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## NOTICES

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### 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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### ACADEMIA.EDU – Lower Palaeolithic artifacts from Plakias Crete

*In A.J. Ammerman & T. Davis (eds.), Island Archaeology and the origins of seafaring in the Eastern Mediterranean, Eurasian Prehistory 11:1-2, 129-152 (2013).*

#### **CURTIS RUNNELS et al – Lower Palaeolithic artifacts from Plakias Crete: implications for hominin dispersals**

Lithic artifacts from eight findspots in the Plakias region of southwestern Crete are ascribed to the Acheulean of the Middle Pleistocene on the basis of morphotypological characteristics, geologic contexts, and OSL assays. Considered in a regional context, the Cretan Acheulean is similar to the Acheulean found on sites in both the eastern and western portions of the Mediterranean region that resulted from an “Out of Africa” adaptive radiation of hominins (probably *Homo erectus* s. l.) that began ca. 0.8 – 1.0 mya. We suggest that hominins may have arrived on Crete in the Middle Pleistocene as part of this hominin dispersal and that open-water crossing, at least in the southern Aegean, may have been involved

[https://www.academia.edu/11294894/Lower Palaeolithic Artifacts from Plakias Crete Implications for Hominin Dispersals](https://www.academia.edu/11294894/Lower_Palaeolithic_Artifacts_from_Plakias_Crete_Implications_for_Hominin_Dispersals)

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### ACADEMIA.EDU – Getting interaction theory (IT) together

*In Interaction Studies 13:3, 436-468 (2012).*

#### **TOM FROESE & SHAUN GALLAGHER – Getting interaction theory (IT) together: Integrating developmental, phenomenological, enactive, and dynamical approaches to social interaction**

We argue that progress in our scientific understanding of the ‘social mind’ is hampered by a number of unfounded assumptions. We single out the widely shared assumption that social behavior depends solely on the capacities of an individual agent. In contrast, both developmental and phenomenological studies suggest that the personal-level capacity for detached ‘social cognition’ (conceived as a process of theorizing about and/or simulating another mind) is a secondary achievement that is dependent on more immediate processes of embodied social interaction. We draw on the enactive approach to cognitive science to further clarify this strong notion of ‘social interaction’ in theoretical terms. In addition, we indicate how this interaction theory (IT) could eventually be formalized with the help of a dynamical systems perspective on the interaction process, especially by making use of evolutionary robotics modeling. We conclude that bringing together the methods and insights of developmental, phenomenological, enactive and dynamical approaches to social interaction can provide a promising framework for future research.

[https://www.academia.edu/69193643/Getting interaction theory IT together Integrating developmental phenomenological enactive and dynamical approaches to social interaction](https://www.academia.edu/69193643/Getting_interaction_theory_IT_together_Integrating_developmental_phenomenological_enactive_and_dynamical_approaches_to_social_interaction)

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### ACADEMIA.EDU – Lower Palaeolithic Transitions in the Northern Latitudes of Eurasia

*In Marta Camps & Parth Chauhan (eds.), Sourcebook of Paleolithic Transitions: Methods, Theories, and Interpretations. Springer: Dordrecht, Netherlands, II:3, 195-209 (2009).*

#### **JAN MICHAL BURDUKIEWICZ – Lower Palaeolithic Transitions in the Northern Latitudes of Eurasia**

The northern latitudes of Eurasia were inhabited temporarily, during favorable, warmer periods since 1 Ma ago with a considerable transition from Mode 1 (Oldowan) or Mode 2 (Acheulean) to microlithic technology and introducing new and more effective composite tools. Until recent years, archaeologists believed that such technology occurred almost exclusively during the Mesolithic and Late Palaeolithic (Mode 5), in the form of small stone inserts held by wooden or bone hafts, producing composite tools. A significant spatial, chronological and ecological variability of Lower Palaeolithic microlithic assemblages suggests that they developed as a result of the adaptation to local environment, possibly temperate and wooded, in different areas from North-Eastern China to Northern Europe, parallel to Mode 1 and Mode 2 in southern and western part of Eurasia.

[https://www.academia.edu/26985290/Lower Palaeolithic Transitions in the Northern Latitudes of Eurasia](https://www.academia.edu/26985290/Lower_Palaeolithic_Transitions_in_the_Northern_Latitudes_of_Eurasia)

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### ACADEMIA.EDU – The illusion of common ground

*New Ideas in Psychology 42, 56-63 (2016).*

#### **STEPHEN J. COWLEY & MATTHEW I. HARVEY – The illusion of common ground**

When people talk about “common ground”, they invoke shared experiences, convictions, and emotions. In the language sciences, however, ‘common ground’ also has a technical sense. Many taking a representational view of language and cognition seek to explain that everyday feeling in terms of how isolated individuals “use” language to communicate. Autonomous cognitive agents are said to use words to communicate inner thoughts and experiences; in such a framework, ‘common ground’ describes a body of information that people allegedly share, hold common, and use to reason about how

intentions have been made manifest. We object to this view, above all, because it leaves out mechanisms that demonstrably enable people to manage joint activities by doing things together. We present an alternative view of linguistic understanding on which appeal to inner representations is replaced by tracing language to synergetic coordination between biological agents who draw on wordings to act within cultural ecosystems. Crucially, human coordination depends on, not just bodies, but also salient patterns of articulatory movement ('wordings'). These rich patterns function as non-local resources that, together with concerted bodily (and vocal) activity, serve to organize, regulate and coordinate both attention and the verbal and non-verbal activity that it gives rise to. Since wordings are normative, they can be used to develop skills for making cultural sense of environments and other peoples' doings. On our view, the technical notion of common ground is an illusion, because appeal to representations blinds theorists to bodily activity and the role of experience. Turning away from how wordings influence the circumstances, skills, and bodily coordination on which interpersonal understanding depends, it makes premature appeal to reasoning and internally represented knowledge. We conclude that outside its vague everyday sense, the concept of common ground is a notion that the language sciences would be well advised to abandon.

[https://www.academia.edu/69577627/The\\_illusion\\_of\\_common\\_ground](https://www.academia.edu/69577627/The_illusion_of_common_ground)

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### ACADEMIA.EDU – Fluvial deposits as an archive of early human activity

*Quaternary Science Reviews* 166, 114-149 (2017).

#### **PARTH R. CHAUHAN et al with MARIE-HÉLÈNE MONCEL – Fluvial deposits as an archive of early human activity: Progress during the 20 years of the Fluvial Archives Group**

Fluvial sedimentary archives are important repositories for Lower and Middle Palaeolithic artefacts throughout the 'Old World', especially in Europe, where the beginning of their study coincided with the realisation that early humans were of great antiquity. Now that many river terrace sequences can be reliably dated and correlated with the globally valid marine isotope record, potentially useful patterns can be recognized in the distribution of the find-spots of the artefacts that constitute the large collections that were assembled during the years of manual gravel extraction. This paper reviews the advances during the past two decades in knowledge of hominin occupation based on artefact occurrences in fluvial contexts, in Europe, Asia and Africa. As such it is an update of a comparable review in 2007, at the end of IGCP Project no. 449, which had instigated the compilation of fluvial records from around the world during 2000-2004, under the auspices of the Fluvial Archives Group. An overarching finding is the confirmation of the well-established view that in Europe there is a demarcation between handaxe making in the west and flake-core industries in the east, although on a wider scale that pattern is undermined by the increased numbers of Lower Palaeolithic bifaces now recognized in East Asia. It is also apparent that, although it seems to have appeared at different places and at different times in the later Lower Palaeolithic, the arrival of Levallois technology as a global phenomenon was similarly timed across the area occupied by Middle Pleistocene hominins, at around 0.3 Ma.

[https://www.academia.edu/33300897/Fluvial\\_deposits\\_as\\_an\\_archive\\_of\\_early\\_human\\_activity\\_Progress\\_during\\_the\\_20\\_years\\_of\\_the\\_Fluvia Archives\\_Group](https://www.academia.edu/33300897/Fluvial_deposits_as_an_archive_of_early_human_activity_Progress_during_the_20_years_of_the_Fluvia Archives_Group)

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### OTHER PUBLICATIONS – Language evolution, narrative and the nature of cognition

*In Journal of Cognitive Science* 22:4, 487-539 (2021).

#### **ANDREW FEENEY & RACHEL EDWARDS – Language evolution, narrative and the nature of cognition**

This paper supports the hypothesis that the forms that modern language assume are constrained by the need to represent externally, a wholly mind-internal Narrative of Thought. Beginning with an overview of research into the role of narrative in human culture, we go on to trace the trajectory of language evolution in relation to human cognition. We note the behavioural innovations that occurred less than 2 million years ago and argue that they arose from a greater degree of cooperation than any previous hominin species had displayed, and led to the emergence of intentional communication in the form of protolanguage. However, this stage in hominin cognition was not indicative of a qualitatively distinctive mode of thought, being grounded in subitizing, and that this is reflected in the cultural stasis that characterises the subsequent million years. The evolution of a uniquely human form of cognition, a System 2 type of thinking in Dual Processing Theory, is a more recent event which enabled the creation and retention of narrative structures through the recursive embedding of simple propositions. This new type of thinking and its external representation in linguistic narrative are seen to coevolve with aspects of autobiographical memory, a sense of self, and Theory of Mind.

<http://jcs.snu.ac.kr/jcs/index.php/issues/?uid=335&mod=document>

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### CONFERENCE ALERT – 4th Evolutionary System Biology (Virtual Conference)

Join us for the 4th Evolutionary System Biology (Virtual Conference) organised by Wellcome Connecting Science.

Date: 9-11 February 2022

This year's conference will focus on the evolution of biological systems at different levels: genes, molecules and systems. We will also explore protein evolution, how microbes adapt to their environment, quantitative genetics, and the impact of evolutionary change on human health.

The organising committee shares on this blog the challenges in this field and why this year's virtual conference is important for those looking to address future evolutionary research questions; please read here: <https://bit.ly/3lVlgq7>

Our keynote speakers will be Nick Barton from IST Austria and Cassandra Extavour from Harvard University.

To increase the international diversity of attendees and promote more inclusive scientific discussions at our conferences, delegates based in Lower and Middle-Income Countries can register for this conference for free.

Registration closes on 2 February 2022.

For registration and the final programme, please go here:

<https://coursesandconferences.wellcomeconnectingscience.org/event/evolutionary-systems-biology-virtual-conference-20220209/>

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### CONFERENCE ALERT – Joint Conference on Language Evolution – Extended Call for Papers

The deadline for submission to Joint Conference on Language Evolution (Kanazawa, Japan, September 5th-8th, 2022) has been EXTENDED to February 15th, 2022.

You can submit to Joint Conference on Language Evolution via EasyChair: <https://easychair.org/conferences/?conf=jcole2022>

Please carefully read the guidelines at <https://sites.google.com/view/joint-conf-language-evolution/submission> – and further details within the provided submission templates – to prepare your submission. In addition to your submission, you will be asked to provide a 150-word summary of your contribution.

If you have a problem with your submission, please email [rie.asano@uni-koeln.de](mailto:rie.asano@uni-koeln.de)

Submissions may be in any relevant discipline, and should aim to make clear their own substantive claim relating to relevant, current scientific literature in the field of language evolution. Submissions which do not have clear relevance to the field or do not adhere to the guidelines may be rejected without review.

The conference languages at Joint Conference on Language Evolution will be English and American Sign Language or International Sign for one parallel session of the conference.

WE ARE EXCITED TO ANNOUNCE 12 CONFIRMED KEYNOTE AND INVITED PRESENTERS!

Keynote presenters: Cedric Boeckx, Kazuo Okanoya, Carol Padden, and Simone Pika

Invited presenters: Judith Burkart, Zanna Clay, Koji Fujita, Takashi Hashimoto, Yasuo Ihara, Harumi Kobayashi, Aniruddh Patel, and Limor Raviv

All submission information and templates can be found here: <https://sites.google.com/view/joint-conf-language-evolution/submission>

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### CONFERENCE ALERT – ESEB Congress 2022 - ABSTRACT SUBMISSION OPEN!

The European Society for Evolutionary Biology invites you to submit your abstract for the next congress from 14-19 August 2022 in Prague, Czech Republic.

The list of symposia is available at <https://www.eseb2022.cz/en/symposia>

Details about submitting an abstract are available at <https://www.eseb2022.cz/en/call-for-abstracts-page>

PLEASE NOTE THE FOLLOWING DATES:

February 2022 - On-line registration opens

15 April 2022 - Abstract submission closes

10 May 2022 - Communication of selection of contributed talks/posters

15 June 2022 - Early bird registration closes

For further information, please visit the congress website at <https://www.eseb2022.cz>

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## NEWS

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### BREAKING SCIENCE – Songs of Song Sparrows More Complex than Previously Thought

Male song sparrows (*Melospiza melodia*) sing with eventual variety, repeating each song type in a consecutive series termed a 'bout.' A new study, published in the journal Proceedings of the Royal Society B, shows that in switching between song types, they follow a 'cycling rule,' cycling through their repertoires in close to the minimum possible number of bouts.

[http://www.sci-news.com/biology/melospiza-melodia-songs-10497.html?utm\\_source=feedburner&utm\\_medium=email](http://www.sci-news.com/biology/melospiza-melodia-songs-10497.html?utm_source=feedburner&utm_medium=email)

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### BREAKING SCIENCE – Sound Communication is Widespread among Fish, Study Says

New research led by Cornell University scientists shows that sound production appeared in the ray-finned fishes (clade Actinopterygii) circa 155 million years ago, as it did in some tetrapods.

<http://www.sci-news.com/biology/fish-sound-communication-10501.html>

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### BREAKING SCIENCE – Canine Genetic Mutation Associated with Small Body Size Arose More Than 53kya

Researchers have assembled a catalog of 1,431 genomes, inclusive of ancient canines, modern breed dogs, and wild canids, in a search for genetic variants passed from ancient to modern dogs.

<http://www.sci-news.com/paleontology/canine-body-size-associated-mutation-10500.html>

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### SCIENCE DAILY – 23,000 years ago, humans in Israel enjoyed a new bounty of food options

As climate shifted 23,000 years ago, humans in Israel experienced a new abundance of food, according to a new study.

<https://www.sciencedaily.com/releases/2022/01/220126144030.htm>

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## SCIENCE DAILY – Song sparrows shuffle and repeat to keep their audience listening

Biologists have found an animal for the first time that communicates with the complexity of human language: song sparrows. According to a new study, male song sparrows memorize a 30-minute long playlist of their recently belted tunes and use that information to curate both their current playlist and the next one. The findings suggest that song sparrows deliberately shuffle and repeat their songs possibly to keep a female's attention.

<https://www.sciencedaily.com/releases/2022/01/220126122443.htm>

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## SCIENCE DAILY – Look who's talking now: The fishes!

A new study finds that fish are far more likely to communicate with sound than generally thought.

<https://www.sciencedaily.com/releases/2022/01/220127172640.htm>

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## SCIENCE NEWS – Did a taste for blood help humans grow big brains? Story isn't so simple, study argues

When it comes to killing and eating other creatures, chimpanzees—our closest relatives—have nothing on us. Animal flesh makes up much more of the average human's diet than a chimp's. Many scientists have long suggested our blood lust ramped up about 2 million years ago, based on the number of butchery marks found at ancient archaeological sites. The spike in calories from meat, the story goes, allowed one of our early ancestors, *Homo erectus*, to grow bigger bodies and brains. But a new study argues the evidence behind this hypothesis is statistically flawed because it fails to account for the fact that researchers have focused most of their time and attention on later sites. As a result of this unequal "sampling effort" over time at different sites, the authors say, it's impossible to know how big a role meat eating played in human evolution.

<https://www.science.org/content/article/did-taste-blood-help-humans-grow-big-brains-story-isn-t-so-simple-study-argues>

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## THE CONVERSATION – Everything we see is a mash-up of the brain's last 15 seconds of visual information

The brain is basically a time machine that ensures what we see is stable and continuous

<https://theconversationuk.cmail19.com/t/r-l-trkhkdt-khhlilah-c/>

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## PUBLICATIONS

### Biology Letters

#### PAPERS

#### **RICARDO CALIARI OLIVEIRA et al – Tragedy of the commons in *Melipona* bees revisited**

*Melipona* stingless bees display a paradoxical overproduction of queens, which are later eliminated by nest-mate workers. Mechanistically, it was suggested that the monoterpenoid geraniol deposited into newly provisioned cells by adult bees would cause larvae to develop into queens in *Melipona beecheii*. This system could be evolutionarily stable if many of these new queens were to leave the nest and parasitize other genetically unrelated colonies nearby, as was shown to occur in a congeneric species. Here, we use microsatellite markers to test whether queen overproduction could be a strategy by which adult workers control the caste fate of the developing larvae to export copies of their own genes to the rest of the population via queen parasitism in *M. beecheii*. In addition, we re-examined whether artificially increasing the levels of geraniol indeed caused larvae to develop as queens rather than workers. Contrary to our prediction, we found no evidence for queen parasitism in *M. beecheii* and observed no effect of geraniol on the rearing of new queens. Together, these results support the original 'tragedy of the commons' hypothesis for queen overproduction in *Melipona* bees, where individual larvae selfishly bias their development towards the queen pathway according to their best evolutionary interests.

<https://royalsocietypublishing.org/doi/full/10.1098/rsbl.2021.0498>

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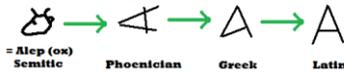
## Current Anthropology

#### PAPERS

#### **PIERS KELLY et al – The Predictable Evolution of Letter Shapes: An Emergent Script of West Africa Recapitulates Historical Change in Writing Systems**

A familiar story about the evolution of alphabets is that individual letters originated in iconic representations of real things. Over time, these naturalistic pictures became simplified into abstract forms. Thus, the iconic ox's head of Egyptian hieroglyphics transformed into the Phoenician and eventually the Roman letter A. In this vein, attempts to theorize the evolution of writing have tended to propose variations on a model of unilinear and unidirectional progression. According to this progressivist formula, pictorial scripts will tend to become more schematic while their systems will target smaller linguistic units. Objections to this theory point to absent, fragmentary, or contrary paleographic evidence, especially for predicted transitions in the underlying grammatical systems of writing. However, the forms of individual signs, such as the letter A, are nonetheless observed to change incrementally over time. We claim that such changes are predictable and that scripts will in fact become visually simpler in the course of their use, a hypothesis regularly confirmed in transmission chain experiments that use graphic stimuli. To test the wider validity of this finding, we turn to the Vai script of Liberia, a syllabic

writing system invented in relative isolation by nonliterate in ca. 1833. Unlike the earliest systems of the ancient world, Vai has the advantage of having been systematically documented from its earliest beginnings until the present day. Using established methods for quantifying visual complexity, we find that the Vai script has become increasingly compressed over the first 171 years of its history, complementing earlier claims and partial evidence that similar processes were at work in early writing systems. As predicted, letters simplified to a greater extent when their initial complexity was higher.



<https://www.journals.uchicago.edu/doi/abs/10.1086/717779>

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eLife

PAPERS

### **CHRISTIAN BRODBECK et al – Parallel processing in speech perception with local and global representations of linguistic context**

Speech processing is highly incremental. It is widely accepted that human listeners continuously use the linguistic context to anticipate upcoming concepts, words, and phonemes. However, previous evidence supports two seemingly contradictory models of how a predictive context is integrated with the bottom-up sensory input: Classic psycholinguistic paradigms suggest a two-stage process, in which acoustic input initially leads to local, context-independent representations, which are then quickly integrated with contextual constraints. This contrasts with the view that the brain constructs a single coherent, unified interpretation of the input, which fully integrates available information across representational hierarchies, and thus uses contextual constraints to modulate even the earliest sensory representations. To distinguish these hypotheses, we tested magnetoencephalography responses to continuous narrative speech for signatures of local and unified predictive models. Results provide evidence that listeners employ both types of models in parallel. Two local context models uniquely predict some part of early neural responses, one based on sublexical phoneme sequences, and one based on the phonemes in the current word alone; at the same time, even early responses to phonemes also reflect a unified model that incorporates sentence level constraints to predict upcoming phonemes. Neural source localization places the anatomical origins of the different predictive models in non-identical parts of the superior temporal lobes bilaterally, with the right hemisphere showing a relative preference for more local models. These results suggest that speech processing recruits both local and unified predictive models in parallel, reconciling previous disparate findings. Parallel models might make the perceptual system more robust, facilitate processing of unexpected inputs, and serve a function in language acquisition.

<https://elifesciences.org/articles/72056>

### **GUY ALEXANDER COOPER et al – The evolution of division of labour in structured and unstructured groups**

Recent theory has overturned the assumption that accelerating returns from individual specialisation are required to favour the evolution of division of labour. Yanni et al., 2020, showed that topologically constrained groups, where cells cooperate with only direct neighbours such as for filaments or branching growths, can evolve a reproductive division of labour even with diminishing returns from individual specialisation. We develop a conceptual framework and specific models to investigate the factors that can favour the initial evolution of reproductive division of labour. We find that selection for division of labour in topologically constrained groups: (1) is not a single mechanism to favour division of labour—depending upon details of the group structure, division of labour can be favoured for different reasons; (2) always involves an efficiency benefit at the level of group fitness; and (3) requires a mechanism of coordination to determine which individuals perform which tasks. Given that such coordination must evolve prior to or concurrently with division of labour, this could limit the extent to which topological constraints favoured the initial evolution of division of labour. We conclude by suggesting experimental designs that could determine why division of labour is favoured in the natural world.

<https://elifesciences.org/articles/71968>

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Frontiers for Young Minds

PAPERS

### **AVI AVITAL & SHLOMIT AGA-MIZRACHI – Are Our Genes Important for Cooperation?**

Social cooperation is a state in which people work together on a shared activity from which they both benefit, and the success of each person is dependent on everyone doing their part. Imagine, for example, a basketball game in which all team members make a shared effort and cooperate to win the game. To study this kind of social cooperation in the lab, we used rats. We created a special maze in which two rats must coordinate their behavior as a pair, moving together through the sections of the maze. Using this maze, we found that a rat's genes are more important than its environment in determining its level of social cooperation.

<https://kids.frontiersin.org/articles/10.3389/frym.2021.751592>

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## Frontiers in Communication

### PAPERS

#### **XIAOWEI ZHAO & PING LI – Fuzzy or Clear? A Computational Approach Towards Dynamic L2 Lexical-Semantic Representation**

In this paper, we present a computational approach to bilingual speakers' non-native (L2) lexical-semantic representations. Specifically, based on detailed analyses of the error patterns shown in our previous simulation results (Zhao and Li *Int. J. Bilingual. Educ. Bilingual.*, 2010, 13, 505–524; Zhao and Li, *Bilingualism*, 2013, 16, 288–303), we aim at revealing the underlying learning factors that may affect the extent of fuzzy category boundaries within bilinguals' L2 representation. Here, we first review computational bilingual models in the literature that have focused on simulating L2 lexical representations, including the Developmental Lexicon II (DevLex-II) model (Zhao and Li, *Int. J. Bilingual. Educ. Bilingual.*, 2010, 13, 505–524; Zhao and Li, *Bilingualism*, 2013, 16, 288–303), on which the current study is based. The DevLex-II modeling results indicate a strong age of acquisition (AoA) effect: When the learning of L2 is early relative to that of native language (L1), functionally distinct lexical representations may be established for both languages; when the learning of L2 is significantly delayed relative to that of L1, fuzzy L2 representations may occur due to the structural consolidation (or the entrenchment) of the L1 lexicon. Next, we explore the error patterns shown in both lexical comprehension and production in DevLex-II. A novel contribution of the current study is that we systematically compare the computational simulation results with empirical findings. Such model-based error analyses extend our previous findings by indicating, especially in the late L2 learning condition, that fuzzy L2 semantic representations emerge and lead to processing errors, including errors in unstable phonology-semantic and semantic-phonemic mappings. The DevLex-II model provides a computational account of the development of bilinguals' L2 representation with reference to the dynamic interaction and competition between the two lexicons. We point to future directions in which fuzzy L2 representations may be overcome, through a framework that highlights the social learning of L2 (SL2) and the embodied semantic representation of the lexicon in the new language (Li and Jeong, *Npj Sci. Learn.*, 2020, 5, 1–9; Zhang, Yang, Wang and Li, *Lang. Cogn. Neurosci.*, 2020, 35, 1223–1238).

<https://www.frontiersin.org/articles/10.3389/fcomm.2021.726443/full>

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## Frontiers in Ecology and Evolution

### PAPERS

#### **CONSTANTINOS XENOPHONTOS et al – Cheating Promotes Coexistence in a Two-Species One-Substrate Culture Model**

Cheating in microbial communities is often regarded as a precursor to a “tragedy of the commons,” ultimately leading to over-exploitation by a few species and destabilization of the community. While current evidence suggests that cheaters are evolutionarily and ecologically abundant, they can also play important roles in communities, such as promoting cooperative behaviors of other species. We developed a closed culture model with two microbial species and a single, complex nutrient substrate (the metaphorical “common”). One of the organisms, an enzyme producer, degrades the substrate, releasing an essential and limiting resource that it can use both to grow and produce more enzymes, but at a cost. The second organism, a cheater, does not produce the enzyme but can access the diffused resource produced by the other species, allowing it to benefit from the public good without contributing to it. We investigated evolutionarily stable states of coexistence between the two organisms and described how enzyme production rates and resource diffusion influence organism abundances. Our model shows that, in the long-term evolutionary scale, monocultures of the producer species drive themselves extinct because selection always favors mutant invaders that invest less in enzyme production, ultimately driving down the release of resources. However, the presence of a cheater buffers this process by reducing the fitness advantage of lower enzyme production, thereby preventing runaway selection in the producer, and promoting coexistence. Resource diffusion rate controls cheater growth, preventing it from outcompeting the producer. These results show that competition from cheaters can force producers to maintain adequate enzyme production to sustain both itself and the cheater. This is similar to what is known in evolutionary game theory as a “snowdrift game” – a metaphor describing a snow shoveler and a cheater following in their clean tracks. We move further to show that cheating can stabilize communities and possibly be a precursor to cooperation, rather than extinction.

<https://www.frontiersin.org/articles/10.3389/fevo.2021.786006/full>

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## Frontiers in Neuroscience

### PAPERS

#### **SAMUEL S. MCAFEE et al – Cerebellar Coordination of Neuronal Communication in Cerebral Cortex**

Cognitive processes involve precisely coordinated neuronal communications between multiple cerebral cortical structures in a task specific manner. Rich new evidence now implicates the cerebellum in cognitive functions. There is general agreement that cerebellar cognitive function involves interactions between the cerebellum and cerebral cortical association areas. Traditional views assume reciprocal interactions between one cerebellar and one cerebral cortical site, via closed-loop connections. We offer evidence supporting a new perspective that assigns the cerebellum the role of a coordinator of communication. We propose that the cerebellum participates in cognitive function by modulating the coherence of neuronal oscillations to optimize communications between multiple cortical structures in a task specific manner.

<https://www.frontiersin.org/articles/10.3389/fnsys.2021.781527/full>

**PATRICK LOUIS ROHRER et al – Children Use Non-referential Gestures In Narrative Speech to Mark Discourse Elements Which Update Common Ground**

While recent studies have claimed that non-referential gestures (i.e., gestures that do not visually represent any semantic content in speech) are used to mark discourse-new and/or -accessible referents and focused information in adult speech, to our knowledge, no prior investigation has studied the relationship between information structure (IS) and gesture referentiality in children's narrative speech from a developmental perspective. A longitudinal database consisting of 332 narratives performed by 83 children at two different time points in development was coded for IS and gesture referentiality (i.e., referential and non-referential gestures). Results revealed that at both time points, both referential and non-referential gestures were produced more with information that moves discourse forward (i.e., focus) and predication (i.e., comment) rather than topical or background information. Further, at 7–9 years of age, children tended to use more non-referential gestures to mark focus and comment constituents than referential gestures. In terms of the marking of the newness of discourse referents, non-referential gestures already seem to play a key role at 5–6 years old, whereas referential gestures did not show any patterns. This relationship was even stronger at 7–9 years old. All in all, our findings offer supporting evidence that in contrast with referential gestures, non-referential gestures have been found to play a key role in marking IS, and that the development of this relationship solidifies at a period in development that coincides with a spurt in non-referential gesture production.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2021.661339/full>

**OLGA CAPIRCI, CHIARA BONSIGNORI & ALESSIO DI RENZO – Signed Languages: A Triangular Semiotic Dimension**

Since the beginning of signed language research, the linguistic units have been divided into conventional, standard and fixed signs, all of which were considered as the core of the language, and iconic and productive signs, put at the edge of language. In the present paper, we will review different models proposed by signed language researchers over the years to describe the signed lexicon, showing how to overcome the hierarchical division between standard and productive lexicon. Drawing from the semiotic insights of Peirce we proposed to look at signs as a triadic construction built on symbolic, iconic, and indexical features. In our model, the different iconic, symbolic, and indexical features of signs are seen as the three sides of the same triangle, detectable in the single linguistic sign (Capirci, 2018; Puupponen, 2019). The key aspect is that the dominance of the feature will determine the different use of the linguistic unit, as we will show with examples from different discourse types (narratives, conference talks, poems, a theater monolog).

<https://www.frontiersin.org/articles/10.3389/fpsyg.2021.802911/full>

**ELIZABETH WARREN & JOSEP CALL – Inferential Communication: Bridging the Gap Between Intentional and Ostensive Communication in Non-human Primates**

Communication, when defined as an act intended to affect the psychological state of another individual, demands the use of inference. Either the signaler, the recipient, or both must make leaps of understanding which surpass the semantic information available and draw from pragmatic clues to fully imbue and interpret meaning. While research into human communication and the evolution of language has long been comfortable with mentalistic interpretations of communicative exchanges, including rich attributions of mental state, research into animal communication has balked at theoretical models which describe mentalized cognitive mechanisms. We submit a new theoretical perspective on animal communication: the model of inferential communication. For use when existing proximate models of animal communication are not sufficient to fully explain the complex, flexible, and intentional communication documented in certain species, specifically non-human primates, we present our model as a bridge between shallower, less cognitive descriptions of communicative behavior and the perhaps otherwise inaccessible mentalistic interpretations of communication found in theoretical considerations of human language. Inferential communication is a framework that builds on existing evidence of referentiality, intentionality, and social inference in primates. It allows that they might be capable of applying social inferences to a communicative setting, which could explain some of the cognitive processes that enable the complexity and flexibility of primate communication systems. While historical models of animal communication focus on the means-ends process of behavior and apparent cognitive outcomes, inferential communication invites consideration of the mentalistic processes that must underlie those outcomes. We propose a mentalized approach to questions, investigations, and interpretations of non-human primate communication. We include an overview of both ultimate and proximate models of animal communication, which contextualize the role and utility of our inferential communication model, and provide a detailed breakdown of the possible levels of cognitive complexity which could be investigated using this framework. Finally, we present some possible applications of inferential communication in the field of non-human primate communication and highlight the role it could play in advancing progress toward an increasingly precise understanding of the cognitive capabilities of our closest living relatives.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2021.718251/full>

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## Nature

### OBITUARIES

#### **MARTA MIRAZÓN LAHR – Richard Leakey (1944–2022)**

Palaeontologist of human origins, conservationist and politician.

<https://www.nature.com/articles/d41586-022-00211-6>

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## Nature Human Behaviour

### PAPERS

#### **KATHELIJNE KOOPS et al – Field experiments find no evidence that chimpanzee nut cracking can be independently innovated**

Cumulative culture has been claimed a hallmark of human evolution. Yet, the uniqueness of human culture is heavily debated. The zone of latent solutions hypothesis states that only humans have cultural forms that require form-copying social learning and are culture-dependent. Non-human ape cultural behaviours are considered ‘latent solutions’, which can be independently (re-)innovated. Others claim that chimpanzees, like humans, have cumulative culture. Here, we use field experiments at Seringbara (Nimba Mountains, Guinea) to test whether chimpanzee nut cracking can be individually (re-)innovated. We provided: (1) palm nuts and stones, (2) palm fruit bunch, (3) cracked palm nuts and (4) Coula nuts and stones. Chimpanzee parties visited ( $n = 35$ ) and explored ( $n = 11$ ) the experiments but no nut cracking occurred. In these experiments, chimpanzees did not individually (re-)innovate nut cracking under ecologically valid conditions. Our null results are consistent with the hypothesis that chimpanzee nut cracking is a product of social learning.

<https://www.nature.com/articles/s41562-021-01272-9>

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## Nature Scientific Reports

### PAPERS

#### **CSABA MOSKÁT & MÁRK E. HAUBER – Syntax errors do not disrupt acoustic communication in the common cuckoo**

When acoustic communication signals are distorted, receivers may misunderstand the signal, rendering it ineffective. Common cuckoos (*Cuculus canorus*) are popularly known for the males’ simple, two-note advertisement calls, the “cu-coo” used for declaring the male’s breeding territories. Cuckoos do not learn their calls (vocal non-learners), so they are expected to have a limited ability to produce different acoustic signals. Nevertheless, male cuckoos appear to make syntax errors (e.g., repeated, reversed, or fragmented elements) even in their simple advertisement calls. We conducted a playback experiment with male cuckoos, broadcasting ten call types, including seven modified calls with errors (e.g. “cu-cu”, and “coo-cu”) and three natural calls used for comparisons (“cu-coo”, “cu-cu-coo”, and interspecific control). Male cuckoos responded in a manner suggesting that the presence of the first (“cu”) note of the natural 2-note “cu-coo” call in any form or combination yield effective signals. However, through the elevated frequency (by about 200 Hz) and greater speed of the “cu” note, the natural 3-note version “cu-cu-coo” call appears to have gained a novel communicative function in signalling with female cuckoos. Thus, syntax errors in calls with the “cu” element are not responsible for changing the function of the male cuckoos’ “cu-coo” call.

<https://www.nature.com/articles/s41598-022-05661-6>

#### **BÁLINT FORGÁCS et al with GYÖRGY GERGELY – The newborn brain is sensitive to the communicative function of language**

Recent studies demonstrated neural systems in bilateral fronto-temporal brain areas in newborns specialized to extract linguistic structure from speech. We hypothesized that these mechanisms show additional sensitivity when identically structured different pseudowords are used communicatively in a turn-taking exchange by two speakers. In an fNIRS experiment newborns heard pseudowords sharing ABB repetition structure in three conditions: two voices turn-takingly exchanged different pseudowords (Communicative); the different pseudowords were produced by a (Single Speaker); two voices turn-takingly repeated identical pseudowords (Echoing). Here we show that left fronto-temporal regions (including Broca’s area) responded more to the Communicative than the other conditions. The results demonstrate that newborns’ left hemisphere brain areas show additional activation when various pseudowords sharing identical structure are exchanged in turn-taking alternation by two speakers. This indicates that language processing brain areas at birth are not only sensitive to the structure but to the functional use of language: communicative information transmission. Newborns appear to be equipped not only with innate systems to identify the structural properties of language but to identify its use, communication itself, that is, information exchange between third party social agents—even outside of the mother–infant dyad.

<https://www.nature.com/articles/s41598-022-05122-0>

#### **ANTONIO J. OSUNA-MASCARÓ et al with ALICE M. I. AUERSPERG – Innovative composite tool use by Goffin’s cockatoos (*Cacatua goffiniana*)**

Composite tool use (using more than one tool simultaneously to achieve an end) has played a significant role in the development of human technology. Typically, it depends on a number of specific and often complex spatial relations and there are thus very few reported cases in non-human animals (e.g., specific nut-cracking techniques in chimpanzees and capuchin monkeys). The innovative strategies underlying the innovation and spread of tool manufacture and associative tool

use (using > 1 tools) across tool using animals is an important milestone towards a better understanding of the evolution of human technology. We tested Goffin's cockatoos on a composite tool problem, the 'Golf Club Task', that requires the use of two objects in combination (one used to control the free movement of a second) to get a reward. We demonstrate that these parrots can innovate composite tool use by actively controlling the position of the end effector and movement of both objects involved in a goal directed manner. The consistent use of different techniques by different subjects highlights the innovative nature of the individual solutions. To test whether the solution could be socially transmitted, we conducted a second study, which provided only tentative evidence for emulative learning. To our knowledge, this indicates that the cognitive preconditions for composite tool use have also evolved outside the primate lineage.

<https://www.nature.com/articles/s41598-022-05529-9>

#### **YAFIT KEDAR, GIL KEDAR & RAN BARKAI – The influence of smoke density on hearth location and activity areas at Lower Paleolithic Lazaret Cave, France**

We analyze the influence of hearth location and smoke dispersal on potential activity areas at Lower Paleolithic Lazaret Cave, France, focusing on archaeostratigraphic unit UA25, where a single hearth was unearthed, and GIS and activity area analysis were performed by the excavators. We simulated smoke dispersal from 16 hypothetical hearth locations and analyzed their effect on potential working spaces. Four activity zones were defined, according to the average smoke exposure recommendations from the World Health Organization (WHO) and Environmental Protection Agency (EPA). We found that the size of the low smoke density area and its distance from the hearth are the main parameters for choosing hearth location. The simulation results show an optimal hearth location zone of about 5 × 5m<sup>2</sup>, and it is precisely in this zone that the Lower Paleolithic humans of Lazaret Cave placed their hearth. We demonstrate that the optimal hearth location zone correlates not only with the archaeological hearth in UA25 but also with the locations of hearths in other layers. In addition, our smoke density analysis confirmed the detailed GIS and activity area reconstruction conducted by the excavators, strongly reinforcing their interpretation regarding the spatial organization of human behavior at Lazaret Cave.

<https://www.nature.com/articles/s41598-022-05517-z>

#### **COMMENTARIES**

##### **EMILY HALLINAN et al with ERELLA HOVERS – No direct evidence for the presence of Nubian Levallois technology and its association with Neanderthals at Shukbah Cave**

Blinkhorn et al. [Blinkhorn, J. et al. Nubian Levallois technology associated with southernmost Neanderthals. *Sci. Rep.* 11, 2869 (2021)] present a reanalysis of fossil and lithic material from Garrod's 1928 excavation at Shukbah Cave, identifying the presence of Nubian Levallois cores and points in direct association with a Neanderthal molar. The authors argue that this demonstrates the Nubian reduction strategy forms a part of the wider Middle Palaeolithic lithic repertoire, therefore its role as a cultural marker for *Homo sapiens* population movements is invalid.

We raise the following four major concerns: (1) we question the assumptions made by the authors about the integrity and homogeneity of the Layer D assemblage and (2) the implications of this for the association of the Neanderthal tooth with any specific component of the assemblage, (3) we challenge the authors' attribution of lithic material to Nubian Levallois technology according to its strict definition, and (4) we argue that the comparative data presented derive from a biased sample of sites. These points critically undermine the article's conclusion that Shukbah's Neanderthals made Nubian cores and thus the argument that Neanderthals might have made Nubian technology elsewhere is unsubstantiated.

<https://www.nature.com/articles/s41598-022-05072-7>

##### **JAMES BLINKHORN et al with CHRIS STRINGER – Reply to: 'No direct evidence for the presence of Nubian Levallois technology and its association with Neanderthals at Shukbah Cave'**

An exclusive connection between *Homo sapiens* and Nubian Levallois technology has been posited, but remains to be demonstrated. Our re-evaluation of the fossil and lithic material from Shukbah Cave confounds such assumptions due to the identification of a Neanderthal molar tooth alongside Nubian Levallois cores and points at the site. Hallinan and colleagues question this finding, instead supporting the use of Nubian Levallois technology as a fossil indicator to track expansions of *Homo sapiens*. We tackle these critiques, highlighting the problematic foundations in the assertion that Nubian Levallois technology is a unique, discrete entity, resulting in its misuse to support simplistic culture-historical narratives.

<https://www.nature.com/articles/s41598-022-05049-6>

#### **CORRECTIONS**

##### **MIKE W. MORLEY et al with ZENOBIA JACOBS – Author Correction: Hominin and animal activities in the microstratigraphic record from Denisova Cave (Altai Mountains, Russia)**

The original version of this Article contained errors in Figure 3, in panels (a) and (b), where the 'Initial Upper Palaeolithic' was incorrectly given as 'Initial Middle Palaeolithic'.

In addition, in panel (a), the break of the middle MP and the IUP between layers 12.1 and 11.4 was incorrectly placed between layers 14 and 12.3.

<https://www.nature.com/articles/s41598-021-03251-6>

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## New Scientist

### ARTICLES

#### **RICHARD WEBB – David Chalmers Interview: Virtual reality is as real as real reality**

Philosopher David Chalmers explains how virtual worlds shed light on questions such as what is reality and are we living in a simulation, and explores what corporate metaverses mean for humanity.

<https://www.newscientist.com/article/mg25333710-900-david-chalmers-interview-virtual-reality-is-as-real-as-real-reality/#ixzz7JDTcF8ZJ>

#### **JONATHAN R. GOODMAN – Evolution of language can help us sift truth from lies in modern world**

RESEARCH on the evolution of language suggests that our communication is largely about cooperation. When we speak with each other, the idea goes, we do so to help coordinate our actions. Antelope hunters, for example, who can signal their movements to each other will do better than those who can't tell others what they are going to do next. Talking benefits others, and often ourselves.

<https://www.newscientist.com/article/mg25333713-000-evolution-of-language-can-help-us-sift-truth-from-lies-in-modern-world/#ixzz7JDTzby4W>

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## PLoS One

### PAPERS

#### **ALEKSANDRS BERDICEVSKIS & ARTURS SEMENUKS – Imperfect language learning reduces morphological overspecification: Experimental evidence**

It is often claimed that languages with more non-native speakers tend to become morphologically simpler, presumably because non-native speakers learn the language imperfectly. A growing number of studies support this claim, but there is a dearth of experiments that evaluate it and the suggested explanatory mechanisms. We performed a large-scale experiment which directly tested whether imperfect language learning simplifies linguistic structure and whether this effect is amplified by iterated learning. Members of 45 transmission chains, each consisting of 10 one-person generations, learned artificial mini-languages and transmitted them to the next generation. Manipulating the learning time showed that when transmission chains contained generations of imperfect learners, the decrease in morphological complexity was more pronounced than when the chains did not contain imperfect learners. The decrease was partial (complexity did not get fully eliminated) and gradual (caused by the accumulation of small simplifying changes). Simplification primarily affected double agent-marking, which is more redundant, arguably more difficult to learn and less salient than other features. The results were not affected by the number of the imperfect-learner generations in the transmission chains. Thus, we provide strong experimental evidence in support of the hypothesis that iterated imperfect learning leads to language simplification.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0262876>

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## PNAS

### PAPERS

#### **KENNETH S. BERENHAUT, KATHERINE E. MOORE & RYAN L. MELVIN – A social perspective on perceived distances reveals deep community structure**

Community structure, including relationships between and within groups, is foundational to our understanding of the world around us. For dissimilarity-based data, leveraging social concepts of conflict and alignment, we provide an approach for capturing meaningful structural information resulting from induced local comparisons. In particular, a measure of local (community) depth is introduced that leads directly to a probabilistic partitioning conveying locally interpreted closeness (or cohesion). A universal choice of threshold for distinguishing strongly and weakly cohesive pairs permits consideration of both local and global structure. Cases in which one might benefit from use of the approach include data with varying density such as that arising as snapshots of complex processes in which differing mechanisms drive evolution locally. The inherent recalibrating in response to density allows one to sidestep the need for localizing parameters, common to many existing methods. Mathematical results together with applications in linguistics, cultural psychology, and genetics, as well as to benchmark clustering data have been included. Together, these demonstrate how meaningful community structure can be identified without additional inputs (e.g., number of clusters or neighborhood size), optimization criteria, iterative procedures, or distributional assumptions.

<https://www.pnas.org/content/119/4/e2003634119.abstract>

#### **FLORIAN M. GARTNER, ISABELLA R. GRAF & ERWIN FREY – The time complexity of self-assembly**

Time efficiency of self-assembly is crucial for many biological processes. Moreover, with the advances of nanotechnology, time efficiency in artificial self-assembly becomes ever more important. While structural determinants and the final assembly yield are increasingly well understood, kinetic aspects concerning the time efficiency, however, remain much more elusive. In computer science, the concept of time complexity is used to characterize the efficiency of an algorithm and describes how the algorithm's runtime depends on the size of the input data. Here we characterize the time complexity of nonequilibrium self-assembly processes by exploring how the time required to realize a certain, substantial yield of a given target structure scales with its size. We identify distinct classes of assembly scenarios, i.e., "algorithms" to accomplish this task, and show that

they exhibit drastically different degrees of complexity. Our analysis enables us to identify optimal control strategies for nonequilibrium self-assembly processes. Furthermore, we suggest an efficient irreversible scheme for the artificial self-assembly of nanostructures, which complements the state-of-the-art approach using reversible binding reactions and requires no fine-tuning of binding energies.

<https://www.pnas.org/content/119/4/e2003634119.abstract>

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## Proceedings of the Royal Society B

### PAPERS

#### **WILLIAM A. SEARCY et al – Long-distance dependencies in birdsong syntax**

Songbird syntax is generally thought to be simple, in particular lacking long-distance dependencies in which one element affects choice of another occurring considerably later in the sequence. Here, we test for long-distance dependencies in the sequences of songs produced by song sparrows (*Melospiza melodia*). Song sparrows sing with eventual variety, repeating each song type in a consecutive series termed a 'bout'. We show that in switching between song types, song sparrows follow a 'cycling rule', cycling through their repertoires in close to the minimum possible number of bouts. Song sparrows do not cycle in a set order but rather vary the order of song types from cycle to cycle. Cycling in a variable order strongly implies long-distance dependencies, in which choice of the next type depends on the song types sung over the past cycle, in the range of 9–10 bouts. Song sparrows also follow a 'bout length rule', whereby the number of repetitions of a song type in a bout is positively associated with the length of the interval until that type recurs. This rule requires even longer distance dependencies that cross one another; such dependencies are characteristic of more complex levels of syntax than previously attributed to non-human animals.

<https://royalsocietypublishing.org/doi/10.1098/rspb.2021.2473>

#### **R. LYNCH et al – Socio-cultural similarity with host population rather than ecological similarity predicts success and failure of human migrations**

Demographers argue that human migration patterns are shaped by people moving to better environments. More recently, however, evolutionary theorists have argued that people move to similar environments to which they are culturally adapted. While previous studies analysing which factors affect migration patterns have focused almost exclusively on successful migrations, here we take advantage of a natural experiment during World War II in which an entire population was forcibly displaced but were then allowed to return home to compare successful with unsuccessful migrations. We test two competing hypotheses: (1) individuals who relocate to environments that are superior to their place of origin will be more likely to remain—The Better Environment Hypothesis or (2) individuals who relocate to environments that are similar to their place of origin will be more likely to remain—The Similar Environment Hypothesis. Using detailed records recording the social, cultural, linguistic and ecological conditions of the origin and destination locations, we find that cultural similarity (e.g. linguistic similarity and marrying within one's own minority ethnic group)—rather than ecological differences—are the best predictors of successful migrations. These results suggest that social relationships, empowered by cultural similarity with the host population, play a critical role in successful migrations and provide limited support for the similar environment hypothesis. Overall, these results demonstrate the importance of comparing unsuccessful with successful migrations in efforts understand the engines of human dispersal and suggest that the primary obstacles to human migrations and successful range expansion are sociocultural rather than ecological.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2021.2298>

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## Royal Society Open Science

### PAPERS

#### **JONATHAN MIRAULT, MATHIEU DECLERCK & JONATHAN GRAINGER – Fast priming of grammatical decisions: repetition and transposed-word priming effects**

We used the grammatical decision task to investigate fast priming of written sentence processing. Targets were sequences of 5 words that either formed a grammatically correct sentence or were ungrammatical. Primes were sequences of 5 words and could be the same word sequence as targets, a different sequence of words with a similar syntactic structure, the same sequence with two inner words transposed or the same sequence with two inner words substituted by different words. Prime-word sequences were presented in a larger font size than targets for 200 ms and followed by the target sequence after a 100 ms delay. We found robust repetition priming in grammatical decisions, with same sequence primes leading to faster responses compared with prime sequences containing different words. We also found transposed-word priming effects, with faster responses following a transposed-word prime compared with substituted-word primes. We conclude that fast primed grammatical decisions might offer investigations of written sentence processing what fast primed lexical decisions have offered studies of visual word recognition.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.211082>

#### **VALERIE ALCALA et al – The tainted altruism effect: a successful pre-registered replication**

Newman and Cain (Newman, Cain 2014 Psychol. Sci.25, 648–655 (doi:10.1177/0956797613504785)) reported that observers view a person's choices as less ethical when that person has acted in response to both altruistic and selfish (commercial)

motivations, as compared with purely selfish interests. The altruistic component reduces the observers' approval rather than raising it. This puzzling phenomenon termed the 'tainted altruism' effect, has attracted considerable interest but no direct replications in prior research. We report direct replications of Newman and Cain's Experiments 2 and 3, using a larger sample (n = 501) intended to be fairly representative of the US population. The results confirm the original findings in considerable detail.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.211152>

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## Trends in Cognitive Sciences

### PAPERS

#### **TIMOTHY T. ROGERS & MATTHEW A. LAMBON RALPH – Semantic tiles or hub-and-spokes?**

New results from Popham et al. generate 'semantic maps' from spoken narratives and movies that appear remarkably aligned near visual cortex. We consider whether such findings are consistent with the hub-and-spokes view of semantic representation or whether they require a rethinking of the cortical knowledge system.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(22\)00017-1](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(22)00017-1)

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