Reviews Psychology

### PAPERS

#### **JUULIA T. SUVILEHTO, ASTA CEKAITE & INDIA MORRISON – The why, who and how of social touch**

A growing body of evidence from the behavioural and neural sciences indicates that social touch has a vital role in human development and psychological well-being. Despite some advances, differences in emphasis and approach across disciplines have hampered a comprehensive understanding of touch behaviour in social interactions. In this Review, we synthesize findings from quantitative and qualitative research in psychology and neuroscience to present a cross-disciplinary framework for investigating social touch and interpreting the associated behaviour. This framework elucidates levels of analysis and explanation for the functions, evolution, mechanisms and development of social touch. We highlight three main areas of inquiry, many of which remain under-researched: the purpose of social touch ('why'), the individuals involved in the touch ('who') and the use of social touch in a given situation ('how'). Together, these dimensions can accommodate features of social relationships from the level of the individual to society while also taking into account the influence of intention, motivation and emotion on social touch. We also consider important yet often overlooked factors such as the species' evolutionary history, language and sociocultural variables, as well as biological mechanisms underpinning social touch.

<https://www.nature.com/articles/s44159-023-00217-5>

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## Nature Scientific Reports

### PAPERS

#### **WALDIR M. SAMPAIO et al – Effects of co-players' identity and reputation in the public goods game**

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

<https://www.nature.com/articles/s41598-023-40730-4>

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## PLoS Biology

### PAPERS

#### **LUDOVIC BELLIER et al – Music can be reconstructed from human auditory cortex activity using nonlinear decoding models**

Music is core to human experience, yet the precise neural dynamics underlying music perception remain unknown. We analyzed a unique intracranial electroencephalography (iEEG) dataset of 29 patients who listened to a Pink Floyd song and applied a stimulus reconstruction approach previously used in the speech domain. We successfully reconstructed a recognizable song from direct neural recordings and quantified the impact of different factors on decoding accuracy. Combining encoding and decoding analyses, we found a right-hemisphere dominance for music perception with a primary role of the superior temporal gyrus (STG), evidenced a new STG subregion tuned to musical rhythm, and defined an anterior–posterior STG organization exhibiting sustained and onset responses to musical elements. Our findings show the feasibility of applying predictive modeling on short datasets acquired in single patients, paving the way for adding musical elements to brain–computer interface (BCI) applications.

**PLoS One****PAPERS****DENISA CRISTINA LUPU et al – In support of 2D:4D: More data exploring its conflicting results on handedness, sexual orientation and sex differences**

In the last few years, several studies have questioned the value of the second-to-fourth digit ratio (2D:4D) as a measure of exposure to sex hormones before birth. Controversy has also extended to the 2D:4D association with individual features previously related to this exposure such as handedness and sexual orientation. Given that it has been argued that sex differences in 2D:4D could be a consequence of body-size differences, we have tested in a large sample the allometric relationship between finger lengths and body size. Our results show that the association is either allometric or isometric, depending on the analyses performed. In any case, the deviation from isometry is not large enough to explain the typically observed sex difference in this trait. We have also tested the association between sexual orientation and 2D:4D, finding a relationship between 2D:4D and sexual orientation in men but not in women. We attribute this discordance with previously published meta-analysis to differences in genetic background, a variable that has gained relevance in recent years in studies involving 2D:4D. Finally, we did not find any relationship between 2D:4D and handedness, evaluated through self-reported preference and hand performance. Our main conclusion is that 2D:4D shows differences between sexes beyond their disparity in body size. In our opinion, 2D:4D can be used cautiously as an indicator of intrauterine exposure to sex hormones taking into account some considerations, such as analysing a very large sample and taking careful measurements of the ethnicity of the sample.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0280514>

**JULIAN KATES-HARBECK & MARTIN NOWAK – Trust based attachment**

In social systems subject to indirect reciprocity, a positive reputation is key for increasing one's likelihood of future positive interactions. The flow of gossip can amplify the impact of a person's actions on their reputation depending on how widely it spreads across the social network, which leads to a percolation problem. To quantify this notion, we calculate the expected number of individuals, the "audience", who find out about a particular interaction. For a potential donor, a larger audience constitutes higher reputational stakes, and thus a higher incentive, to perform "good" actions in line with current social norms. For a receiver, a larger audience therefore increases the trust that the partner will be cooperative. This idea can be used for an algorithm that generates social networks, which we call trust based attachment (TBA). TBA produces graphs that share crucial quantitative properties with real-world networks, such as high clustering, small-world behavior, and powerlaw degree distributions. We also show that TBA can be approximated by simple friend-of-friend routines based on triadic closure, which are known to be highly effective at generating realistic social network structures. Therefore, our work provides a new justification for triadic closure in social contexts based on notions of trust, gossip, and social information spread. These factors are thus identified as potential significant influences on how humans form social ties.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0288142>

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**Quarterly Review of Biology****PAPERS****MICHAEL RUSE – The Complete Correspondence of Charles Darwin**

<https://www.journals.uchicago.edu/doi/abs/10.1086/726499>

**REVIEWS****PETER J. BOWLER – Illuminating Human Evolution: 150 Years after Darwin. Evolutionary Studies edited by Jaume Bertranpetit and Juli Peretó**

<https://www.journals.uchicago.edu/doi/abs/10.1086/726490>

**STEFAN BERNHARDT-RADU – The Huxleys: An Intimate History of Evolution by Alison Bashford**

<https://www.journals.uchicago.edu/doi/abs/10.1086/726527>

**KOSTAS KAMPOURAKIS – Treasure Your Exceptions: The Science and Life of William Bateson. Second Edition by Alan G. Cock and Donald R. Forsdyke**

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**ALEXANDRE FRANÇQ & SYLVAIN BILLIARD – The Last Writings of Thomas S. Kuhn: Incommensurability in Science by Thomas S. Kuhn; edited by Bojana Mladenović**

<https://www.journals.uchicago.edu/doi/abs/10.1086/726494>



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**MICHAEL RUSE – Writing Gaia: The Scientific Correspondence of James Lovelock and Lynn Margulis edited by Bruce Clarke and Sébastien Dutreuil**

<https://www.journals.uchicago.edu/doi/abs/10.1086/726486>

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## Trends in Cognitive Sciences

### PAPERS

#### **NINA KAZANINA & DAVID POEPEL – The neural ingredients for a language of thought are available**

The classical notion of a 'language of thought' (LoT), advanced prominently by the philosopher Jerry Fodor, is an influential position in cognitive science whereby the mental representations underpinning thought are considered to be compositional and productive, enabling the construction of new complex thoughts from more primitive symbolic concepts. LoT theory has been challenged because a neural implementation has been deemed implausible. We disagree. Examples of critical computational ingredients needed for a neural implementation of a LoT have in fact been demonstrated, in particular in the hippocampal spatial navigation system of rodents. Here, we show that cell types found in spatial navigation (border cells, object cells, head-direction cells, etc.) provide key types of representation and computation required for the LoT, underscoring its neurobiological viability.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(23\)00193-6](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00193-6)

#### **ROCCO CHIOU et al – Semantic cognition versus numerical cognition: a topographical perspective**

Semantic cognition and numerical cognition are dissociable faculties with separable neural mechanisms. However, recent advances in the cortical topography of the temporal and parietal lobes have revealed a common organisational principle for the neural representations of semantics and numbers. We discuss their convergence and divergence through the prism of topography.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(23\)00200-0](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00200-0)

### COMMENTARIES

#### **JOHN KOUNIOS & YONGTAEK OH – Creativity and semantic memory: the answers are upstream**

Beaty and Kenett's review of research on creativity and semantic memory structure exemplifies the difficulty of inferring knowledge structures or processes from impoverished output variables such as association frequencies and reaction times. Their review falls into the same theoretical traps that complicated the work of early semantic memory researchers.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(23\)00170-5](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00170-5)

#### **YOED N. KENETT & ROGER E. BEATY – On semantic structures and processes in creative thinking**

Kounios and Oh offer a perspective on our recent review on the role of associative processes in creativity, highlighting potential theoretical considerations surrounding semantic memory structure. Kounios and Oh critique network-based approaches to analyzing semantic memory structure that rely, in their view, on behavioral tasks 'downstream' from the original source of semantic representation. Instead, they advocate for 'upstream' processes of semantic activation via electrophysiological methods (the N400 component).

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(23\)00192-4](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00192-4)

#### **ORIGINAL ARTICLE: ROGER E. BEATY & YOED N. KENETT – Associative thinking at the core of creativity**

In EAORC Bulletin 1,041.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(23\)00094-3](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00094-3)

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