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Neanderthals could accomplish complex, multistep tasks that took planning ahead over several days. Precision grip, and may have even painted cave art. Now, a tar

MOSAIC ENVIRONMENT: IMPLICATIONS FOR HOMININ ADAPTATIONS TO OPEN HABITATS

PaleoAnthropology 2009: 252−262.

JILL D. PRUETZ & PACO BERTOLANI – Chimpanzee (Pan troglodytes verus) Behavioral Responses to Stresses Associated With Living In a Savannah-Mosaic Environment: Implications for Hominin Adaptations to Open Habitats

Anthropologists have long been interested in the behavioral ecology of nonhuman primates living in savannas given what we know of early hominin environments. As expected, chimpanzees in the Fongoli community in southeastern Sénégal show a unique suite of behavioral adaptations to stresses associated with their savanna habitat. While Fongoli chimpanzees are species-typical in certain regards, such as including ripe fruit in the diet during all months of the year, they also adjust their behavior to the particular stresses of this dry, hot and open environment. These behaviors include using caves as shelters during the dry season, soaking in pools of water during the hot, early rainy season, and traveling and foraging at night during maximum phases of the moon. Adult males of this 35-member community serve as focal subjects in a long-term study of the ecology and behavior of chimpanzees in a savanna-mosaic environment. Here, we report on Fongoli chimpanzee activity budgets, grouping behavior, and habitat use during the dry versus wet season based on over 2500 hours of observation from March 2005–July 2006. Findings support the hypothesis that ecological pressures associated with a savanna environment significantly affect great ape behavior. The Fongoli chimpanzees’ large home range (>65km²) is sometimes used cyclically, with the community traveling as one large party, in contrast to the typical chimpanzee fission-fusion pattern. Combined with data on temperature in the various habitats within the savanna mosaic, results show that Fongoli chimpanzees minimize energy expenditure during the hottest months and at the hottest time of day by resting more and traveling less, in addition to selectively using small patches of closed-canopy habitats, such as gallery forest. They move significantly more during early hours of the hot, dry season specifically and range in smaller parties at this time compared to during the wet season. The stresses associated with a savanna-mosaic environment and chimpanzees’ behavioral adjustments to them have important implications for understanding early hominin behavior in similar environments.

https://www.researchgate.net/publication/240844888_Chimpanzee_Pan_troglodytes_verus_Behavioral_Responses_to_Stresses_Associated_with_Living_in_a_Savanna-Mosaic_Environment_Implications_for_Hominin_Adaptations_to_Open_Habitats

SCIENCE NEWS – 50,000-year-old, tar-smeared tool shows Neanderthal smarts

Old-school scholars considered Neanderthals brutish and simple, but recent research shows they made jewelry, had a precision grip, and may have even painted cave art. Now, a tar-caked tool found on a Dutch beach supports the idea that Neanderthals could accomplish complex, multistep tasks that took planning ahead over several days.


SOCIETY FOR SCIENCE – Organoids offer clues to how brains are made in humans and chimpanzees

Three-dimensional clumps of brain cells offer clues about how brains get made in humans and chimpanzees.

A Milk and Ochre Paint Mixture Used 49,000 Years Ago at Sibudu, South Africa

Gas chromatography/mass spectrometry, proteomic and scanning electron microscopy with energy-dispersive X-ray spectroscopy (SEM/EDS) analyses of residue on a stone flake from a 49,000 year-old layer of Sibudu (South Africa) indicate a mixture of ochre and casein from milk, likely obtained by killing a lactating wild bovid. Ochre powder production and use are documented in Middle Stone Age South African sites but until now there has been no evidence of the use of milk as a binder.

Our analyses show that this ochre-based mixture was neither a hafting adhesive nor a residue left after treating animal skins, but a liquid mixture consisting of a powdered pigment mixed with milk; in other words, a paint medium that could have been applied to a surface or to human skin. The significance of our finds also lies in the fact that it establishes the antiquity of the use of milk as a binder well before the introduction of domestic cattle in South Africa in the first millennium AD.

https://www.academia.edu/17147498/A_Milk_and_Ochre_Paint_Mixture_Used_49_000_Years_Ago_at_Sibudu_South_Africa?email_work_card=view-paper
between symmetric and asymmetric cognitive structures. Specifically, whereas symmetric structures devoid of thematic empirical finding concerns the role of language, potential for introducing asymmetry, this paper focuses on one specific feature, namely thematic between two kinds of cognitive structures: symmetric and asymmetric. While in principle any feature whatsoever has the potential for introducing asymmetry by elephants is affected by the ecological conditions within their forest resort and by the farming landscape outside (Barnes, 2002; Barnes et al., 2003; Danquah, 2003; Chiyo et al., 2005). In addition, physical features of the environment play a role. For example, Dickinson (1998) suspected that the Kakum elephants raided less frequently at the full moon. Here we test Dickinson’s (1998) hypothesis for the Kakum elephants using data from an investigation of crop-raiding around KCA (Barnes et al., 2003, 2005). An exploratory analysis of the data revealed that rainfall was another physical variable that influenced crop-raiding, and here we show how rainfall and lunar phase together predict the risk from elephants.

https://www.academia.edu/28257374/Crop-raiding_elephants_and_the_moon

THE CONVERSATION – We need to understand the culture of whales so we can save them
Do animals have their own culture? A researcher studying the culture of whales argues that they do. She says understanding that may be one way to save them from extinction.

https://theconversationuk.cmail19.com/t/r-l-jdidzuk-khhilahh-e/

OTHER NEWS – The Royal Society – All our journal content is free to access – LAST DAY!
We are delighted to announce our participation in Open Access Week, which runs from 21 – 27 October. For the duration of the event, all our journal content will be free to access. We have been publishing groundbreaking research since 1665 and our archive includes papers by some of the world’s most eminent scientists, as well as many of the most important discoveries from history. Our journals are multi-disciplinary so, whatever your area, or whatever your interest, there will be something in our archive for you.

https://eur03.safelinks.protection.outlook.com/?url=http%3A%2F%2Fnewsletters.royalsociety.org%2Fc%2F1CeFePuMcqQs1b1eN9s2rO6mdg4&data=01%7C01%7CMARTIN.1.EDWARDES%40KCL.AC.UK%7Cf3dfbde264f4096968e08d757a8ee22%7C83970cf141f34c16b83c7240716e4356%7C0&data=vvMSdn2HFik0eo5gzTFBFAh2FHDWMQe3f%2B%2BN8Z6VIww%3D&reserv=0

PUBLICATIONS

Frontiers in Psychology

PAPERS

ALPASLAN AKAY, GÖKHAN KARABULUT & BILGE TERZİOĞLU – Standing in Others’ Shoes: Empathy and Positional Behavior
Studies show that people are concerned with other people's consumption position in a varying degree with respect to the type of goods consumed and individual characteristics. Using both survey experiments and a large survey of subjective well-being (SWB) dataset, this paper aims to investigate the association between the degree of empathic capacity and positional concerns for consumption items involving pleasure and pain. The paper exploits both empathy quotient (EQ) and interpersonal reactivity index (IRI) measures of empathic capacity, i.e., dispositional empathy, which are sufficient measures capturing affective and cognitive aspects of empathy. Positional concerns are identified directly using a series of stated choice experiments and indirectly using the SWB approach. The main result of the paper is that positional concerns vary substantially with the levels of empathic capacity. Both EQ and IRI are found to be positively associated with positional concerns for “goods” (e.g., after-tax income, market value of a luxury car), reflecting a degree of self-regarded feelings and behavior to reduce personal distress, and negatively associated with positional concerns for “bads” (e.g., working hours and poverty rates), reflecting a degree of other-regarding feelings and behavior. The results are robust with respect to various checks including statistical specifications, reference groups, and omitted variables (e.g., prosocial behavior and competitiveness) that could bias the results.


DAVID GIL & YESHAYAHU SHEN – How Grammar Introduces Asymmetry Into Cognitive Structures: Compositional Semantics, Metaphors, and Schematic Symbiosis
This paper presents a preliminary and tentative formulation of a novel empirical generalization governing the relationship between grammar and cognition across a variety of independent domains. Its point of departure is an abstract distinction between two kinds of cognitive structures: symmetric and asymmetric. While in principle any feature whatsoever has the potential for introducing asymmetry, this paper focuses on one specific feature, namely thematic-role assignment. Our main empirical finding concerns the role of language, or, more specifically, grammar, in effecting and maintaining the distinction between symmetric and asymmetric cognitive structures. Specifically, whereas symmetric structures devoid of thematic-role
assignment more commonly occur in a non-grammatical and usually also non-verbal medium, asymmetric structures involving thematic-role assignment are more likely to be associated with a grammatical medium. Our work draws together three independent strands of empirical research associated with three diverse phenomenological domains: compositional semantics, metaphors and schematological hybrids. These three domains instantiate conceptual combinations, bringing together two or more subordinate entities into a single superordinate entity. For compositional semantics this consists of a juxtaposition of constituent signs to form a single more complex sign; for metaphors this entails the bringing together of two different concepts in order to produce a comparison; while for schematological hybrids this involves the combination of different entities to form a single new hybrid entity. Our empirical results reveal a remarkable parallelism between the above three domains. Within each domain, symmetric structures tend to be associated with a non-verbal or otherwise non-grammatical medium, while asymmetric structures are more frequently associated with a grammatical medium. Thus, within each domain, grammar introduces asymmetry. More specifically, we find that in all three domains, the asymmetry in question is one that involves the assignment of thematic roles. To capture this effect, we posit two distinct levels, or tiers, of cognition: non-grammatical cognition, more commonly associated with symmetric structures, and grammatical cognition more conducive to asymmetric structures. Within each of the three phenomenological domains, we find the distinction between non-grammatical and grammatical cognition to be manifest in three independent realms, phylogeny, ontogeny, and the architecture of human cognition. Thus, grammar constitutes the driving force behind the transition from symmetric to asymmetric cognitive structures.


Journal of Linguistics

REVIEW

KUANG YE – A critical introduction to language evolution


Language and Cognition

PAPER

NIKLAS JOHANSSON, ANDREY ANIKIN & NIKOLAY ASEYEV – Color sound symbolism in natural languages

This paper investigates the underlying cognitive processes of sound–color associations by connecting perceptual evidence from research on cross-modal correspondences to sound symbolic patterns in the words for colors in natural languages. Building upon earlier perceptual experiments, we hypothesized that sonorous and bright phonemes would be over-represented in the words for bright and saturated colors. This hypothesis was tested on eleven color words and related concepts (red–green, yellow–blue, black–white, gray, night–day, dark–light) from 245 language families. Textual data was transcribed into the International Phonetic Alphabet (IPA), and each phoneme was described acoustically using high-quality IPA recordings. These acoustic measurements were then correlated with the luminance and saturation of each color obtained from cross-linguistic color-naming data in the World Color Survey. As expected, vowels with high brightness and sonority ratings were over-represented in the words for colors with high luminance, while sonorous consonants were more common in the words for saturated colors. We discuss these results in relation to lexicalization patterns and the links between iconicity and perceptual cross-modal associations.


Nature Communications

PAPER

MARIA GIULIA PRETI & DIMITRI VAN DE VILLE – Decoupling of brain function from structure reveals regional behavioral specialization in humans

The brain is an assembly of neuronal populations interconnected by structural pathways. Brain activity is expressed on and constrained by this substrate. Therefore, statistical dependencies between functional signals in directly connected areas can be expected higher. However, the degree to which brain function is bound by the underlying wiring diagram remains a complex question that has been only partially answered. Here, we introduce the structural-decoupling index to quantify the coupling strength between structure and function, and we reveal a macroscale gradient from brain regions more strongly coupled, to regions more strongly decoupled, than expected by realistic surrogate data. This gradient spans behavioral domains from lower-level sensory function to high-level cognitive ones and shows for the first time that the strength of structure-function coupling is spatially varying in line with evidence derived from other modalities, such as functional connectivity, gene expression, microstructural properties and temporal hierarchy.

https://www.nature.com/articles/s41467-019-12765-7
**Philosophical Transactions of the Royal Society B**

**PAPERS**

**JAMIE WARD – Synaesthesia: a distinct entity that is an emergent feature of adaptive neurocognitive differences**

In this article, I argue that synaesthesia is not on a continuum with neurotypical cognition. Synaesthesia is special: its phenomenology is different; it has distinct causal mechanisms; and is likely to be associated with a distinct neurocognitive profile. However, not all synaesthetes are the same, and there are quantifiable differences between them. In particular, the number of types of synaesthesia that a person possesses is a hitherto underappreciated variable that predicts cognitive differences along a number of dimensions (mental imagery, sensory sensitivity, attention to detail). Together with enhanced memory, this may constitute a common core of abilities that may go some way to explaining why synaesthesia might have evolved. I argue that the direct benefits of synaesthesia are generally limited (i.e. the synaesthetic associations do not convey novel information about the world) but, nevertheless, synaesthesia may develop due to other adaptive functions (e.g. perceptual ability, memory) that necessitate changes to design features of the brain. The article concludes by suggesting that synaesthesia forces us to reconsider what we mean by a ‘normal’ mind/brain. There may be multiple ‘normal’ neurodevelopmental trajectories that can sculpt very different ways of experiencing the world, of which synaesthesia is but one.


**JENNIFER L. MANKIN – Deepening understanding of language through synaesthesia: a call to reform and expand**

In this paper, I present arguments and suggestions for the improvement of the scientific study of synaesthesia, and particularly grapheme-colour synaesthesia in relation to psycholinguistic research, although the principles I advocate can be easily adapted to any subfield of synaesthesia study. I postulate that the current state of research on synaesthesia in general, and on grapheme-colour synaesthesia in particular, suffers from a lack of exploratory evidence and essential groundwork upon which to build hypothesis-testing studies. In particular, I argue that synaesthesia research has been artificially bounded by assumptions about the nature of synaesthetic experiences, which constrain both the questions that researchers ask and the way in which they go about answering those questions. As a specific example, I detail how much of the current research on grapheme-colour synaesthesia is built to accommodate two major assumptions about the nature of colours for letters and for words—assumptions which I will contend are not universally true, and the exceptions to which point to a much richer and heterogeneous understanding of synaesthetic experience than current research practices capture. The top-down predetermination of what is important or meaningful to measure, and what is not, has subsequently impeded a full understanding of what synaesthesia is and how it works. I argue that these assumptions must be carefully addressed and evaluated, both for the particular case of grapheme-colour synaesthesia and for the field as a whole, to move towards a holistic and fruitful understanding of synaesthesia as a phenomenon and as a tool to study language, thought and perception. To that end, I propose specific recommendations for synaesthesia researchers to solidify and expand their understanding and to capture the actual experience of synaesthetes.


**MARIE LUISE SCHREITER et al – How non-veridical perception drives actions in healthy humans: evidence from synaesthesia**

We continually perform actions that are driven by our perception and it is a commonly held view that only objectively perceived changes within the ‘real’ world affect behaviour. Exceptions are generally only made for mental health disorders associated with delusions and hallucinations where behaviour may be triggered by the experience of objectively non-existent percepts. Here, we demonstrate, using synaesthesia as a model condition (in N = 19 grapheme-colour synaesthetes), how objectively non-existent (i.e. non-veridical) but still non-pathological perceptions affect actions in healthy humans. Using electroencephalography, we determine whether early-stage perceptual processes (reflected by P1 and N1 event-related potential (ERP) components), or late-stage-integration processes (reflected by N2 component), underlie the effects of non-veridical perceptions on action control. ERP analysis suggests that even though the examined peculiarities and experimental variations are perceptual in nature, it is not early-stage perceptual processes, but rather higher-order executive control processes linking perceptions to the appropriate motor response underlying this effect. Source localization analysis implicates activation within medial frontal cortices in the effect of how irrelevant non-veridical perceptions modulate behaviour. Our results challenge common conceptions about the determinants of human behaviour but can be explained by well-established theoretical frameworks detailing the link between perception and action.


**KALLIOPI IOUMPA et al – Enhanced self-reported affect and prosocial behaviour without differential physiological responses in mirror-sensory synaesthesia**

Mirror-sensory synaesthetes mirror the pain or touch that they observe in other people on their own bodies. This type of synaesthesia has been associated with enhanced empathy. We investigated whether the enhanced empathy of people with mirror-sensory synaesthesia influences the experience of situations involving touch or pain and whether it affects their prosocial decision making. Mirror-sensory synaesthetes (N = 18, all female), verified with a touch-interference paradigm, were compared with a similar number of age-matched control individuals (all female). Participants viewed arousing images depicting pain or touch; we recorded subjective valence and arousal ratings, and physiological responses, hypothesizing more
extreme reactions in synaesthetes. The subjective impact of positive and negative images was stronger in synaesthetes than in control participants; the stronger the reported synaesthesia, the more extreme the picture ratings. However, there was no evidence for differential physiological or hormonal responses to arousing pictures. Prosocial decision making was assessed with an economic game assessing altruism, in which participants had to divide money between themselves and a second player. Mirror-sensory synaesthetes donated more money than non-synaesthetes, showing enhanced prosocial behaviour, and also scored higher on the Interpersonal Reactivity Index as a measure of empathy. Our study demonstrates the subjective impact of mirror-sensory synaesthesia and its stimulating influence on prosocial behaviour. https://royalsocietypublishing.org/doi/full/10.1098/rstb.2019.0395

PLoS One

PAPERS

DREW M. ALTSCHUL et mul – Establishing an Infrastructure for collaboration in primate cognition research

Inferring the evolutionary history of cognitive abilities requires large and diverse samples. However, such samples are often beyond the reach of individual researchers or institutions, and studies are often limited to small numbers of species. Consequently, methodological and site-specific differences across studies can limit comparisons between species. Here we introduce the ManyPrimates project, which addresses these challenges by providing a large-scale collaborative framework for comparative studies in primate cognition. To demonstrate the viability of the project we conducted a case study of short-term memory. In this initial study, we were able to include 176 individuals from 12 primate species housed at 11 sites across Africa, Asia, North America and Europe. All subjects were tested in a delayed-response task using consistent methodology across sites. Individuals could access food rewards by remembering the position of the hidden reward after a 0, 15, or 30-second delay. Overall, individuals performed better with shorter delays, as predicted by previous studies. Phylogenetic analysis revealed a strong phylogenetic signal for short-term memory. Although, with only 12 species, the validity of this analysis is limited, our initial results demonstrate the feasibility of a large, collaborative open-science project. We present the ManyPrimates project as an exciting opportunity to address open questions in primate cognition and behaviour with large, diverse datasets. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0223675

YVONNE ZÜRCHER, ERIK P. WILLEMS & JUDITH M. BURKART – Are dialects socially learned in marmoset monkeys?

Evidence from translocation experiments

The acoustic properties of vocalizations in common marmosets differ between populations. These differences may be the result of social vocal learning, but they can also result from environmental or genetic differences between populations. We performed translocation experiments to separately quantify the influence of a change in the physical environment (experiment 1), and a change in the social environment (experiment 2) on the acoustic properties of calls from individual captive common marmosets. If population differences were due to genetic differences, we expected no change in the vocalizations of the translocated marmosets. If differences were due to environmental factors, we expected vocalizations to permanently change contingent with environmental changes. If social learning was involved, we expected that the vocalizations of animals translocated to a new population with a different dialect would become more similar to the new population. In experiment 1, we translocated marmosets to a different physical environment without changing the social composition of the groups or their neighbours. Immediately after the translocation to the new facility, one out of three call types showed a significant change in call structure, but 5–6 weeks later, the calls were no longer different from before the translocation. Thus, the novel physical environment did not induce long lasting changes in the vocalizations of the marmosets. In experiment 2, we translocated marmosets to a new population with a different dialect. Importantly, our previous work had shown that these two populations differed significantly in vocalization structure. The translocated marmosets were still housed in their original social group, but after translocation they were surrounded by the vocalizations from neighbouring groups of the new population. The vocal distance between the translocated individuals and the new population decreased for two out of three call types over 16 weeks. Thus, even without direct social contact or interaction, the vocalizations of the translocated animals converged towards the new population, indicating that common marmosets can modify their calls due to acoustic input from conspecifics alone, via crowd vocal learning. To our knowledge, this is the first study able to distinguish between different explanations for vocal dialects as well as to show crowd vocal learning in a primate species. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0222486

PNAS

ARTICLES

JOÃO ZILHÃO – Tar adhesives, Neandertals, and the tyranny of the discontinuous mind

Were the builders of Stonehenge and the painters of Altamira (Fig. 1) cognitively and behaviorally like present-day humans? Did those prehistoric people have language? In the absence of writing, these never-asked questions cannot be answered with direct evidence. However, we take it for granted that, yes, they were, and they did. We do so because we instinctively know that such works require the capacity for abstract thought, deep foresight, and sophisticated communication. In current scientific discourse, this “complex” cognition is set against the simpler modes that can be observed in other species and are
assumed to also have characterized our nonhuman ancestors. Hence the question that lies at the core of much paleoanthropological research: When, how, and why did humans acquire language and so-called “modern” (i.e., like present-day) cognition and behavior? Or, put another way, when did humans become, well, “human”? In PNAS, Niekus et al. (1) speak to these issues based on their analysis of a 50,000-y-old flint flake dredged from the postglacially submerged Rhine-Meuse Valley in the North Sea off Holland. The flake is embedded in birch bark tar and is of Neandertal make. It adds to comparable finds showing that Neandertals used artificial adhesives to haft, or better handle, stone tools across their entire geographic range and since at least 200,000 y ago. 
https://www.pnas.org/content/early/2019/10/10/1916116116?etoc=

SEAN GRANT & KATHRYN E. BOUSKILL – Why Institutional review boards should have a role in the open science movement
Open science involves the use of practices across the research life cycle that facilitate the transparency, reproducibility, and availability of scientific products and output. Prominent open science practices include registration of study protocols and preanalysis plans; materials, data, and code sharing; and publication of summary findings in open access outlets. To achieve openness as the default approach, initiatives are trying to use a systems approach to engage stakeholders—namely, scientific journals, funding agencies, and professional societies. Proponents hope to realign the research enterprise with the values of transparency and reproducibility. Institutional review boards (IRBs) are overlooked, yet critical, stakeholders for proponents to engage in open science initiatives. 
https://www.pnas.org/content/116/43/21336?etoc=

PAPERS

MARCEL J. L. TH. NIEKUS et al – Middle Paleolithic complex technology and a Neandertal tar-backed tool from the Dutch North Sea
We report the discovery of a 50,000-y-old birch tar-hafted flint tool found off the present-day coastline of The Netherlands. The production of adhesives and multicomponent tools is considered complex technology and has a prominent place in discussions about the evolution of human behavior. This find provides evidence on the ecological capabilities of Neandertals and illuminates the currently debated conditions under which these technologies could be maintained. 14C-accelerator mass spectrometry dating and the geological provenance of the artifact firmly associates it with a host of Middle Paleolithic stone tools and a Neandertal fossil. The find was analyzed using pyrolysis-gas chromatography-mass spectrometry, X-ray micro-computed tomography, and optical light microscopy. The object is a piece of birch tar, encompassing one-third of a flint flake. This find is from northwestern Europe and complements a small set of well-dated and chemically identified adhesives from Middle Paleolithic/Middle Stone Age contexts. Together with data from experiments and other Middle Paleolithic adhesives, it demonstrates that Neandertals mastered complex adhesive production strategies and composite tool use at the northern edge of their range. Thus, a large population size is not a necessary condition for complex behavior and technology. The mitigation of ecological risk, as demonstrated by the challenging conditions during Marine Isotope Stage 4 and 3, provides a better explanation for the transmission and maintenance of technological complexity.
https://www.pnas.org/content/early/2019/10/15/1907828116.abstract?etoc=

MICHAEL W. KRAUS et al – Evidence for the reproduction of social class in brief speech
Economic inequality is at its highest point on record and is linked to poorer health and well-being across countries. The forces that perpetuate inequality continue to be studied, and here we examine how a person’s position within the economic hierarchy, their social class, is accurately perceived and reproduced by mundane patterns embedded in brief speech. Studies 1 through 4 examined the extent that people accurately perceive social class based on brief speech patterns. We find that brief speech spoken out of context is sufficient to allow respondents to discern the social class of speakers at levels above chance accuracy, that adherence to both digital and subjective standards for English is associated with higher perceived and actual social class of speakers, and that pronunciation cues in speech communicate social class over and above speech content. In study 5, we find that people with prior hiring experience use speech patterns in preinterview conversations to judge the fit, competence, starting salary, and signing bonus of prospective job candidates in ways that bias the process in favor of applicants of higher social class. Overall, this research provides evidence for the stratification of common speech and its role in both shaping perceiver judgments and perpetuating inequality during the briefest interactions.
https://www.pnas.org/content/early/2019/10/15/1900500116.abstract?etoc=

MIGUEL SÁNCHEZ-VALPUESTA et al – Corticobasal ganglia projecting neurons are required for juvenile vocal learning but not for adult vocal plasticity in songbirds
Birdsong, like human speech, consists of a sequence of temporally precise movements acquired through vocal learning. The learning of such sequential vocalizations depends on the neural function of the motor cortex and basal ganglia. However, it is unknown how the connections between cortical and basal ganglia components contribute to vocal motor skill learning, as mammalian motor cortices serve multiple types of motor action and most experimentally tractable animals do not exhibit vocal learning. Here, we leveraged the zebra finch, a songbird, as an animal model to explore the function of the connectivity between cortex-like (HVC) and basal ganglia (area X), connected by HVC(X) projection neurons with temporally precise firing
during singing. By specifically ablating HVC(X) neurons, juvenile zebra finches failed to copy tutored syllable acoustics and developed temporally unstable songs with less sequence consistency. In contrast, HVC(X)-ablated adults did not alter their learned song structure, but generated acoustic fluctuations and responded to auditory feedback disruption by the introduction of song deterioration, as did normal adults. These results indicate that the corticobasal ganglia input is important for learning the acoustic and temporal aspects of song structure, but not for generating vocal fluctuations that contribute to the maintenance of an already learned vocal pattern.

https://www.pnas.org/content/early/2019/10/18/1913575116.abstract?etoc

J. TYLER FAITH, JOHN ROWAN & ANDREW DU – Early hominins evolved within non-analog ecosystems
Present-day African ecosystems serve as referential models for conceptualizing the environmental context of early hominin evolution, but the degree to which modern ecosystems are representative of those in the past is unclear. A growing body of evidence from eastern Africa’s rich and well-dated late Cenozoic fossil record documents communities of large-bodied mammalian herbivores with ecological structures differing dramatically from those of the present day, implying that modern communities may not be suitable analogs for the ancient ecosystems of hominin evolution. To determine when and why the ecological structure of eastern Africa’s herbivore faunas came to resemble those of the present, here we analyze functional trait changes in a comprehensive dataset of 305 modern and fossil herbivore communities spanning the last ~7 Myr. We show that nearly all communities prior to ~700 ka were functionally non-analog, largely due to a greater richness of non-ruminants and megaherbivores (species >1,000 kg). The emergence of functionally modern communities precedes that of taxonomically modern communities by 100,000s of years, and can be attributed to the combined influence of Plio-Pleistocene C4 grassland expansion and pulses of aridity after ~1 Ma. Given the disproportionate ecological impacts of large-bodied herbivores on factors such as vegetation structure, hydrology, and fire regimes, it follows that the vast majority of early hominin evolution transpired in the context of ecosystems that functioned unlike any today. Identifying how past ecosystems differed compositionally and functionally from those today is key to conceptualizing ancient African environments and testing ecological hypotheses of hominin evolution.

https://www.pnas.org/content/116/43/21478.abstract?etoc

Trends in Cognitive Sciences
PAPERS
MARK VAN VUGT & JENNIFER E. SMITH – A Dual Model of Leadership and Hierarchy: Evolutionary Synthesis
From the popularity of authoritarian political leaders to the under-representation of women in boardrooms, leadership is an important theme in current human social affairs. Leadership is also a prominent research topic in the biological, social, and cognitive sciences. However, these active literatures have evolved somewhat independently and there is a need for synthesis. A comparative-evolutionary approach can integrate seemingly divergent perspectives by making a distinction between two leadership styles, prestige and dominance, that have contrasting expressions, functions, histories, and neural and developmental pathways. The distinction may help to resolve various scientific puzzles, such as: (i) opposing views on the different functions and expressions of leadership; (ii) the appeal of dominance-style leaders; and (iii) sex biases in leadership emergence in modern society.


Trends in Neurosciences
PAPERS
JUDITH N. MILDNER & DIANA I. TAMIR – Spontaneous Thought as an Unconstrained Memory Process
The stream of thought can flow freely, without much guidance from attention or cognitive control. What determines what we think about from one moment to the next? Spontaneous thought shares many commonalities with memory processes. We use insights from computational models of memory to explain how the stream of thought flows through the landscape of memory. In this framework of spontaneous thought, semantic memory scaffolds episodic memory to form the content of thought, and drifting context modulated by one’s current state – both internal and external – constrains the area of memory to explore. This conceptualization of spontaneous thought can help to answer outstanding questions such as: what is the function of spontaneous thought, and how does the mind select what to think about?

https://www.cell.com/trends/neurosciences/fulltext/S0166-2236(19)30162-6

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