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## EAORC NOTICES

### PUBLICATION ALERTS

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

And if you have any other ideas for extending the “EAORC experience”, please contact me.

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### ACADEMIA.EDU – The Howiesons Poort and MSA III at Klasies River main site, Cave 1A

*Journal of Archaeological Science* 37 (2010) 630–655

#### **P. VILLA et al – The Howiesons Poort and MSA III at Klasies River main site, Cave 1A**

We present the results of a technological analysis of the Howiesons Poort and MSA III lithic artifacts from Cave 1A at Klasies River. We studied most of the debitage and retouched pieces from Deacon’s excavations (about 3000 pieces) and all the cores and retouched pieces from three layers of Singer and Wymer excavations (640 pieces). Our analysis shows: (1) that HP blade production was based on the use of marginal percussion by soft stone hammer, as at Rose Cottage; (2) that impact scars at Klasies, Rose Cottage and Sibudu indicate that the backed pieces were hafted in two different ways; and (3) that the HP backed pieces were an innovative way of hafting spear tips but are not clear evidence of the invention of bows and arrows. We document the gradual evolution of debitage techniques within the HP sequence with progressive abandonment of the HP technological style. Very similar trends occur in the upper part of the HP sequence at Rose Cottage. The similarity in temporal trends between sites separated by more than 600 km has significant implications for the disappearance of the HP industry. We suggest that the disappearance of the HP was not due to a phenomenon of population contraction and isolation that caused the collapse of social networks. The internal evolution and parallel process of change documented at Klasies and Rose Cottage speak against a collapse of social systems and are associated with evidence of environmental and subsistence changes at the transition MIS 4/3.

<file:///C:/Users/Martin%20Edwardes/Documents/My%20Documents/Education/Extracts/not%20on%20Excel/villa%20&%20-%20Howiesons%20Poort%20&%20MSA%20III%20at%20Klasies%20River%20main%20site.pdf>

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### ACADEMIA.EDU – Brain mechanisms of acoustic communication in humans and nonhuman primates

*Behavioral and Brain Sciences* 37 (2014), 529-604

#### **HERMANN ACKERMANN, STEFFEN R. HAGE & WOLFRAM ZIEGLER – Brain mechanisms of acoustic communication in humans and nonhuman primates: An evolutionary perspective**

Any account of “what is special about the human brain” (Passingham 2008) must specify the neural basis of our unique ability to produce speech and delineate how these remarkable motor capabilities could have emerged in our hominin ancestors. Clinical data suggest that the basal ganglia provide a platform for the integration of primate-general mechanisms of acoustic communication with the faculty of articulate speech in humans. Furthermore, neurobiological and paleoanthropological data point at a two-stage model of the phylogenetic evolution of this crucial prerequisite of spoken language: (i) monosynaptic refinement of the projections of motor cortex to the brainstem nuclei that steer laryngeal muscles, presumably, as part of a “phylogenetic trend” associated with increasing brain size during hominin evolution; (ii) subsequent vocal-laryngeal elaboration of cortico-basal ganglia circuitries, driven by human-specific FOXP2 mutations. This concept implies vocal continuity of spoken language evolution at the motor level, elucidating the deep entrenchment of articulate speech into a “nonverbal matrix” (Ingold 1994), which is not accounted for by gestural-origin theories. Moreover, it provides a solution to the question for the adaptive value of the “first word” (Bickerton 2009) since even the earliest and most simple verbal utterances must have increased the versatility of vocal displays afforded by the preceding elaboration of monosynaptic corticobulbar tracts, giving rise to enhanced social cooperation and prestige. At the ontogenetic level, the proposed model assumes age-dependent interactions between the basal ganglia and their cortical targets, similar to vocal learning in some

songbirds. In this view, the emergence of articulate speech builds on the “renaissance” of an ancient organizational principle and, hence, may represent an example of “evolutionary tinkering” (Jacob1977).

[https://www.academia.edu/13158124/Modification\\_of\\_spectral\\_features\\_by\\_nonhuman\\_primates?email\\_work\\_card=view-paper](https://www.academia.edu/13158124/Modification_of_spectral_features_by_nonhuman_primates?email_work_card=view-paper)

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## NEWS

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### BREAKING SCIENCE – Neanderthals as Good at Tolerating Smoke-Related Toxins as Modern Humans

A new genetic study conducted by researchers from Leiden University and Wageningen University thoroughly debunks previous claims that a genetic mutation gave early Homo sapiens an evolutionary advantage over Neanderthals in adapting to campfire smoke exposure.

[http://feedproxy.google.com/~r/BreakingScienceNews/~3/odzsaBkk9Pw/neanderthals-smoke-related-toxins-09104.html?utm\\_source=feedburner&utm\\_medium=email](http://feedproxy.google.com/~r/BreakingScienceNews/~3/odzsaBkk9Pw/neanderthals-smoke-related-toxins-09104.html?utm_source=feedburner&utm_medium=email)

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### BREAKING SCIENCE – Upper Paleolithic Figurines of Women with Obesity Linked to Climate Change?

Obesity is rare in hunter-gatherer cultures. Nevertheless, dozens of handheld ‘Venus’ figurines — the oldest art sculptures of humans known and tend to be of women who have obesity or are pregnant — have been identified that date to Ice Age European hunter-gatherers from 38,000 to 14,000 years ago.

[http://feedproxy.google.com/~r/BreakingScienceNews/~3/1Uz9Y1vnhIo/venus-figurines-09113.html?utm\\_source=feedburner&utm\\_medium=email](http://feedproxy.google.com/~r/BreakingScienceNews/~3/1Uz9Y1vnhIo/venus-figurines-09113.html?utm_source=feedburner&utm_medium=email)

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### NATURE BRIEFING – The Sistine Chapel of the ancients

Archaeologists have documented tens of thousands of ice-age paintings that stretch across nearly 13 kilometres of cliff face in Colombia. They depict patterns, figures, handprints and animals, including now-extinct species such as mastodons, palaeolamas, giant sloths and ice-age horses. The discovery was made last year but is only now being revealed to coincide with the release of a television documentary that includes the art. The paintings are in the Serranía de la Lindosa, near the Chiribiquete national park, another site that is rich with prehistoric art.

<https://nature.us17.list-manage.com/track/click?u=2c6057c528fdc6f73fa196d9d&id=2efc50acde&e=1db4b9a19b>

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### SCIENCE DAILY – Preschool children can't see the mountains for the cat

Imagine seeing an image of a cat in front of a wide scene of mountains and being told just to remember the mountains if you saw them in a later picture. As an adult, that's not hard to do. But a new study shows that, even when told to pay attention to the mountain, preschool children focus so much on the cat that they won't later recognize the same mountain.

<https://www.sciencedaily.com/releases/2020/11/201130131425.htm>

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### SCIENCE DAILY – Researchers study influence of cultural factors on gesture design

Freehand gesture-based interfaces in interactive systems are becoming more common, but what if your preferred way to gesture a command - say, changing the TV to channel 10 - significantly differed from that of a user from another culture? Would the system recognize your command? Researchers explored this question and found that some gesture choices are significantly influenced by the cultural backgrounds of participants.

<https://www.sciencedaily.com/releases/2020/12/201201144039.htm>

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## PUBLICATIONS

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### Current Anthropology

#### COMMENTARIES

#### **ROB WISEMAN – Embodied Simulation, Conceptual Metaphor, and Archaeological Interpretation: A Reply to Gibbs**

When I wrote my analysis of van Gennep’s rites of passage (Wiseman 2019), I introduced conceptual metaphor theory (CMT) to expose the conceptual foundations on which this class of rituals is built. Metaphors are pervasive in the formation of concepts, so analyzing them provides rich insights into people’s thought processes, both past and present. However, CMT has seen little use in archaeology and, indeed, fairly limited application in anthropology at large. Although my article included an annex on identifying conceptual metaphors in the archaeological record, the treatment was brief and discussed only some of the surface layers of this theory.

Here Gibbs (2020) exposes much deeper strata. “Embodied simulation” is one of the basic ways humans think and the foundation on which many conceptual metaphors are built.

<https://www.journals.uchicago.edu/doi/pdf/10.1086/711909>

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## Evolutionary Anthropology

### PAPERS

#### **BERNARD WOOD – Birth of Homo erectus**

Eugène Dubois was the pioneer of human origins research in South-East Asia, specifically on two of the islands, Sumatra and Java, now included in Indonesia. Dubois was a polymath, whose research interests embraced encephalization and hydrology as well as paleoanthropology. His interpretations of the hominin fossil evidence he collected, which he eventually assigned to *Pithecanthropus erectus*, changed over the years, and he evidently felt defensive about those interpretations, but in his 1894 paper he presents cogent reasons for his decision. The taxon he introduced is still recognized, and while it is no longer seen as “the” link between fossil apes and modern humans, it is currently one of the longest surviving hominin taxa.

<https://onlinelibrary.wiley.com/doi/full/10.1002/evan.21873?campaign=wolearlyview>

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## Evolutionary Human Sciences

### PAPERS

#### **SERGEY GAVRILETS – The dynamics of injunctive social norms**

*[PREPRINT]*

Injunctive social norms are behaviors that one is expected to follow and expects others to follow in a given social situation; they are maintained by the threat of disapproval or punishment and by the process of internalization. Injunctive norms govern all aspects of our social life but the understanding of their effects on individual and group behavior is currently rather incomplete. Here I develop a general mathematical approach describing the dynamics of injunctive norms in heterogeneous groups. My approach captures various costs and benefits, both material and normative, associated with norm-related behaviors including punishment and disapproval by others. It also allows for errors in decision-making and explicitly accounts for differences between individuals in their values, beliefs about the population state, and sensitivity to the actions of others. In addition, it enables one to study the consequences of mixing populations with different normative values and the effects of persuasive interventions. I describe how interactions of these factors affect individual and group behavior. As illustration, I consider policies developed by practitioners to abolish the norms of footbinding and female genital cutting, to decrease college students’ drinking, and to increase pro-environmental behaviors. The theory developed here can be used for achieving a better understanding of historical and current social processes as well as for developing practical policies better accounting for human social behavior.

<https://www.cambridge.org/core/journals/evolutionary-human-sciences/article/dynamics-of-injunctive-social-norms/DED2545EE037BC8AB7BB1D2542AD3D17>

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## Frontiers in Psychology

### PAPERS

#### **HOLGER DIESSEL – A Dynamic Network Approach to the Study of Syntax**

Usage-based linguists and psychologists have produced a large body of empirical results suggesting that linguistic structure is derived from language use. However, while researchers agree that these results characterize grammar as an emergent phenomenon, there is no consensus among usage-based scholars as to how the various results can be explained and integrated into an explicit theory or model. Building on network theory, the current paper outlines a structured network approach to the study of grammar in which the core concepts of syntax are analyzed by a set of relations that specify associations between different aspects of a speaker’s linguistic knowledge. These associations are shaped by domain-general processes that can give rise to new structures and meanings in language acquisition and language change. Combining research from linguistics and psychology, the paper proposes specific network analyses for the following phenomena: argument structure, word classes, constituent structure, constructions and construction families, and grammatical categories such as voice, case and number. The article builds on data and analyses presented in Diessel (2019; *The Grammar Network. How Linguistic Structure is Shaped by Language Use*) but approaches the topic from a different perspective.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2020.604853/full>

#### **ULI SAUERLAND & ARTEMIS ALEXIADOU – Generative Grammar: A Meaning First Approach**

The theory of language must predict the possible thought—signal (or meaning—sound or sign) pairings of a language. We argue for a Meaning First architecture of language where a thought structure is generated first. The thought structure is then realized using language to communicate the thought, to memorize it, or perhaps with another purpose. Our view contrasts with the T-model architecture of mainstream generative grammar, according to which distinct phrase-structural representations—Phonetic Form (PF) for articulation, Logical Form (LF) for interpretation—are generated within the grammar. At the same time, our view differs from early transformational grammar and generative semantics: We view the relationship between the thought structure and the corresponding signal as one of compression. We specify a formal sketch of compression as a choice between multiple possible pronunciations balancing the desire to transmit information against the effort of pronunciation. The Meaning First architecture allows a greater degree of independence between thought structures and the linguistic signal. We present three arguments favoring this type of independence. First we argue that scopal properties can be better explained if we only compare thought structures independent of their realization as a sentence. Secondly, we argue that Meaning First architecture allows contentful late insertion, an idea that has been argued

for in Distributed Morphology already, but as we argue is also motivated by the division of the logical and socio-emotive meaning content of language. Finally, we show that only the Meaning First architecture provides a satisfying account of the mixing of multiple languages by multilingual speakers, especially for cases of simultaneous articulation across two modalities in bimodal speakers. Our view of the structure of grammar leads to a reassessment of priorities in linguistic analyses: while current mainstream work is often focused on establishing one-to-one relationships between concepts and morphemes, our view makes it plausible that primitive concepts are frequently marked indirectly or unpronounced entirely. Our view therefore assigns great value to the understanding of logical primitives and of compression.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2020.571295/full>

### **ALINA SCHAFFER et al – Gaze Following in Ungulates: Domesticated and Non-domesticated Species Follow the Gaze of Both Humans and Conspecifics in an Experimental Context**

Gaze following is the ability to use others' gaze to obtain information about the environment (e.g., food location, predators, and social interactions). As such, it may be highly adaptive in a variety of socio-ecological contexts, and thus be widespread across animal taxa. To date, gaze following has been mostly studied in primates, and partially in birds, but little is known on the gaze following abilities of other taxa and, especially, on the evolutionary pressures that led to their emergence. In this study, we used an experimental approach to test gaze following skills in a still understudied taxon, ungulates. Across four species (i.e., domestic goats and lamas, and non-domestic guanacos and mouflons), we assessed the individual ability to spontaneously follow the gaze of both conspecifics and human experimenters in different conditions. In line with our predictions, species followed the model's gaze both with human and conspecific models, but more likely with the latter. Except for guanacos, all species showed gaze following significantly more in the experimental conditions (than in the control ones). Despite the relative low number of study subjects, our study provides the first experimental evidence of gaze following skills in non-domesticated ungulates, and contributes to understanding how gaze following skills are distributed in another taxon—an essential endeavor to identify the evolutionary pressures leading to the emergence of gaze following skills across taxa.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2020.604904/full>

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## Mind & Language

### PAPERS

#### **ARMIN W. SCHULZ – Enhancing thoughts: Culture, technology, and the evolution of human cognitive uniqueness**

Three facts are widely thought to be key to the characterization of human cognitive uniqueness (though a number of other factors are often cited as well): (a) humans are sophisticated cultural learners; (b) humans often rely on mental states with rich representational contents; and (c) humans have the ability and disposition to make and use tools. This article argues that (a)–(c) create a positive feedback loop: Sophisticated cultural learning makes possible the manufacture of tools that increase the sophistication of representational decision-making, which in turn allows for yet further increases in the sophistication of cultural learning and tool manufacture.

<https://onlinelibrary.wiley.com/doi/full/10.1111/mila.12320?campaign=wolearlyview>

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## Nature

### NEWS

#### **If you can't be kind in peer review, be neutral**

Expressive language can make for better reading, but pruning it from peer reviews might create a kinder research culture, say Rebekah Baglini and Christine Parsons.

<https://www.nature.com/articles/d41586-020-03394-y>

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## Nature Communications

### PAPERS

#### **NICOLÒ CESANA-ARLOTTI, ÁGNES MELINDA KOVÁCS & ERNŐ TÉGLÁS – Infants recruit logic to learn about the social world**

When perceptually available information is scant, we can leverage logical connections among hypotheses to draw reliable conclusions that guide our reasoning and learning. We investigate whether this function of logical reasoning is present in infancy and aid understanding and learning about the social environment. In our task, infants watch reaching actions directed toward a hidden object whose identity is ambiguous between two alternatives and has to be inferred by elimination. Here we show that infants apply a disjunctive inference to identify the hidden object and use this logical conclusion to assess the consistency of the actions with a preference previously demonstrated by the agent and, importantly, also to acquire new knowledge regarding the preferences of the observed actor. These findings suggest that, early in life, preverbal logical reasoning functions as a reliable source of evidence that can support learning by offering a logical route for knowledge acquisition.

<https://www.nature.com/articles/s41467-020-19734-5>

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## Nature Human Behaviour

### PAPERS

#### **DAVID M. LYDON-STALEY et al – Hunters, busybodies and the knowledge network building associated with deprivation curiosity**

The open-ended and internally driven nature of curiosity makes characterizing the information seeking that accompanies it a daunting endeavour. We use a historico-philosophical taxonomy of information seeking coupled with a knowledge network building framework to capture styles of information-seeking in 149 participants as they explore Wikipedia for over 5 hours spanning 21 days. We create knowledge networks in which nodes represent distinct concepts and edges represent the similarity between concepts. We quantify the tightness of knowledge networks using graph theoretical indices and use a generative model of network growth to explore mechanisms underlying information-seeking. Deprivation curiosity (the tendency to seek information that eliminates knowledge gaps) is associated with the creation of relatively tight networks and a relatively greater tendency to return to previously visited concepts. With this framework in hand, future research can readily quantify the information seeking associated with curiosity.

<https://www.nature.com/articles/s41562-020-00985-7>

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## Nature Scientific Reports

### PAPERS

#### **AMELINE BARDO et al – The implications of thumb movements for Neanderthal and modern human manipulation**

Much research has debated the technological abilities of Neanderthals relative to those of early modern humans, with a particular focus on subtle differences in thumb morphology and how this may reflect differences in manipulative behaviors in these two species. Here, we provide a novel perspective on this debate through a 3D geometric morphometric analysis of shape covariation between the trapezial and proximal first metacarpal articular surfaces of Neanderthals (*Homo neanderthalensis*) in comparison to early and recent humans (*Homo sapiens*). Results show a distinct pattern of shape covariation in Neanderthals, consistent with more extended and adducted thumb postures that may reflect habitual use of grips commonly used for hafted tools. Both Neanderthals and recent humans demonstrate high intraspecific variation in shape covariation. This intraspecific variation is likely the result of genetic and/or developmental differences, but may also reflect, in part, differing functional requirements imposed by the use of varied tool-kits. These results underscore the importance of holistic joint shape analysis for understanding the functional capabilities and evolution of the modern human thumb.

<https://www.nature.com/articles/s41598-020-75694-2>

#### **HANZHI ZHANG et al with MARK PAGEL – Dated phylogeny suggests early Neolithic origin of Sino-Tibetan languages**

An accurate reconstruction of Sino-Tibetan language evolution would greatly advance our understanding of East Asian population history. Two recent phylogenetic studies attempted to do so but several of their conclusions are different from each other. Here we reconstruct the phylogeny of the Sino-Tibetan language family, using Bayesian computational methods applied to a larger and linguistically more diverse sample. Our results confirm previous work in finding that the ancestral Sino-Tibetans first split into Sinitic and Tibeto-Burman clades, and support the existence of key internal relationships. But we find that the initial divergence of this group occurred earlier than previously suggested, at approximately 8000 years before the present, coinciding with the onset of millet-based agriculture and significant environmental changes in the Yellow River region. Our findings illustrate that key aspects of phylogenetic history can be replicated in this complex language family, and calls for a more nuanced understanding of the first Sino-Tibetan speakers in relation to the “early farming dispersal” theory of language evolution.

<https://www.nature.com/articles/s41598-020-77404-4>

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## New Scientist

### ARTICLES

#### **SIMON BARON-COHEN – Why autism and invention are intimately related**

The prehistoric cognitive revolution that saw an explosion of inventions was driven by a new, pattern-seeking network in the brain – and that’s highly correlated with autism today.

<https://www.newscientist.com/article/mg24833113-700-simon-baron-cohen-why-autism-and-invention-are-intimately-related/#ixzz6fbnPAb8t>

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## PLoS Biology

### PAPERS

#### **DAN VANDERPOOL et al – Primate phylogenomics uncovers multiple rapid radiations and ancient interspecific Introgression**

*[This is an uncorrected proof]*

Our understanding of the evolutionary history of primates is undergoing continual revision due to ongoing genome sequencing efforts. Bolstered by growing fossil evidence, these data have led to increased acceptance of once controversial

hypotheses regarding phylogenetic relationships, hybridization and introgression, and the biogeographical history of primate groups. Among these findings is a pattern of recent introgression between species within all major primate groups examined to date, though little is known about introgression deeper in time. To address this and other phylogenetic questions, here, we present new reference genome assemblies for 3 Old World monkey (OWM) species: *Colobus angolensis* ssp. *palliatu*s (the black and white colobus), *Macaca nemestrina* (southern pig-tailed macaque), and *Mandrillus leucophaeus* (the drill). We combine these data with 23 additional primate genomes to estimate both the species tree and individual gene trees using thousands of loci. While our species tree is largely consistent with previous phylogenetic hypotheses, the gene trees reveal high levels of genealogical discordance associated with multiple primate radiations. We use strongly asymmetric patterns of gene tree discordance around specific branches to identify multiple instances of introgression between ancestral primate lineages. In addition, we exploit recent fossil evidence to perform fossil-calibrated molecular dating analyses across the tree. Taken together, our genome-wide data help to resolve multiple contentious sets of relationships among primates, while also providing insight into the biological processes and technical artifacts that led to the disagreements in the first place.

<https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000954>

### **SREEJAN KUMAR et al – Searching through functional space reveals distributed visual, auditory, and semantic coding in the human brain**

There are two classical views about how the mind is organized in the brain. Early phrenology and neurophysiology and later neuropsychology argued that brain regions are specialized for certain functions of the mind. Older behavioral neuroscience and more recent neural network modeling and pattern classification instead argued against a one-to-one mapping, and rather that functions of the mind are distributed across multiple brain regions. Although there is considerable evidence for both perspectives in modern cognitive neuroscience, we hypothesize that the degree to which functions are distributed has been underestimated because of biases in prior work that favored finding specialized regions. Our novel machine learning approach, functional searchlight, reveals that features of a movie extracted with three different types of computational model and object representations are more widely distributed in the brain than suggested by current methods. Moreover, these distributed representations carry more movie content than could previously be decoded from the brain. This suggests a better way to conduct model-based analysis of brain data and provides a more solid basis on which to evaluate and refine theoretical models.

<https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1008457>

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## **PLoS One**

### **PAPERS**

### **ALESSANDRO RIGA et al – In situ observations on the dentition and oral cavity of the Neanderthal skeleton from Altamura (Italy)**

The Neanderthal specimen from Lamalunga Cave, near Altamura (Apulia, Italy), was discovered during a speleological survey in 1993. The specimen is one of the most complete fossil hominins in Europe and its state of preservation is exceptional, although it is stuck in calcareous concretions and the bones are mostly covered by calcite depositions. Nevertheless, it is possible to carry out some observations on craniodental features that have not previously been described. In this work, we present an account of the oral cavity, made possible by the use of a videoscope, which allowed us to reach some hidden parts of the mandible and palate. This is the first detailed overview of the teeth and maxillary bones of the Neanderthal skeleton from Altamura. The dentition is almost complete. However, two teeth (upper right P3 and upper left M1) were lost ante mortem and four teeth (lower right I1 and P3 and lower left I1 and I2) were lost most probably post mortem. Dental wear is marked. The erupted M3s and the inversion of the compensating curve of Wilson in the M1s and M2s but not in the M3s suggest that the individual is fully adult, but not old. Although most of the teeth have their roots exposed for several millimeters, the periodontal bone appears to be in good condition overall, except in correspondence of the two ante-mortem tooth losses. X-rays of the anterior teeth show a periapical lesion, probably linked to the advanced dental wear. We also observed a weak expression of taurodontism in the posterior dentition and the presence of a retromolar space, features consistent with an attribution to the Neanderthal hypodigm; this attribution is also supported by aspects of the cranial morphology, the morphometric analysis of the scapula and preliminary mtDNA data. There is also a well-developed palatine torus, to the best of our knowledge a feature not previously described in Neanderthals.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0241713>

### **CECILIA PADILLA-IGLESIAS, ERIK GJESFJELD & LUCIO VINICIUS – Geographical and social isolation drive the evolution of Austronesian languages**

The origins of linguistic diversity remain controversial. Studies disagree on whether group features such as population size or social structure accelerate or decelerate linguistic differentiation. While some analyses of between-group factors highlight the role of geographical isolation and reduced linguistic exchange in differentiation, others suggest that linguistic divergence is driven primarily by warfare among neighbouring groups and the use of language as marker of group identity. Here we provide the first integrated test of the effects of five historical sociodemographic and geographic variables on three measures of linguistic diversification among 50 Austronesian languages: rates of word gain, loss and overall lexical turnover. We control for their shared evolutionary histories through a time-calibrated phylogenetic sister-pairs approach. Results show that languages spoken in larger communities create new words at a faster pace. Within-group conflict promotes linguistic

differentiation by increasing word loss, while warfare hinders linguistic differentiation by decreasing both rates of word gain and loss. Finally, we show that geographical isolation is a strong driver of lexical evolution mainly due to a considerable drift-driven acceleration in rates of word loss. We conclude that the motor of extreme linguistic diversity in Austronesia may have been the dispersal of populations across relatively isolated islands, favouring strong cultural ties amongst societies instead of warfare and cultural group marking.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0243171>

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## PNAS

### PAPERS

#### **CHRISTOPHER D. MANNING et al – Emergent linguistic structure in artificial neural networks trained by self-supervision**

This paper explores the knowledge of linguistic structure learned by large artificial neural networks, trained via self-supervision, whereby the model simply tries to predict a masked word in a given context. Human language communication is via sequences of words, but language understanding requires constructing rich hierarchical structures that are never observed explicitly. The mechanisms for this have been a prime mystery of human language acquisition, while engineering work has mainly proceeded by supervised learning on treebanks of sentences hand labeled for this latent structure. However, we demonstrate that modern deep contextual language models learn major aspects of this structure, without any explicit supervision. We develop methods for identifying linguistic hierarchical structure emergent in artificial neural networks and demonstrate that components in these models focus on syntactic grammatical relationships and anaphoric coreference. Indeed, we show that a linear transformation of learned embeddings in these models captures parse tree distances to a surprising degree, allowing approximate reconstruction of the sentence tree structures normally assumed by linguists. These results help explain why these models have brought such large improvements across many language-understanding tasks.

<https://www.pnas.org/content/117/48/30046.abstract?etoc>

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## Trends in Cognitive Sciences

### COMMENTARIES

#### **GIACOMO NOVEMBRE & GIAN DOMENICO IANNETTI – Hyperscanning Alone Cannot Prove Causality. Multibrain Stimulation Can**

Brains that work together, couple together through interbrain synchrony. Does interbrain synchrony causally facilitate social interaction? This question cannot be answered by simply recording from multiple brains (hyperscanning). It instead requires causal protocols entailing their simultaneous stimulation (multibrain stimulation). We highlight promising findings and future horizons of this nascent field.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(20\)30275-8?dgcid=raven\\_jbs\\_aip\\_email](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(20)30275-8?dgcid=raven_jbs_aip_email)

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