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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.

ACADEMIA.EDU – Primate Vocalization, Gesture, and the Evolution of Human Language

Current Anthropology Volume 49, Number 6, 2008, 1053-1076

MICHAEL A. ARBIB, KATJA LIEBAL & SIMONE PIKA – Primate Vocalization, Gesture, and the Evolution of Human Language

The performance of language is multimodal, not confined to speech. Review of monkey and ape communication demonstrates greater flexibility in the use of hands and body than for vocalization. Nonetheless, the gestural repertoire of any group of nonhuman primates is small compared with the vocabulary of any human language and thus, presumably, of the transitional form called protolanguage. We argue that it was the coupling of gestural communication with enhanced capacities for imitation that made possible the emergence of protosign to provide essential scaffolding for protospeech in the evolution of protolanguage. Similarly, we argue against a direct evolutionary path from nonhuman primate vocalization to human speech. The analysis refines aspects of the mirror system hypothesis on the role of the primate brain’s mirror system for manual action in evolution of the human language-ready brain.

https://www.academia.edu/17440597/Primate_Vocalization_Gesture_and_the_Evolution_of_Human_Language?email_work_card=view-paper

ACADEMIA.EDU – The comparative psychology of human uniqueness

In Robert G. Bednarik (ed.), The Psychology of Human Behavior. Nova Science Publishers: Hauppauge, NY, USA, 111-182. (2013)

ROBERT DIELENBERG – The comparative psychology of human uniqueness: A cognitive behavioral review

The dominant paradigm of comparative psychology is that nonhuman primate cognitive abilities differ from humans in degree, not kind. In broadly reviewing the human-nonhuman research landscape, including two areas still well under-represented—volitional control and innovation, it was found that while nonhuman primates (and apes in particular) demonstrate flexible physical adeptness, this flexibility does not extend to the realm of imagination and ideas. Specifically, apes were found to have “first order awareness of the unseen world”, that is, the ability to infer some physical unseen causation, but lack “second order awareness of the unseen world”—the ability to infer properties of things based purely on observational knowledge of internal structure derived from primary experience of simple elements. It is argued that second order unseen awareness emerges from self-reflective consciousness. Access to unseen worlds of imagination and ideas allows humans to create cumulative culture through a process of renewed hybridization of form and function. Nonhuman primate culture by comparison lacks hybridization and therefore displays a general paucity of cumulative traditions.

https://www.academia.edu/1241591/The_comparative_psychology_of_human_uniqueness_A_cognitive_behavioral_review?email_work_card=view-paper

RESEARCHGATE – Bottlenose dolphins share a stereotyped whistle contour

PLoS ONE 15(5): e0233658, May 2020

BRITTANY L JONES et al – Five members of a mixed-sex group of bottlenose dolphins share a stereotyped whistle contour in addition to maintaining their individually distinctive signature whistles

Most commonly, animal communication systems are driven by shared call repertoires, with some individual distinctiveness encoded as a byproduct of voice cues. We provide evidence that bottlenose dolphins produce both individually distinctive whistles, and a shared whistle type. A stereotyped whistle contour (termed the group whistle) is shared by five bottlenose dolphins that have lived, worked, and traveled together for at least 21 years. These five dolphins are members of a group of eight dolphins that work as a specialized team for the Navy Marine Mammal Program. Each dolphin is routinely recorded during periods when an individual is isolated from the others in above ground pools as part of their routine training. Each of the eight dolphins has an individually distinctive signature whistle. In addition, at least five of these dolphins share a distinct non-signature whistle type. This shared whistle contour was produced an average of 22.4% +/- 9.0% of the time during periods in which individuals were isolated. During these isolations the signature whistle was produced an average of 42.9% +/- 11.9% of the time. This is consistent with decades of signature whistle research. A group of 10 naïve observers rated the similarity of the different whistle contours. The observers rated the group whistle contour produced by all five dolphins as highly similar ($P < 0.01$). Their ratings further showed that the signature whistles of the five dolphins were very different ($P < 0.01$). These findings were further supported by discriminant function analyses. That said, the shared whistle contours still

exhibited individual differences which may allow conspecifics to identify the producer even when a whistle contour is shared among multiple dolphins. This is the first in-depth analysis of a non-signature whistle type shared among multiple conspecifics.

https://www.researchgate.net/publication/341596996_Five_members_of_a_mixed-sex_group_of_bottlenose_dolphins_share_a_stereotyped_whistle_contour_in_addition_to_maintaining_their_individually_distinctive_signature_whistles

RESEARCHGATE – Gestural communication in nonhuman and human primates

(2007), John Benjamins B.V.: Amsterdam, Netherlands.

KATJA LIEBAL, CORNELIA MÜLLER AND SIMONE PIKA (eds.) – Gestural communication in nonhuman and human primates

Researchers have looked at gestures using a variety of research questions and methodological approaches, as well as different definitions. The majority of studies investigated gestures in humans, but recent research started to include different species of non-human primates, particularly great apes but also monkeys. To enable an intense discourse and an interdisciplinary, comparative exchange between researchers interested in different fields of gesture research, a workshop on “Gestural communication in nonhuman and human primates” was held at the Max Planck Institute for Evolutionary Anthropology in Leipzig, March 2004. This multidisciplinary perspective is essential to explore such fundamental questions as the evolution of language as well as the phenomenon of gesture as such: the multiple facets of cognitive, affective, and social functions of gestures, their forms of uses, their varying structural properties, and the cognitive processes such as intention and abstraction involved in the creation and use of gestural signs. Studying gestures in nonhuman and human primates appears therefore a highly interesting enterprise; not only because of their shared phylogenetic history but because of their close relation to language. Gesture is the modality which may take over the burden of vocal language if needed for physiological or ritual reasons (as in sign languages of the deaf and in alternate sign languages). In other words, gestures may develop into a full fledged language under certain conditions. Taking this potential seriously may help to throw new light on the hypothesis that gesture might have been the modality which contributed to the evolution of vocal language in one or the other way.

https://www.academia.edu/21412344/Gestural_communication_of_apes?email_work_card=view-paper

NEWS

SOCIETY FOR SCIENCE – Ardi and her discoverers shake up hominid evolution in 'Fossil Men'

A new book covers the big personalities, field exploits and scientific clashes behind the discovery of the hominid skeleton nicknamed Ardi.

<http://click.societyforscience-email.com/?qs=15a522d3939b791287aa2991d3080097b2a7c7642453ab2cfb5060f4b8a1737ade68ecc283f85873903d68290dd3188d6ccef2ed3f3a30ba>

SCIENCE DAILY – Scientists discover new mechanism controlling brain size

International research has led to the discovery of a new mechanism that controls the size of our brains. The finding, which is based on studies on a rare congenital brain disease, delivers an important piece of data in our knowledge about how the human brain is formed during development.

<https://www.sciencedaily.com/releases/2020/11/201116112916.htm>

SCIENCE DAILY – Migrant children often misdiagnosed as having 'impairment of language acquisition'

Around 45% of children in Austrian day nurseries have a first language other than German. Those who are experiencing difficulty in learning the second language are often diagnosed as having a suspected 'impairment of language acquisition'. In fact, this often merely reflects the fact that they have not yet fully acquired the second language.

<https://www.sciencedaily.com/releases/2020/11/201116112905.htm>

SCIENCE DAILY – Teaching and complex tools 'evolved together'

The human ability to teach and our use of complex tools may have evolved together, according to new research.

<https://www.sciencedaily.com/releases/2020/11/201117192623.htm>

SCIENCE DAILY – Middle Stone Age populations repeatedly occupied West African coast

Researchers reveal evidence of Middle Stone Age occupations of the West African coast. Ranging from 62 to 25 thousand years ago, the largest well-dated assemblages from the region clearly document technological continuity across almost 40,000 years in West Africa.

<https://www.sciencedaily.com/releases/2020/11/201120113906.htm>

PUBLICATIONS

American Journal of Physical Anthropology

PAPERS

CAROLINE VANSICKLE, ZACHARY COFRAN & DAVID HUNT – Did Neandertals have large brains? Factors affecting endocranial volume comparisons

We examined endocranial volume (ECV) derived from virtually reconstructed endocasts of 11 Neandertals, six of which had associated femoral head diameters (FHD). Our recent human comparative dataset consisted of virtually measured ECV and associated FHD from 94 recent humans from the Robert J. Terry Anatomical Collection (63 male, 31 female). ECV of Neandertals and recent humans was compared using bootstrap resampling, repeating the analysis for two groupings of Neandertals (all and classic) and for three groupings of recent humans (all, males, and females). To examine brain size scaling, we completed an ordinary least squares regression of log (ECV) against log (FHD) for Neandertals and recent humans. The results of the bootstrap resampling analyses indicated that Neandertals only had significantly larger ECV when compared with recent human females. The regression between ECV and FHD suggested that Neandertals fall within the range of variation for larger humans.

<https://onlinelibrary.wiley.com/doi/full/10.1002/ajpa.24124?campaign=woletoc>

SONG-TAO GUO et al – Male social rank and food competition in a primate multi-level society

We performed a field experiment with a breeding band of golden snub-nosed monkeys, a species that lives in a multi-level society in high-altitude forests in central China. We provisioned monkey's high-profitability food during winter when natural foods are limited, and then recorded the times individual adult males spent engaged in different behaviors. Higher-ranking males spent less time feeding overall and fed on provisioned foods at a higher rate than lower-ranking males. Higher-ranking males therefore had more time to spend on alternative behaviors. We found no significant difference according to rank in times spent moving or resting. However, high-ranking males spend significantly longer on affiliative behaviors with other members of their social sub-units, especially grooming and being groomed, behaviors known to promote social cohesion in primates.

<https://onlinelibrary.wiley.com/doi/full/10.1002/ajpa.24141?campaign=woletoc>

Current Biology

ARTICLES

KAREN EMMOREY – Sign Language: How the Brain Represents Phonology without Sound

A rare case of a deaf signer undergoing awake craniotomy has revealed that sensorimotor cortex is functionally organized for signing. Electroencephalography recordings indicated neural tuning to linguistically-relevant handshapes and body locations and distinct neural activity for linguistic versus transitional movements.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(20\)31348-8?dgcid=raven_jbs_etoc_email](https://www.cell.com/current-biology/fulltext/S0960-9822(20)31348-8?dgcid=raven_jbs_etoc_email)

PAPERS

MATTHEW K. LEONARD et al – Cortical Encoding of Manual Articulatory and Linguistic Features in American Sign Language

The fluent production of a signed language requires exquisite coordination of sensory, motor, and cognitive processes. Similar to speech production, language produced with the hands by fluent signers appears effortless but reflects the precise coordination of both large-scale and local cortical networks. The organization and representational structure of sensorimotor features underlying sign language phonology in these networks remains unknown. Here, we present a unique case study of high-density electroencephalography (ECoG) recordings from the cortical surface of profoundly deaf signer during awake craniotomy. While neural activity was recorded from sensorimotor cortex, the participant produced a large variety of movements in linguistic and transitional movement contexts. We found that at both single electrode and neural population levels, high-gamma activity reflected tuning for particular hand, arm, and face movements, which were organized along dimensions that are relevant for phonology in sign language. Decoding of manual articulatory features revealed a clear functional organization and population dynamics for these highly practiced movements. Furthermore, neural activity clearly differentiated linguistic and transitional movements, demonstrating encoding of language-relevant articulatory features. These results provide a novel and unique view of the fine-scale dynamics of complex and meaningful sensorimotor actions.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(20\)31238-0?dgcid=raven_jbs_etoc_email](https://www.cell.com/current-biology/fulltext/S0960-9822(20)31238-0?dgcid=raven_jbs_etoc_email)

SAMANTHA J. GREEN et al – Chimpanzees Use Least-Cost Routes to Out-of-Sight Goals

While the ability of naturally ranging animals to recall the location of food resources and use straight-line routes between them has been demonstrated in several studies [1 , 2], it is not known whether animals can use knowledge of their landscape to walk least-cost routes [3]. This ability is likely to be particularly important for animals living in highly variable energy landscapes, where movement costs are exacerbated [4 , 5]. Here, we used least-cost modeling, which determines the most efficient route assuming full knowledge of the environment, to investigate whether chimpanzees (*Pan troglodytes*) living in a rugged, montane environment walk least-cost routes to out-of-sight goals. We compared the “costs” and geometry

of observed movements with predicted least-cost routes and local knowledge (agent-based) and straight-line null models. The least-cost model performed better than the local knowledge and straight-line models across all parameters, and linear mixed modeling showed a strong relationship between the cost of observed chimpanzee travel and least-cost routes. Our study provides the first example of the ability to take least-cost routes to out-of-sight goals by chimpanzees and suggests they have spatial memory of their home range landscape. This ability may be a key trait that has enabled chimpanzees to maintain their energy balance in a low-resource environment. Our findings provide a further example of how the advanced cognitive complexity of hominins may have facilitated their adaptation to a variety of environmental conditions and lead us to hypothesize that landscape complexity may play a role in shaping cognition.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(20\)31266-5?dgcid=raven_jbs_etoc_email](https://www.cell.com/current-biology/fulltext/S0960-9822(20)31266-5?dgcid=raven_jbs_etoc_email)

Mind & Language

PAPERS

NICHOLAS SHEA – Concept-metacognition

Concepts are our tools for thinking. They enable us to engage in explicit reasoning about things in the world. Like physical tools, they can be more or less good, given the ways we use them—more or less dependable for categorisation, learning, induction, action-planning, and so on. Do concept users appreciate, explicitly or implicitly, that concepts vary in dependability? Do they feel that some concepts are in some way defective? If so, we metacognise our concepts. This article offers a preliminary taxonomy of different forms of metacognition directed at concepts and suggests that concept-metacognition impacts on several different cognitive processes.

Concept-metacognition - Shea - 2020 - Mind & Language - Wiley Online Library

Nature

ARTICLES

ELSA ARCAUTE – Hierarchies defined through human mobility

An analysis of worldwide data finds that human mobility has a hierarchical structure. A proposed model that accounts for such hierarchies reproduces differences in mobility behaviour across genders and levels of urbanization.

<https://www.nature.com/articles/d41586-020-03197-1>

PAPERS

LAURA ALESSANDRETTI, ULF ASLAK & SUNE LEHMANN – The scales of human mobility

There is a contradiction at the heart of our current understanding of individual and collective mobility patterns. On the one hand, a highly influential body of literature on human mobility driven by analyses of massive empirical datasets finds that human movements show no evidence of characteristic spatial scales. There, human mobility is described as scale free^{1,2,3}. On the other hand, geographically, the concept of scale—referring to meaningful levels of description from individual buildings to neighbourhoods, cities, regions and countries—is central for the description of various aspects of human behaviour, such as socioeconomic interactions, or political and cultural dynamics^{4,5}. Here we resolve this apparent paradox by showing that day-to-day human mobility does indeed contain meaningful scales, corresponding to spatial ‘containers’ that restrict mobility behaviour. The scale-free results arise from aggregating displacements across containers. We present a simple model—which given a person’s trajectory—infers their neighbourhood, city and so on, as well as the sizes of these geographical containers. We find that the containers—characterizing the trajectories of more than 700,000 individuals—do indeed have typical sizes. We show that our model is also able to generate highly realistic trajectories and provides a way to understand the differences in mobility behaviour across countries, gender groups and urban–rural areas.

<https://www.nature.com/articles/s41586-020-2909-1>

PNAS

PAPERS

ADAM Z. REYNOLDS et al – Matriliney reverses gender disparities in inflammation and hypertension among the Mosuo of China

Women experience higher morbidity than men, despite living longer. This is often attributed to biological differences between the sexes; however, the majority of societies in which these disparities are observed exhibit gender norms that favor men. We tested the hypothesis that female-biased gender norms ameliorate gender disparities in health by comparing gender differences in inflammation and hypertension among the matrilineal and patrilineal Mosuo of China. Widely reported gender disparities in health were reversed among matrilineal Mosuo compared with patrilineal Mosuo, due to substantial improvements in women’s health, with no concomitant detrimental effects on men. These findings offer evidence that gender norms limiting women’s autonomy and biasing inheritance toward men adversely affect the health of women, increasing women’s risk for chronic diseases with tremendous global health impact.

<https://www.pnas.org/content/early/2020/11/10/2014403117.abstract?etoc>

ZHONGQIAO LIN et al – Evidence accumulation for value computation in the prefrontal cortex during decision making

A key step of decision making is to determine the value associated with each option. The evaluation process often depends on the accumulation of evidence from multiple sources, which may arrive at different times. How evidence is accumulated for value computation in the brain during decision making has not been well studied. To address this problem, we trained rhesus monkeys to perform a decision-making task in which they had to make eye movement choices between two targets, whose reward probabilities had to be determined with the combined evidence from four sequentially presented visual stimuli. We studied the encoding of the reward probabilities associated with the stimuli and the eye movements in the orbitofrontal (OFC) and the dorsolateral prefrontal (DLPFC) cortices during the decision process. We found that the OFC neurons encoded the reward probability associated with individual pieces of evidence in the stimulus domain. Importantly, the representation of the reward probability in the OFC was transient, and the OFC did not encode the reward probability associated with the combined evidence from multiple stimuli. The computation of the combined reward probabilities was observed only in the DLPFC and only in the action domain. Furthermore, the reward probability encoding in the DLPFC exhibited an asymmetric pattern of mixed selectivity that supported the computation of the stimulus-to-action transition of reward information. Our results reveal that the OFC and the DLPFC play distinct roles in the value computation during evidence accumulation.

<https://www.pnas.org/content/early/2020/11/13/2019077117.abstract?etoc>

LING HUANG et al – A source for awareness-dependent figure–ground segregation in human prefrontal cortex

Figure–ground modulation, i.e., the enhancement of neuronal responses evoked by the figure relative to the background, has three complementary components: edge modulation (boundary detection), center modulation (region filling), and background modulation (background suppression). However, the neuronal mechanisms mediating these three modulations and how they depend on awareness remain unclear. For each modulation, we compared both the cueing effect produced in a Posner paradigm and fMRI blood oxygen-level dependent (BOLD) signal in primary visual cortex (V1) evoked by visible relative to invisible orientation-defined figures. We found that edge modulation was independent of awareness, whereas both center and background modulations were strongly modulated by awareness, with greater modulations in the visible than the invisible condition. Effective-connectivity analysis further showed that the awareness-dependent region-filling and background-suppression processes in V1 were not derived through intracortical interactions within V1, but rather by feedback from the frontal eye field (FEF) and dorsolateral prefrontal cortex (DLPFC), respectively. These results indicate a source for an awareness-dependent figure–ground segregation in human prefrontal cortex.

<https://www.pnas.org/content/early/2020/11/11/1922832117.abstract?etoc>

MAURICIO DE JESUS DIAS MARTINS AND NICOLAS BAUMARD – The rise of prosociality in fiction preceded democratic revolutions in Early Modern Europe

The English and French Revolutions represent a turning point in history, marking the beginning of the modern rise of democracy. Recent advances in cultural evolution have put forward the idea that the early modern revolutions may be the product of a long-term psychological shift, from hierarchical and dominance-based interactions to democratic and trust-based relationships. In this study, we tested this hypothesis by analyzing theater plays during the early modern period in England and France. We found an increase in cooperation-related words over time relative to dominance-related words in both countries. Furthermore, we found that the accelerated rise of cooperation-related words preceded both the English Civil War (1642) and the French Revolution (1789). Finally, we found that rising per capita gross domestic product (GDPpc) generally led to an increase in cooperation-related words. These results highlight the likely role of long-term psychological and economic changes in explaining the rise of early modern democracies.

<https://www.pnas.org/content/117/46/28684.abstract?etoc>

LION SCHULZ et al – Dogmatism manifests in lowered information search under uncertainty

When knowledge is scarce, it is adaptive to seek further information to resolve uncertainty and obtain a more accurate worldview. Biases in such information-seeking behavior can contribute to the maintenance of inaccurate views. Here, we investigate whether predispositions for uncertainty-guided information seeking relate to individual differences in dogmatism, a phenomenon linked to entrenched beliefs in political, scientific, and religious discourse. We addressed this question in a perceptual decision-making task, allowing us to rule out motivational factors and isolate the role of uncertainty. In two independent general population samples ($n = 370$ and $n = 364$), we show that more dogmatic participants are less likely to seek out new information to refine an initial perceptual decision, leading to a reduction in overall belief accuracy despite similar initial decision performance. Trial-by-trial modeling revealed that dogmatic participants placed less reliance on internal signals of uncertainty (confidence) to guide information search, rendering them less likely to seek additional information to update beliefs derived from weak or uncertain initial evidence. Together, our results highlight a cognitive mechanism that may contribute to the formation of dogmatic worldviews.

<https://www.pnas.org/content/early/2020/11/18/2009641117.abstract?etoc>

PAPERS

AMANDA J. LUCAS et al with FRANCESCA HAPPÉ – The value of teaching increases with tool complexity in cumulative cultural evolution

Human cumulative cultural evolution (CCE) is recognized as a powerful ecological and evolutionary force, but its origins are poorly understood. The long-standing view that CCE requires specialized social learning processes such as teaching has recently come under question, and cannot explain why such processes evolved in the first place. An alternative, but largely untested, hypothesis is that these processes gradually coevolved with an increasing reliance on complex tools. To address this, we used large-scale transmission chain experiments (624 participants), to examine the role of different learning processes in generating cumulative improvements in two tool types of differing complexity. Both tool types increased in efficacy across experimental generations, but teaching only provided an advantage for the more complex tools. Moreover, while the simple tools tended to converge on a common design, the more complex tools maintained a diversity of designs. These findings indicate that the emergence of cumulative culture is not strictly dependent on, but may generate selection for, teaching. As reliance on increasingly complex tools grew, so too would selection for teaching, facilitating the increasingly open-ended evolution of cultural artefacts.

<https://royalsocietypublishing.org/doi/10.1098/rspb.2020.1885>

Trends in Cognitive Sciences

PAPERS

MEDHA SHEKHAR & DOBROMIR RAHNEV – Sources of Metacognitive Inefficiency

Confidence judgments are typically less informative about one's accuracy than they could be; a phenomenon we call metacognitive inefficiency. We review the existence of different sources of metacognitive inefficiency and classify them into four categories based on whether the corruption is due to: (i) systematic or nonsystematic influences, and (ii) the input to or the computation of the metacognitive system. Critically, the existence of different sources of metacognitive inefficiency provides an alternative explanation for behavioral findings typically interpreted as evidence for domain-specific (and against domain-general) metacognitive systems. We argue that, contrary to the dominant assumption in the field, metacognitive failures are not monolithic and suggest that understanding the sources of metacognitive inefficiency should be a primary goal of the science of metacognition.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(20\)30253-9?dgcid=raven_jbs_aip_email](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(20)30253-9?dgcid=raven_jbs_aip_email)

BRUCE RAWLINGS & CRISTINE H. LEGARE – Toddlers, Tools, and Tech: The Cognitive Ontogenesis of Innovation

The development of tool innovation presents a paradox. How do humans have such diverse and complex technology, ranging from smartphones to aircraft, and yet young children find even simple tool innovation challenges, such as fashioning a hook to retrieve a basket from a tube, remarkably difficult? We propose that the solution to this paradox is the cognitive ontogenesis of tool innovation. Using a common measure of children's tool innovation, we describe how multiple cognitive mechanisms work in concert at each step of its process: recognizing the problem, generating appropriate solutions, and the social transmission of innovations. We discuss what the ontogeny of this skill tells us about cognitive and cultural evolution and provide recommendations for future research.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(20\)30252-7?dgcid=raven_jbs_aip_email](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(20)30252-7?dgcid=raven_jbs_aip_email)

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