

EAORC BULLETIN 1,029 – 5 March 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.

EAORC LETTERS – From Martin P.J. Edwardes – Looking for readers

I have just finished the first draft of my next book, “The Origins of Grammar: An anthropological perspective (2nd edition)”, and I would be grateful to anyone willing to read and comment on this draft. If you are interested in reading a chapter or two, or even the whole thing, let me know (martin.edwardes@btopenworld.com). If you just want a preview without commenting, that’s OK, too.

This is an extensive update and rewrite of the first edition (published 2010). The bibliography now has over 700 entries, the mean first publication date is 1996 and the median is 2005. I’m much happier with this rewrite than I was with the original, and I hope to publish it with UCL Press, alongside “The Origins of Self: An anthropological perspective”. That means a pdf downloadable version will be available for free. I can recommend UCL press in terms of getting your work out into the World: where OOG e1 sold under 150 in 12 years, OOS has sold 215 and has 33,809 downloads in under 4 years.

The contents (currently) are as follows.

PROLOGUE – THE ORIGINS OF GRAMMAR ... AGAIN?

What is Grammar? - Telling the story of grammar - Mapping the Journey - The purpose of this book

CHAPTER 1 – WHY ALL THE FUSS?

The Problem of Brainpower - Two Legs, Two Hands - Making Tools - Hunting and Culture - Language: the final frontier? - The Genetic Problem of Language - What Is Language for?

CHAPTER 2 – THE STORY SO FAR

Language Is Making and Using Tools - Language Is Play - Language Is a Signal of Fitness - Language Is Embodied - Language Is Multimodal - Language Is Cognition - Language Is Social Construction - Language Just Is

CHAPTER 3 – THE HEAVY HAND OF GENERATIVE LINGUISTICS

Linguistic Structure - Extending Structure - Principles and Parameters - Small is Beautiful - Generative Linguistics and the Origins of Grammar - Is Generative Grammar an Inimical Environment for Grammar Origins?

CHAPTER 4 – SOME VIEWS FROM STRUCTURALISM

A System of Functions - Systemic Functional Grammar - Other Views on Functional Grammar - Grammar without Tiers? - Linear Grammars - Functionalist Linguistics and the Origins of Grammar

CHAPTER 5 – IT’S ALL IN THE MIND

A Short History of Cognitive Linguistics - The Nature of Cognitive Linguistics - Embodiment - The Modularity Debate - The Nature of Cognitive Grammar - Cognitive Linguistics and the Origins of Grammar

CHAPTER 6 – BECOMING HUMAN

Manual Dexterity - Dexterity and Working Together - The Costs of Reproduction - Beating the Cheats - Making Models

CHAPTER 7 – THE WEIRDNESS OF SELF

The Structure of Social Modelling - Planning and Modelling - The Self and Language - From Selfishness to Awareness of Self - Awareness of Self and Modelling a Self - Awareness of Selfness

CHAPTER 8 – THE SOCIALISATION OF HUMANITY

Altruistic Punishment - Metaphor in Cognition - THE GROUP IS AN ENTITY - THE GROUP IS AN ENTITY: building social structures - THE GROUP IS AN ENTITY: an ancient metaphor? - What Happened, and When?

CHAPTER 9 – HOW DID WE COME TO USE GRAMMAR?

Grammaticalization - Grammaticalization and Grammar Origins - Overture and Beginners, Please - Not Required at the Origin of Grammar - Becoming Complex - From Non-grammar to Grammar

CHAPTER 10 – WHAT NONHUMANS TELL US ABOUT BEING HUMAN

Animals and Grammar - Primate, Know Thyself - Empathy and Theory of Mind - Accommodating Others - Multiple Intelligences - Not about Language?

CHAPTER 11 – WHAT YOUNG HUMANS TELL US ABOUT BEING HUMAN

Children and Human Language Grammar Origins - Children and Cooperation - Children and Selfhood - Children and Language

CHAPTER 12 – WHAT TIME TELLS US ABOUT BEING HUMAN

Getting Tense - Doing Other Things with Time - Adding Depth - Time, Uncertainty and Fiction - How We Came to Share Time in Language - From Complex Language 1 to Complex Language 2 - How Children Become Time-aware - Three Time Points, Three Persons? - Time and Being Human

CHAPTER 13 – THE EVOLUTION OF GRAMMAR

Basic Communication - Social Modelling - Uttering Language - What Language Did Next - Are There Grammar Universals? - The Socialisation-Cognition-Communication Braid

EPILOGUE – BEING HUMAN

Differences and Similarities - And Finally ...

CONFERENCE ALERT – Evolutionary Knowledge for Everyone (EvoKE) 2023

<https://evokeproject.org/2023/02/13/evoke-2023-in-bath-save-the-date/>

EvoKE 2023 will take place from the 3rd to 5th July 2023 at the University of Bath, UK (<https://bath.ac.uk>).

During these days, our international and interdisciplinary community will meet to learn, collaborate and develop creative and effective education and outreach projects.

The workshops will run for 2 hours (or 4 hours over two sessions; morning/afternoon) and are expected to be strongly hands-on and collaborative.

Deadline for applications, 31st March, 2023. Apply here:

https://docs.google.com/forms/d/e/1FAIpQLSdAn1GGKXmckFrSJ_5cq4NqaTQP1QbhGNre-uduyKZZtRY5wQ/viewform

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CONFERENCE ALERT – EVOLUTION 2023, the joint annual meeting of the ASN, SSB, and SSE

Registration is now open for EVOLUTION 2023, the joint annual meeting of the ASN, SSB, and SSE.

Join us for the in-person conference in Albuquerque this June 21-25 and for the virtual event a few weeks before on June 2-3.

Information: <https://evolutionmeetings.org>

Registration: <https://www.xcdsystem.com/evolution/attendee/index.cfm?ID=F4Zjeoi>

HIGHLIGHTS:

* Early registration discount until May 1.

* In-person talk submission is first-come, first-served-all submissions accepted until capacity is reached or until May 15. All posters accepted until June 1. In-person talk and poster submission are available once you complete registration.

* This year's virtual event includes award symposia, networking, workshops, and special events, as well as the usual chance to present your research in a talk, all presented LIVE. Virtual talk submission is available once you complete registration.

* Hotel accommodations are open for booking.

* Arrive early for pre-conference events and workshops, including a behind-the-scenes tour of UNM's Museum of Southwest Biology.

* Conference-ending Super Social in the Albuquerque Civic Plaza.

* Mid-meeting Night at the Museum at the New Mexico Museum of Natural History and Science.

* Multiple participation/travel support opportunities to help finance your participation; details here:

<https://www.evolutionmeetings.org/participation-support.html>

* Hoping to compete for SSB Mayr (in-person and virtual) or SSE Hamilton (virtual) awards? Instructions here:

<https://www.evolutionmeetings.org/student-awards.html>

* FREE on-site daycare, sign up during registration.

"Hollis, Brian" BRIAN.HOLLIS@sc.edu

NEWS

NATURE BRIEFING – Forget the ‘alpha’ wolf stereotype

An increasing number of wildlife biologists say that wolf packs in the wild aren't led by a domineering 'alpha male' — just good old mum and dad. "He's just the father of the family," says wolf researcher L. David Mech. The terminology arose from studying unrelated wolves thrown together in captivity, says Mech — a recipe for discord. In the wild, competition tends to arise in rare cases when there's plenty of food around and wolf packs balloon in size. "In that case, I personally think the alpha term applies because there is still a dominant female calling the shots in that pack," says wolf researcher David Ausband.

<https://nature.us17.list-manage.com/track/click?u=2c6057c528fdc6f73fa196d9d&id=ac51e9f19d&e=1db4b9a19b>

NATURE BRIEFING – Ancient humans sat out ice age in Spain

European hunter-gatherers holed up in what is now Spain to escape the last ice age, which covered large parts of the continent with glaciers for several millennia. Researchers analysed DNA from 356 individuals who lived in Europe and western Asia between 35,000 and 5,000 years ago. The humans who had sought out the warmer climate on the Iberian Peninsula repopulated Western Europe after the deep freeze ended. This explains how a genetic signature that first showed up in 35,000-year-old remains popped up again in populations tens of thousands of years later — a fact that had remained a mystery until now.

<https://nature.us17.list-manage.com/track/click?u=2c6057c528fdc6f73fa196d9d&id=8db4a42818&e=1db4b9a19b>

SCIENCE NEWS – Ancient DNA upends European prehistory

Genes reveal striking diversity within similar ice age cultures.

<https://www.science.org/content/article/ancient-dna-upends-european-prehistory>

SOCIETY FOR SCIENCE – Ancient DNA unveils disparate fates of Ice Age hunter-gatherers in Europe

Ancient DNA unveils two regional populations that lived in what is now Europe and made similar tools but met different fates.

<http://click.societyforscience->

email.com/?qs=2cafca92c1f6a755bf7f465defe9663a8d7bff734be8576e4cef52e36d317a4059a6abff06081e7128a2905be61e138df71ae7513aeed1107779ad9a0ff58e3f

SOCIETY FOR SCIENCE – Homo sapiens may have brought archery to Europe about 54,000 years ago

Small stone points found in a French rock-shelter could have felled prey only as tips of arrows shot from bows, scientists say.

<http://click.societyforscience->

email.com/?qs=2cafca92c1f6a75564022244a5b63d4e0600e28f9131317dd44af940afe21eb0e7ba5ac92b01073754129af05156841001eda683dcb976038d695c85c91bffe4

THE CONVERSATION – American man developed an Irish accent after getting prostate cancer

There have only been around 200 reported cases of foreign accent syndrome since it was first reported in 1907.

<https://theconversationuk.cmail19.com/t/r-l-tjuhqut-khhilillah-v/>

THE CONVERSATION – Why prey animals often see threats where there are none – and how it costs them

False alarms are common in prey animals, but what causes them and how can they be avoided?

<https://theconversationuk.cmail19.com/t/r-l-tjuhqut-khhilillah-yu/>

PUBLICATIONS

Cell Genomics

PAPERS

LAURITS SKOV et al – Extraordinary selection on the human X chromosome associated with archaic admixture

The X chromosome in non-African humans shows less diversity and less Neanderthal introgression than expected from neutral evolution. Analyzing 162 human male X chromosomes worldwide, we identified fourteen chromosomal regions where nearly identical haplotypes spanning several hundred kilobases are found at high frequencies in non-Africans. Genetic drift alone cannot explain the existence of these haplotypes, which must have been associated with strong positive selection in partial selective sweeps. Moreover, the swept haplotypes are entirely devoid of archaic ancestry as opposed to the non-swept haplotypes in the same genomic regions. The ancient Ust'-Ishim male dated at 45,000 before the present (BP) also carries the swept haplotypes, implying that selection on the haplotypes must have occurred between 45,000 and 55,000 years ago. Finally, we find that the chromosomal positions of sweeps overlap previously reported hotspots of selective sweeps in great ape evolution, suggesting a mechanism of selection unique to X chromosomes.

[https://www.cell.com/cell-genomics/fulltext/S2666-979X\(23\)00034-4](https://www.cell.com/cell-genomics/fulltext/S2666-979X(23)00034-4)

Frontiers in Computer Science

PAPERS

ARTHUR PELLET-ROSTAING et al – A multimodal approach for modeling engagement in conversation

Recently, engagement has emerged as a key variable explaining the success of conversation. In the perspective of human-machine interaction, an automatic assessment of engagement becomes crucial to better understand the dynamics of an interaction and to design socially-aware robots. This paper presents a predictive model of the level of engagement in conversations. It shows in particular the interest of using a rich multimodal set of features, outperforming the existing models in this domain. In terms of methodology, study is based on two audio-visual corpora of naturalistic face-to-face interactions. These resources have been enriched with various annotations of verbal and nonverbal behaviors, such as smiles, head nods, and feedbacks. In addition, we manually annotated gestures intensity. Based on a review of previous works in psychology and human-machine interaction, we propose a new definition of the notion of engagement, adequate for the description of this phenomenon both in natural and mediated environments. This definition have been implemented in our annotation scheme. In our work, engagement is studied at the turn level, known to be crucial for the organization of the conversation. Even though there is still a lack of consensus around their precise definition, we have developed a turn detection tool. A multimodal characterization of engagement is performed using a multi-level classification of turns. We claim a set of multimodal cues, involving prosodic, mimo-gestural and morpho-syntactic information, is relevant to characterize the level of engagement of speakers in conversation. Our results significantly outperform the baseline and reach state-of-the-art level (0.76 weighted F-score). The most contributing modalities are identified by testing the performance of a two-layer perceptron when trained on unimodal feature sets and on combinations of two to four modalities. These results

support our claim about multimodality: combining features related to the speech fundamental frequency and energy with mimo-gestural features leads to the best performance.

<https://www.frontiersin.org/articles/10.3389/fcomp.2023.1062342/full>

Frontiers in Psychiatry

PAPERS

SILJE BAARDSTU et al – The role of early social play behaviors and language skills for shy children's later internalizing difficulties in school

Research has demonstrated links from early childhood shyness to socioemotional problems later in life. This longitudinal study explored the role of early social play behaviors and language skills in the associations between childhood shyness and later internalizing and language difficulties in school. Participants were N = 7,447 children (50.1% girls) from the Norwegian Mother, Father, and Child Cohort Study (MoBa). Latent direct, indirect, and interaction path analyses were performed within a structural equation framework. Results showed that mother-rated childhood shyness from age 18 months to age five years was associated with mother-rated internalizing difficulties and language problems at age eight years. Lower levels of teacher-reported social play behaviors and poorer language skills in preschool increased the risk of later anxiety problems among shy children, whereas higher levels of language competencies and social play behaviors buffered against later anxiety problems. The study identifies some of the early risk and protective factors that may influence shy children's socio-emotional functioning and adjustment.

<https://www.frontiersin.org/articles/10.3389/fpsy.2023.1120109/full>

Nature

NEWS

Ancient genomes show how humans escaped Europe's deep freeze

A pair of studies offer the most detailed look yet at groups of hunter-gatherers living before, during and after the last ice age.

<https://www.nature.com/articles/d41586-023-00611-2>

ARTICLES

LUDOVIC ORLANDO – The genomic history of ice-age Europeans

An extensive genomic time series has been produced for 356 humans from across ice-age Europe. The data reveal how climate change affected the ranges of hunter-gatherer populations as they developed diverse cultures.

<https://www.nature.com/articles/d41586-023-00371-z>

PAPERS

COSIMO POSTH et mul with JOHANNES KRAUSE – Palaeogenomics of Upper Palaeolithic to Neolithic European hunter-gatherers

Modern humans have populated Europe for more than 45,000 years^{1,2}. Our knowledge of the genetic relatedness and structure of ancient hunter-gatherers is however limited, owing to the scarceness and poor molecular preservation of human remains from that period³. Here we analyse 356 ancient hunter-gatherer genomes, including new genomic data for 116 individuals from 14 countries in western and central Eurasia, spanning between 35,000 and 5,000 years ago. We identify a genetic ancestry profile in individuals associated with Upper Palaeolithic Gravettian assemblages from western Europe that is distinct from contemporaneous groups related to this archaeological culture in central and southern Europe⁴, but resembles that of preceding individuals associated with the Aurignacian culture. This ancestry profile survived during the Last Glacial Maximum (25,000 to 19,000 years ago) in human populations from southwestern Europe associated with the Solutrean culture, and with the following Magdalenian culture that re-expanded northeastward after the Last Glacial Maximum. Conversely, we reveal a genetic turnover in southern Europe suggesting a local replacement of human groups around the time of the Last Glacial Maximum, accompanied by a north-to-south dispersal of populations associated with the Epigravettian culture. From at least 14,000 years ago, an ancestry related to this culture spread from the south across the rest of Europe, largely replacing the Magdalenian-associated gene pool. After a period of limited admixture that spanned the beginning of the Mesolithic, we find genetic interactions between western and eastern European hunter-gatherers, who were also characterized by marked differences in phenotypically relevant variants.

<https://www.nature.com/articles/s41586-023-05726-0>

CALLUM MUNDAY et al – Valley formation aridifies East Africa and elevates Congo Basin rainfall

East African aridification during the past 8 million years is frequently invoked as a driver of large-scale shifts in vegetation¹ and the evolution of new animal lineages, including hominins^{2,3,4}. However, evidence for increasing aridity is debated⁵ and, crucially, the mechanisms leading to dry conditions are unclear⁶. Here, numerical model experiments show that valleys punctuating the 6,000-km-long East African Rift System (EARS) are central to the development of dry conditions in East Africa. These valleys, including the Turkana Basin in Kenya, cause East Africa to dry by channelling water vapour towards Central Africa, a process that simultaneously enhances rainfall in the Congo Basin rainforest. Without the valleys, the uplift of

the rift system leads to a wetter climate in East Africa and a drier climate in the Congo Basin. Results from climate model experiments demonstrate that the detailed tectonic development of Africa has shaped the rainfall distribution, with profound implications for the evolution of African plant and animal lineages.

<https://www.nature.com/articles/s41586-022-05662-5>

Nature Ecology & Evolution

PAPERS

VANESSA VILLALBA-MOUÇO et al with JOHANNES KRAUSE – A 23,000-year-old southern Iberian individual links human groups that lived in Western Europe before and after the Last Glacial Maximum

Human populations underwent range contractions during the Last Glacial Maximum (LGM) which had lasting and dramatic effects on their genetic variation. The genetic ancestry of individuals associated with the post-LGM Magdalenian technocomplex has been interpreted as being derived from groups associated with the pre-LGM Aurignacian. However, both these ancestries differ from that of central European individuals associated with the chronologically intermediate Gravettian. Thus, the genomic transition from pre- to post-LGM remains unclear also in western Europe, where we lack genomic data associated with the intermediate Solutrean, which spans the height of the LGM. Here we present genome-wide data from sites in Andalusia in southern Spain, including from a Solutrean-associated individual from Cueva del Malalmuerzo, directly dated to ~23,000 cal yr BP. The Malalmuerzo individual carried genetic ancestry that directly connects earlier Aurignacian-associated individuals with post-LGM Magdalenian-associated ancestry in western Europe. This scenario differs from Italy, where individuals associated with the transition from pre- and post-LGM carry different genetic ancestries. This suggests different dynamics in the proposed southern refugia of Ice Age Europe and posits Iberia as a potential refugium for western European pre-LGM ancestry. More, individuals from Cueva Ardales, which were thought to be of Palaeolithic origin, date younger than expected and, together with individuals from the Andalusian sites Caserones and Aguilillas, fall within the genetic variation of the Neolithic, Chalcolithic and Bronze Age individuals from southern Iberia.

<https://www.nature.com/articles/s41559-023-01987-0>

Nature Human Behaviour

PAPERS

MENOUA KESHISHIAN et al – Joint, distributed and hierarchically organized encoding of linguistic features in the human auditory cortex

The precise role of the human auditory cortex in representing speech sounds and transforming them to meaning is not yet fully understood. Here we used intracranial recordings from the auditory cortex of neurosurgical patients as they listened to natural speech. We found an explicit, temporally ordered and anatomically distributed neural encoding of multiple linguistic features, including phonetic, prelexical phonotactics, word frequency, and lexical–phonological and lexical–semantic information. Grouping neural sites on the basis of their encoded linguistic features revealed a hierarchical pattern, with distinct representations of prelexical and postlexical features distributed across various auditory areas. While sites with longer response latencies and greater distance from the primary auditory cortex encoded higher-level linguistic features, the encoding of lower-level features was preserved and not discarded. Our study reveals a cumulative mapping of sound to meaning and provides empirical evidence for validating neurolinguistic and psycholinguistic models of spoken word recognition that preserve the acoustic variations in speech.

<https://www.nature.com/articles/s41562-023-01520-0>

CHARLOTTE CAUCHETEUX, ALEXANDRE GRAMFORT & JEAN-RÉMI KING – Evidence of a predictive coding hierarchy in the human brain listening to speech

Considerable progress has recently been made in natural language processing: deep learning algorithms are increasingly able to generate, summarize, translate and classify texts. Yet, these language models still fail to match the language abilities of humans. Predictive coding theory offers a tentative explanation to this discrepancy: while language models are optimized to predict nearby words, the human brain would continuously predict a hierarchy of representations that spans multiple timescales. To test this hypothesis, we analysed the functional magnetic resonance imaging brain signals of 304 participants listening to short stories. First, we confirmed that the activations of modern language models linearly map onto the brain responses to speech. Second, we showed that enhancing these algorithms with predictions that span multiple timescales improves this brain mapping. Finally, we showed that these predictions are organized hierarchically: frontoparietal cortices predict higher-level, longer-range and more contextual representations than temporal cortices. Overall, these results strengthen the role of hierarchical predictive coding in language processing and illustrate how the synergy between neuroscience and artificial intelligence can unravel the computational bases of human cognition.

<https://www.nature.com/articles/s41562-022-01516-2>

Nature Machine Intelligence

PAPERS

NING DING et al – Parameter-efficient fine-tuning of large-scale pre-trained language models

With the prevalence of pre-trained language models (PLMs) and the pre-training–fine-tuning paradigm, it has been continuously shown that larger models tend to yield better performance. However, as PLMs scale up, fine-tuning and storing all the parameters is prohibitively costly and eventually becomes practically infeasible. This necessitates a new branch of research focusing on the parameter-efficient adaptation of PLMs, which optimizes a small portion of the model parameters while keeping the rest fixed, drastically cutting down computation and storage costs. In general, it demonstrates that large-scale models could be effectively stimulated by the optimization of a few parameters. Despite the various designs, here we discuss and analyse the approaches under a more consistent and accessible term ‘delta-tuning’, where ‘delta’ a mathematical notation often used to denote changes, is borrowed to refer to the portion of parameters that are ‘changed’ during training. We formally describe the problem and propose a unified categorization criterion for existing delta-tuning methods to explore their correlations and differences. We also discuss the theoretical principles underlying the effectiveness of delta-tuning and interpret them from the perspectives of optimization and optimal control. Furthermore, we provide a holistic empirical study on over 100 natural language processing tasks and investigate various aspects of delta-tuning. With comprehensive study and analysis, our research demonstrates the theoretical and practical properties of delta-tuning in the adaptation of PLMs.

<https://www.nature.com/articles/s42256-023-00626-4>

Nature Reviews Psychology

ARTICLES

ASIFA MAJID – Establishing psychological universals

Universals of thought and behaviour across variable cultural experiences can reveal uniquely human cognition. However, culturally informed and theoretically motivated sampling is needed to reveal true universals.

<https://www.nature.com/articles/s44159-023-00169-w>

PAPERS

TESS ALLEGRA FOREST et al – Changes in statistical learning across development

Statistical learning enables learners to extract the environmental regularities necessary to piece together the structure of their worlds. The capacity for statistical learning and its properties are likely to change across development from infancy to adulthood. Acknowledging this developmental change has broad implications for understanding the cognitive architecture of statistical learning and why children excel in certain learning situations relative to adults. In this Review, we first synthesize empirical work on the development of statistical learning, which indicates that it improves with development only for certain forms of input. Taking inspiration from related cognitive and neural findings, we then consider developmental changes in the properties of statistical learning. Infants and young children might have a broader and less-directed curriculum for learning and represent the outcomes of learning differently from older children and adults. This synthesis offers insight into how developmental changes in statistical learning from infancy through adulthood might fundamentally alter how children interact with, learn about, and remember their experiences.

<https://www.nature.com/articles/s44159-023-00157-0>

Nature Scientific Data

PAPERS

V. BORGHESANI et al – The Three Terms Task - an open benchmark to compare human and artificial semantic representations

Word processing entails retrieval of a unitary yet multidimensional semantic representation (e.g., a lemon’s colour, flavour, possible use) and has been investigated in both cognitive neuroscience and artificial intelligence. To enable the direct comparison of human and artificial semantic representations, and to support the use of natural language processing (NLP) for computational modelling of human understanding, a critical challenge is the development of benchmarks of appropriate size and complexity. Here we present a dataset probing semantic knowledge with a three-terms semantic associative task: which of two target words is more closely associated with a given anchor (e.g., is lemon closer to squeezer or sour?). The dataset includes both abstract and concrete nouns for a total of 10,107 triplets. For the 2,255 triplets with varying levels of agreement among NLP word embeddings, we additionally collected behavioural similarity judgments from 1,322 human raters. We hope that this openly available, large-scale dataset will be a useful benchmark for both computational and neuroscientific investigations of semantic knowledge.

<https://www.nature.com/articles/s41597-023-02015-3>

PAUL STOEWER et al – Neural network based formation of cognitive maps of semantic spaces and the putative emergence of abstract concepts

How do we make sense of the input from our sensory organs, and put the perceived information into context of our past experiences? The hippocampal-entorhinal complex plays a major role in the organization of memory and thought. The formation of and navigation in cognitive maps of arbitrary mental spaces via place and grid cells can serve as a representation of memories and experiences and their relations to each other. The multi-scale successor representation is proposed to be the mathematical principle underlying place and grid cell computations. Here, we present a neural network, which learns a cognitive map of a semantic space based on 32 different animal species encoded as feature vectors. The neural network successfully learns the similarities between different animal species, and constructs a cognitive map of ‘animal space’ based on the principle of successor representations with an accuracy of around 30% which is near to the theoretical maximum regarding the fact that all animal species have more than one possible successor, i.e. nearest neighbor in feature space. Furthermore, a hierarchical structure, i.e. different scales of cognitive maps, can be modeled based on multi-scale successor representations. We find that, in fine-grained cognitive maps, the animal vectors are evenly distributed in feature space. In contrast, in coarse-grained maps, animal vectors are highly clustered according to their biological class, i.e. amphibians, mammals and insects. This could be a putative mechanism enabling the emergence of new, abstract semantic concepts. Finally, even completely new or incomplete input can be represented by interpolation of the representations from the cognitive map with remarkable high accuracy of up to 95%. We conclude that the successor representation can serve as a weighted pointer to past memories and experiences, and may therefore be a crucial building block to include prior knowledge, and to derive context knowledge from novel input. Thus, our model provides a new tool to complement contemporary deep learning approaches on the road towards artificial general intelligence.

<https://www.nature.com/articles/s41598-023-30307-6>

I. MARRIOTT HARESIGN et al – Gaze onsets during naturalistic infant-caregiver interaction associate with ‘sender’ but not ‘receiver’ neural responses, and do not lead to changes in inter-brain synchrony

Temporal coordination during infant-caregiver social interaction is thought to be crucial for supporting early language acquisition and cognitive development. Despite a growing prevalence of theories suggesting that increased inter-brain synchrony associates with many key aspects of social interactions such as mutual gaze, little is known about how this arises during development. Here, we investigated the role of mutual gaze onsets as a potential driver of inter-brain synchrony. We extracted dual EEG activity around naturally occurring gaze onsets during infant-caregiver social interactions in N = 55 dyads (mean age 12 months). We differentiated between two types of gaze onset, depending on each partners’ role. ‘Sender’ gaze onsets were defined at a time when either the adult or the infant made a gaze shift towards their partner at a time when their partner was either already looking at them (mutual) or not looking at them (non-mutual). ‘Receiver’ gaze onsets were defined at a time when their partner made a gaze shift towards them at a time when either the adult or the infant was already looking at their partner (mutual) or not (non-mutual). Contrary to our hypothesis we found that, during a naturalistic interaction, both mutual and non-mutual gaze onsets were associated with changes in the sender, but not the receiver’s brain activity and were not associated with increases in inter-brain synchrony above baseline. Further, we found that mutual, compared to non-mutual gaze onsets were not associated with increased inter brain synchrony. Overall, our results suggest that the effects of mutual gaze are strongest at the intra-brain level, in the ‘sender’ but not the ‘receiver’ of the mutual gaze.

<https://www.nature.com/articles/s41598-023-28988-0>

LENA WARNKE & JAN P. DE RUITER – Top-down effect of dialogue coherence on perceived speaker identity

A key mechanism in the comprehension of conversation is the ability for listeners to recognize who is speaking and when a speaker switch occurs. Some authors suggest that speaker change detection is accomplished through bottom-up mechanisms in which listeners draw on changes in the acoustic features of the auditory signal. Other accounts propose that speaker change detection involves drawing on top-down linguistic representations to identify who is speaking. The present study investigates these hypotheses experimentally by manipulating the pragmatic coherence of conversational utterances. In experiment 1, participants listened to pairs of utterances and had to indicate whether they heard the same or different speakers. Even though all utterances were spoken by the same speaker, our results show that when two segments of conversation are spoken by the same speaker but make sense for different speakers to say, listeners report hearing different speakers. In experiment 2 we removed pragmatic information from the same stimuli by scrambling word order while leaving acoustic information intact. In contrast to experiment 1, results from the second experiment indicate no difference between our experimental conditions. We interpret these results as a top-down effect of pragmatic expectations: knowledge of conversational structure at least partially determines a listener’s perception of speaker changes in conversation.

<https://www.nature.com/articles/s41598-023-30435-z>

ENNIO BILANCINI, LEONARDO BONCINELLI & EUGENIO VICARIO – Assortativity in cognition

In pairwise interactions, where two individuals meet and play a social game with each other, assortativity in cognition means that pairs where both decision-makers use the same cognitive process are more likely to occur than what happens under

random matching. In this paper, we show theoretically that assortativity in cognition may arise as a consequence of assortativity in other dimensions. Moreover, we analyze an applied model where we investigate the effects of assortativity in cognition on the emergence of cooperation and on the degree of prosociality of intuition and deliberation, which are the typical cognitive processes postulated by the dual process theory in psychology. In particular, with assortativity in cognition, deliberation is able to shape the intuitive heuristic toward cooperation, increasing the degree of prosociality of intuition, and ultimately promoting the overall cooperation. Our findings rely on agent-based simulations, but analytical results are also obtained in a special case. We conclude with examples involving different payoff matrices of the underlying social games, showing that assortativity in cognition can have non-trivial implications in terms of its societal desirability.

<https://www.nature.com/articles/s41598-023-30301-y>

FIONNUALA R. MCCULLY & PAUL E. ROSE – Individual personality predicts social network assemblages in a colonial bird

Animal personalities manifest as consistent individual differences in the performance of specific behavioural expressions. Personality research has implications for zoo animal welfare, as it can further our understanding of how captive individuals may differ in their resource use and provide insight into improving individual and group social health. For group living species, personality may enable assortment based on similar behaviour and influence an individual's interactions with conspecifics (e.g. social support). This research aimed to document how personality traits (aggressive, exploratory, submissive) influenced the social network structure of highly social animals in a captive environment. Data were collected from separate flocks of captive Caribbean (Phoenicopterus ruber) and Chilean flamingos (Phoenicopterus chilensis) to identify relationships between birds and examine opportunities for social support. The flocks associated non-randomly, and in both cases, personality was a substantial predictor of network structure. Personality also predicted key elements of Caribbean flamingo social role (degree, betweenness and average association strength) conflict outcome, and propensity to provide social support, however these patterns were not replicated within the Chilean flamingo network. While both species appear to assort by personality, the broader relationship between personality and social role may vary depending on species and context.

<https://www.nature.com/articles/s41598-023-29315-3>

New Scientist

NEWS

Some of the earliest modern humans in Europe used bows and arrows

A site in France briefly occupied by modern humans is littered with stone points that were probably used as arrowheads, showing that bows and arrows were used in Europe much earlier than we thought.

<https://www.newscientist.com/article/2360535-some-of-the-earliest-modern-humans-in-europe-used-bows-and-arrows/>

ARTICLES

ABIGAIL BEALL – Should you have children? The true costs and benefits of parenthood

Whether or not you have children can have a big impact on your health and happiness, not to mention the planet – and some do regret their decisions. Here's how the evidence can guide you.

<https://www.newscientist.com/article/mg25734280-300-should-you-have-children-the-true-costs-and-benefits-of-parenthood/>

PLoS One

PAPERS

LEILANI FORBY et al – Reading the room: Autistic traits, gaze behaviour, and the ability to infer social relationships

Individuals high in autistic traits can have difficulty understanding verbal and non-verbal cues, and may display atypical gaze behaviour during social interactions. The aim of this study was to examine differences among neurotypical individuals with high and low levels of autistic traits with regard to their gaze behaviour and their ability to assess peers' social status accurately. Fifty-four university students who completed the 10-item Autism Quotient (AQ-10) were eye-tracked as they watched six 20-second video clips of people ("targets") involved in a group decision-making task. Simulating natural, everyday social interactions, the video clips included moments of debate, humour, interruptions, and cross talk. Results showed that high-scorers on the AQ-10 (i.e., those with more autistic traits) did not differ from the low-scorers in either gaze behaviour or assessing the targets' relative social status. The results based on this neurotypical group of participants suggest that the ability of individuals high in autistic traits to read social cues may be preserved in certain tasks crucial to navigating day-to-day social relationships. These findings are discussed in terms of their implications for theory of mind, weak central coherence, and social motivation theories of autism.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0282310>

MOHAMMAD JAVAD SHOAEI et al with MICHAEL D. PETRAGLIA – Defining paleoclimatic routes and opportunities for hominin dispersals across Iran

Fossil and archaeological evidence indicates that hominin dispersals into Southwest Asia occurred throughout the Pleistocene, including the expansion of *Homo sapiens* populations out of Africa. While there is evidence for hominin occupations in the Pleistocene in Iran, as evidenced by the presence of Lower to Upper Paleolithic archaeological sites, the extent to which humid periods facilitated population expansions into western Asia has remained unclear. To test the role of humid periods on hominin dispersals here we assess Paleolithic site distributions and paleoenvironmental records across Iran. We developed the first spatially comprehensive, high-resolution paleohydrological model for Iran in order to assess water availability and its influence on hominin dispersals. We highlight environmentally mediated routes which likely played a key role in Late Pleistocene hominin dispersals, including the expansion of *H. sapiens* and Neanderthals eastwards into Asia. Our combined analyses indicate that, during MIS 5, there were opportunities for hominins to traverse a northern route through the Alborz and Kopet Dagh Mountains and the Dasht-e Kavir desert owing to the presence of activated fresh water sources. We recognize a new southern route along the Zagros Mountains and extending eastwards towards Pakistan and Afghanistan. We find evidence for a potential northern route during MIS 3, which would have permitted hominin movements and species interactions in Southwest Asia. Between humid periods, these interconnections would have waned, isolating populations in the Zagros and Alborz Mountains, where hominins may have continued to have had access to water.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0281872>

DMITRI BERSHADSKYY – Reverberation effect of communication in a public goods game

Using a public goods laboratory experiment, this paper analyzes the extent to which face-to-face communication keeps its efficiency gains even after its removal. This is important as communication in real world is costly (e.g. time). If the effect of communication is long-lasting, the number of communication periods could be minimized. This paper provides evidence that there is a lasting positive effect on contributions even after communication was removed. Yet, after the removal, the contributions are lower and abate over time to the previous magnitude. This is referred to as the reverberation effect of communication. As we do not observe an effect of endogenizing communication, the strongest driver of the size of the contributions is the existence of communication or its reverberation. Eventually, the experiment provides evidence for a strong end-game effect after communication was removed, insinuating communication does not protect from the end-game behavior. In total, the results of the paper imply, that the effects of communication are not permanent but communication should be repeated. Simultaneously, results indicate no need for permanent communication. Since communication is conducted using video-conference tools, we present results from a machine learning based analysis of facial expressions to predict contribution behavior on group level.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0281633>

Proceedings of the Royal Society B**PAPERS****IRUN R. COHEN & ASSAF MARRON – Evolution is driven by natural autoencoding: reframing species, interaction codes, cooperation and sexual reproduction**

The continuity of life and its evolution, we proposed, emerge from an interactive group process manifested in networks of interaction. We term this process survival of the fittest. Here, we reason that survival of the fittest results from a natural computational process we term natural autoencoding. Natural autoencoding works by retaining repeating biological interactions while non-repeatable interactions disappear. (i) We define a species by its species interaction code, which consists of a compact description of the repeating interactions of species organisms with their external and internal environments. Species interaction codes are descriptions recorded in the biological infrastructure that enables repeating interactions. Encoding and decoding are interwoven. (ii) Evolution proceeds by natural autoencoding of sustained changes in species interaction codes. DNA is only one element in natural autoencoding. (iii) Natural autoencoding accounts for the paradox of genome randomization in sexual reproduction—recombined genomes are analogous to the diversified inputs required for artificial autoencoding. The increase in entropy generated by genome randomization compensates for the decrease in entropy generated by organized life. (iv) Natural autoencoding and artificial autoencoding algorithms manifest defined similarities and differences. Recognition of the importance of fitness could well serve the future of a humanly livable biosphere.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2022.2409>

CHRISTINA LUBINUS et al – Explaining flexible continuous speech comprehension from individual motor rhythms

When speech is too fast, the tracking of the acoustic signal along the auditory pathway deteriorates, leading to suboptimal speech segmentation and decoding of speech information. Thus, speech comprehension is limited by the temporal constraints of the auditory system. Here we ask whether individual differences in auditory-motor coupling strength in part shape these temporal constraints. In two behavioural experiments, we characterize individual differences in the comprehension of naturalistic speech as function of the individual synchronization between the auditory and motor systems and the preferred frequencies of the systems. Obviously, speech comprehension declined at higher speech rates. Importantly, however, both higher auditory-motor synchronization and higher spontaneous speech motor production rates

were predictive of better speech-comprehension performance. Furthermore, performance increased with higher working memory capacity (digit span) and higher linguistic, model-based sentence predictability—particularly so at higher speech rates and for individuals with high auditory-motor synchronization. The data provide evidence for a model of speech comprehension in which individual flexibility of not only the motor system but also auditory-motor synchronization may play a modulatory role.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2022.2410>

Royal Society Open Science

PAPERS

ROWAN TITCHENER et al with JULIA FISCHER – Social disappointment and partner presence affect long-tailed macaque refusal behaviour in an ‘inequity aversion’ experiment

Protest in response to unequal reward distribution is thought to have played a central role in the evolution of human cooperation. Some animals refuse food and become demotivated when rewarded more poorly than a conspecific, and this has been taken as evidence that non-human animals, like humans, protest in the face of inequity. An alternative explanation—social disappointment—shifts the cause of this discontent away from the unequal reward, to the human experimenter who could—but elects not to—treat the subject well. This study investigates whether social disappointment could explain frustration behaviour in long-tailed macaques, *Macaca fascicularis*. We tested 12 monkeys in a novel ‘inequity aversion’ paradigm. Subjects had to pull a lever and were rewarded with low-value food; in half of the trials, a partner worked alongside the subjects receiving high-value food. Rewards were distributed either by a human or a machine. In line with the social disappointment hypothesis, monkeys rewarded by the human refused food more often than monkeys rewarded by the machine. Our study extends previous findings in chimpanzees and suggests that social disappointment plus social facilitation or food competition effects drive food refusal patterns.

<https://royalsocietypublishing.org/doi/10.1098/rsos.221225>

Science

NEWS

Ancient DNA upends European prehistory

Genes reveal striking diversity within similar ice age cultures.

<https://www.science.org/content/article/ancient-dna-upends-european-prehistory>

ARTICLES

ANDREA RAVIGNANI & CHRISTIAN T. HERBST – Toothed whales evolved a third way of making sounds similar to that of land mammals and birds

The ability of humans to sing and speak requires precise neural control of the larynx and other organs to produce sounds. This neural control is limited in most mammals. For animals that create complex sounds, less is known about how peripheral anatomical structures enable vocal feats. On page 928 of this issue, Madsen et al. demonstrate that toothed whales, such as dolphins and killer whales, have a distinct nasal structure that produces diverse sounds in a broad frequency range that spans >4 orders of magnitude.

<https://www.science.org/doi/10.1126/science.adg5256>

PAPERS

PETER T. MADSEN, URSULA SIEBERT & COEN P. H. ELEMANS – Toothed whales use distinct vocal registers for echolocation and communication

Echolocating toothed whales (odontocetes) capture fast-moving prey in dark marine environments, which critically depends on their ability to generate powerful, ultrasonic clicks. How their supposedly air-driven sound source can produce biosonar clicks at depths of >1000 meters, while also producing rich vocal repertoires to mediate complex social communication, remains unknown. We show that odontocetes possess a sound production system based on air driven through nasal passages that is functionally analogous to laryngeal and syringeal sound production. Tissue vibration in different registers produces distinct echolocation and communication signals across all major odontocete clades, and thus provides a physiological basis for classifying their vocal repertoires. The vocal fry register is used by species from porpoises to sperm whales for generating powerful, highly air-efficient echolocation clicks.

<https://www.science.org/doi/10.1126/science.adc9570>

Science Advances

ARTICLES

VALERIE F. REYNA – Social media: Why sharing interferes with telling true from false

Sharing on social media decreases true-false discrimination but focusing on accuracy helps people recognize what they already know. Process-oriented research offers hope in combatting misinformation.

<https://www.science.org/doi/full/10.1126/sciadv.adg8333>

PAPERS

ZIV EPSTEIN et al – The social media context interferes with truth discernment

There is widespread concern about misinformation circulating on social media. In particular, many argue that the context of social media itself may make people susceptible to the influence of false claims. Here, we test that claim by asking whether simply considering sharing news on social media reduces the extent to which people discriminate truth from falsehood when judging accuracy. In a large online experiment examining coronavirus disease 2019 (COVID-19) and political news (N = 3157 Americans), we find support for this possibility. When judging the accuracy of headlines, participants were worse at discerning truth from falsehood if they both evaluated accuracy and indicated their sharing intentions, compared to just evaluating accuracy. These results suggest that people may be particularly vulnerable to believing false claims on social media, given that sharing is a core element of what makes social media “social.”

<https://www.science.org/doi/full/10.1126/sciadv.abo6169>

Scientific American

ARTICLES

FRANCINE RUSSO – Viking Textiles Show Women Had Tremendous Power

Cloth from Viking and medieval archaeological sites shows that women literally made the money in the North Atlantic.

<https://www.scientificamerican.com/article/viking-textiles-show-women-had-tremendous-power/>

GYÖRGY BUZSÁKI – How the Brain ‘Constructs’ the Outside World

Neural activity probes your physical surroundings to select just the information needed to survive and flourish.

<https://www.scientificamerican.com/article/how-the-brain-constructs-the-outside-world/>

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