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NOTICES

PUBLICATION ALERTS
If you have had a paper or book published, or you see something which would be of interest to the group, 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.
NEW EAORC WEBSITE
Please note the new EAORC website address: http://martinedwardes.me.uk/eaorc/. If you visit the old website you are directed to the new one; the old website will cease to exist in August 2019.

SCIENCE NEWS – A busy week for the open-access movement
It’s been a busy week for the open-access movement, the effort to make all scientific journal articles immediately free to read. Making that change would require a major shift in most journals’ business models, from one that charges subscribers to read articles to one in which authors pay to publish.


SCIENCE NEWS – Humans are wiping out chimpanzee cultures
When chimpanzees encounter humans, it’s usually bad news for the chimps. Logging, hunting, and epidemics have helped push chimpanzee populations to the brink across their range in West and Central Africa. Now, a new study suggests human activity may also rob chimp populations of their cultures.


SCIENCE NEWS – Disorder left ancient human relative with teeth pocked like golf balls
Add this to your list of nightmare jobs: prehistoric dentist. Had the profession existed 1.8 million years ago, it would have encountered an ancient human relative with a disconcertingly common dental disorder: weakened, pockmarked teeth resembling the surface of a golf ball.


SOCIETY FOR SCIENCE – How singing mice belt out duets
A precise timing system in the brain helps musical rodents from the cloud forests of Costa Rica sing to one another.

http://click.societyforscience-email.com/?qs=3aff31c53f60030ca94d84495cc7d0753408af92e9e8bb14e65b66c0dbd7b314563b5b055cf915de929ba842b7eae06f55e3edbec6f30c

SOCIETY FOR SCIENCE – Hominids may have hunted rabbits as far back as 400,000 years ago
Stone Age groups in Europe put small game on the menu surprisingly early.

http://click.societyforscience-email.com/?qs=b20e571225fc788a234b346c4acae19404f5de563d3e3a7b4ce2520f167531da4eaebe0cf1ce48f010e24badb040f5b840e0c567c8e0

SOCIETY FOR SCIENCE – Ripples race in the brain as memories are recalled
A fast brain wave called a ripple often came before a person’s correct answer on a memory test.

http://click.societyforscience-email.com/?qs=b5afe3f635ef0fb734b7ab50ae811303e2260c05941ff8e088f853629d606f14691557946c1354a5cc46cc055f66c2dad994f929b957993

SOCIETY FOR SCIENCE – Human encroachment threatens chimpanzee culture
Human activity is affecting chimps’ behavioral repertoire, a new study suggests. Creating chimp cultural heritage sites might save unique behaviors.

http://click.societyforscience-email.com/?qs=b5afe3f635ef0fb7811d16385b2653cc52f91f5cfff4a7bef90bdcb28d7072fc6d358375723aaaa883db2ba88df6e68a8e82674f5a6eb6

SCIENCE DAILY – Seven moral rules found all around the world
What is morality? And to what extent does it vary around the world? The theory of ‘morality-as-cooperation’ argues that morality consists of a collection of biological and cultural solutions to the problems of cooperation recurrent in human social life. These solutions or cooperative behaviors are plausible candidates for universal moral rules, and that morality-as-cooperation could provide the unified theory of morality that anthropology has hitherto lacked.

https://www.sciencedaily.com/releases/2019/03/190304134216.htm
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<td>The inhabitants of several sites in the Upper Tigris Valley, such as Hakemi Use, domesticated animals and cereals during the Pottery Neolithic period, while the inhabitants in this valley were hunter–gatherers in the Pre-Pottery Neolithic period, consuming freshwater and terrestrial food resources. However, there is considerable uncertainty surrounding whether or not changes in dietary food composition accompanied the shift in food production away from foraging. In order to reveal the impact of the development of agriculture on the human diet over the Pre-Pottery and Pottery Neolithic periods in this region, we analyzed the isotopic compositions of amino acids from the farmers at the Hakemi Use Pottery Neolithic site, and compared them with those from the Pre-Pottery hunter–gatherers in the close region. Whereas freshwater resources were consumed by hunter–gatherers in this region during the Pre-Pottery period, the δ15N values of glutamic acid (δ15NGlu) and phenylalanine (δ15NPhe) suggest that freshwater food resources were rarely consumed by inhabitants following the development of agriculture. Despite living in similar settings by the Tigris as its inhabitants during the Pre-Pottery period, the farmers of the Pottery Neolithic period depended less on freshwater resources for their diets relative to the hunter–gatherers of the Pre-Pottery Neolithic period.</td>
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<td><strong>CYRIL C. GRUETER et al – Infant handling by female mountain gorillas: Establishing its frequency, function, and (ir)relevance for life history evolution</strong></td>
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<td>Infant handling describes cases in which youngsters are temporarily removed from the care of their mothers and “taken care of” (held, carried, etc.) by other conspecifics. Handlers may gain indirect fitness benefits from these actions and can practice mothering skills, thereby improving the odds of survival of their own infants. Great apes are notable for displaying little infant handling. Apart from anecdotal observations, no published data exist on infant handling in wild mountain gorillas. We tested two of the most pertinent explanations (“kin selection” and “learning to mother”) in a wild population of mountain gorillas in Rwanda. We predicted that (a) nulliparous females would exhibit infant handling (i.e., carrying) more than parous females and (b) maternal kin would exhibit more infant handling than nonkin. We collated 8 years of data on infant carrying behavior collected in 13 groups monitored by the Dian Fossey Gorilla Fund’s Karisoke Research Center. Infant handling is an infrequent behavior (1,783 instances over 25,600 observation hours). A strong positive effect of relatedness and handler parity on the frequency of infant handling emerged. While the nature of handler–infant interactions (affiliative, abusive, etc.) remains unstudied, they could constitute alloparental care and could therefore attenuate maternal energetic burden and ultimately allow increased birth rates. However, the rarity of this behavior makes it an unlikely contributor to mountain gorillas’ relatively short interbirth intervals.</td>
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<td><strong>JONATHAN SANTANA et al – Aggressive or funerary cannibalism? Skull-cup and human bone manipulation in Cueva de El Toro (Early Neolithic, southern Iberia)</strong></td>
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<td>We analyze the processing sequence involved in the manufacture of a skull-cup and the manipulation of human bones from the Early Neolithic of Cueva de El Toro (Málaga, Spain). The Early Neolithic material studied includes human remains found in two separate assemblages. Assemblage A consists of one skull-cup, a non-manipulated adult human mandible, and four ceramic vessels. Assemblage B contains manipulated and non-manipulated human remains that appeared mingled with domestic waste. Using a taphonomic approach, we evaluate the skull-cup processing and the anthropogenic alteration of human bones. Evidence from Cueva de El Toro suggests that cannibalism was conducted in the domestic sphere, likely following ritualized practices where the skull-cup could have played a part. Interpretation of this evidence suggests two hypotheses: (a) aggressive cannibalism relates to extreme inter-group violence; and (b) funerary cannibalism is a facet of multi-stage burial practices. Similar evidence has been found in other Neolithic sites of this region and suggests that cannibalism and skull-cups were elements widespread in these communities. These practices may be linked to significant transformations associated with the end of the Early Neolithic in southern Iberia.</td>
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| Animal Behaviour |
| PAPERS |
| **T.M. PALACIOS-ROMO, F.CASTELLANOS & G.RAMOS-FERNANDEZ – Uncovering the decision rules behind collective foraging in spider monkeys** |
| Unlike animals living in cohesive groups, those in groups with high fission–fusion dynamics can separate temporarily from other group members. While mechanisms underlying collective decisions are not well understood, it is possible that these |
separations occur by a divergence of interests between individuals. We evaluated the collective foraging decisions made by a group of Geoffroy’s spider monkeys, Ateles geoffroyi, in a tropical forest in the Yucatan peninsula, Mexico. We assessed whether each individual’s centrality in the social network, years living in the group, age, sex and social relationships affected the collective decisions. We examined two collective dynamics: foraging movements and arrivals to novel food patches, and in the latter, identified knowledgeable and naïve individuals. In both dynamics, spider monkeys exhibited partially shared leadership influenced by individual attributes, particularly the centrality in the social network, age and time in the group. These attributes have been associated with ecological knowledge. In arrivals to novel food patches, individuals most likely to have information about food resources (i.e. central individuals and males) had a greater likelihood to be followed, suggesting an influence of social information on the tendency to follow others. Also, we show evidence that social information could accelerate the arrival of naïve individuals to these patches. Collective foraging dynamics in our study group seem to arise from local rules that each individual follows when foraging: when a naïve individual needs social information to forage, it will follow the individual that is more likely to have this information, i.e. a central individual or a male; otherwise, when it is not possible or necessary to use social information, naïve individuals will follow a partner with which they have a strong social relationship. Thus, the interaction between local decision rules and the structure of the social network could drive collective coordination in foraging dynamics.


Biology Letters
PAPERS
BARBARA C. KLUMP, MATHIEU CANTAT & CHRISTIAN RUTZ – Raw-material selectivity in hook-tool-crafting New Caledonian crows
Animals that manufacture foraging tools face the challenge of identifying suitable raw materials among a multitude of options. New Caledonian crows exhibit strong population-specific material preferences for the manufacture of hooked stick tools, but it is unknown how they identify their favourite plants. We investigated experimentally whether crows pay attention to the stems of plants (from which the tools are made) and/or their leaves (which are usually discarded during manufacture but may enable rapid and reliable species identification at a distance). Subjects were highly selective in choice trials with multiple plant species. Two additional treatments with experimental leaf–stem combinations revealed that birds can identify their preferred plant species by its stems alone, and possibly also its leaves. These findings encourage future experiments that investigate whether New Caledonian crows attend to features of the stem that are required for the production of efficient hooked stick tools. Our study provides one of the most detailed assessments to date of how non-human animals identify raw materials for tool manufacture.

Evolutionary Anthropology
PAPERS
J. FRANCIS THACKERAY – Teilhard de Chardin, human evolution and “Piltdown Man”
Pierre Teilhard de Chardin was a French Jesuit paleontologist, priest, and philosopher. In the figures published in articles in 1943 and 1951, he attempted to draw a “plausible schematic reconstruction of the natural connections between fossil men” and “a phyletic composition of the human group”. I draw attention to Teilhard’s reference to Eoanthropus (“Piltdown Man”) in small print in his figure that was first printed in 1943. Most suspiciously, there is no reference to this (supposedly important) genus in the associated text, nor is there any reference whatsoever to “Piltdown Man” in the article published in 1951. Even as early as January 1913, Teilhard may have been aware that “Piltdown Man” was a hoax or joke, artificially associating a human cranium with a modified orangutan mandible. A new suspect is Edgar Willett (rather than Charles Dawson). Teilhard may have been an advisory accomplice in a joke that went seriously wrong.

Frontiers in Neuroscience
ARTICLES
PEDRO MATEOS-APARICIO & ANTONIO RODRÍGUEZ-MORENO – The Impact of Studying Brain Plasticity
Neural plasticity, also known as neuroplasticity or brain plasticity, can be defined as the ability of the nervous system to change its activity in response to intrinsic or extrinsic stimuli by reorganizing its structure, functions, or connections. A fundamental property of neurons is their ability to modify the strength and efficacy of synaptic transmission through a diverse number of activity-dependent mechanisms, typically referred as synaptic plasticity. Research in the past century has showed that neural plasticity is a fundamental property of nervous systems in species from insects to humans. Indeed, studies into synaptic plasticity have not only been an important driving force in neuroscience research but they are also contributing to the well-being of our societies as this phenomenon is involved in learning and memory, brain development and homeostasis, sensorial training, and recovery from brain lesions. However, despite intense research into the mechanisms governing synaptic plasticity, it is still not clear exactly how plasticity shapes brain morphology and physiology. Thus, studying synaptic plasticity is clearly still important if we wish to fully understand how the brain works.
Frontiers in Psychology

BAUKE M. DE JONG – Free Will Emerges From a Multistage Process of Target Assignment and Body-Scheme Recruitment for Free Effector Selection

Self-intended action implies an initial stage of assigning an external entity as target of action, with subsequent recruitment of body-scheme information serving the free selection of an appropriate effector system to achieve the action aim. This plurality underscores that neuronal response freedom underlying the generation of such action is not necessarily restricted to a singular cerebral concept at its initiation, but that such freedom is embedded in a series of successive processing steps. In this respect, action intention initially concerns the transition of a neutral object into a target of action, while the “will” to act further crystallizes with the recruitment of one’s body scheme. The latter is a prerequisite for effector selection and indeed complements the emerging sense of agency. This temporal order of neuronal events fits a model of fronto-parietal interactions associated with volition. A concise behavioral experiment is additionally described, in which successively displayed balls represent either a recognizable object with distinct shape and color features, or a target of action. Instructions to write down the ball’s characteristics were alternated by the command “action.” When shifting from a neutral object to an action target, the ball was placed in one of three backgrounds: empty, an outdoor goal or indoor basket. In response to the action command, subjects reported intended actions such as kicking, seizing, throwing and heading, thus implicitly referring to the foot, hand, or head as chosen effector. For the latter the parietal cortex is strongly implicated, not only concerning predefined but also free selection. Although subjects were free to choose what to do with the ball, the environmental cues of the ball strongly influenced their choices. These results illustrate the temporal order in fronto-parietal processing associated with initial target assignment, instantly followed by the embodiment of will, i.e., the recruitment of body-scheme information for possible effector selection. Such multistage neuronal processing underlying free action selection underscores that the onset of brain signals prior to the perceived sense of free will is not a valid argument to reduce free will to an illusion.

Interface: Journal of the Royal Society

SHINNOSUKE NAKAYAMA et al – Social information and spontaneous emergence of leaders in human groups

Understanding the dynamics of social networks is the objective of interdisciplinary research ranging from animal collective behaviour to epidemiology, political science and marketing. Social influence is key to comprehending emergent group behaviour, but we know little about how inter-individual relationships emerge in the first place. We conducted an experiment where participants repeatedly performed a cognitive test in a small group. In each round, they were allowed to change their answers upon seeing the current answers of other members and their past performance in selecting correct answers. Rather than following a simple majority rule, participants granularly processed the performance of others in deciding how to change their answers. Toward a network model of the experiment, we associated a directed link of a time-varying network with every change in a participant’s answer that mirrored the answer of another group member. The rate of growth of the network was not constant in time, whereby links were found to emerge faster as time progressed. Further, repeated interactions reinforced relationships between individuals’ performance and their network centrality. Our results provide empirical evidence that inter-individual relationships spontaneously emerge in an adaptive way, where good performers rise as group leaders over time.

ANDREA FALCÓN-CORTÉS, DENIS BOYER & GABRIEL RAMOS-FERNÁNDEZ – Collective learning from individual experiences and information transfer during group foraging

Living in groups brings benefits to many animals, such as protection against predators and an improved capacity for sensing and making decisions while searching for resources in uncertain environments. A body of studies has shown how collective behaviours within animal groups on the move can be useful for pooling information about the current state of the environment. The effects of interactions on collective motion have been mostly studied in models of agents with no memory. Thus, whether coordinated behaviours can emerge from individuals with memory and different foraging experiences is still poorly understood. By means of an agent-based model, we quantify how individual memory and information fluxes can contribute to improving the foraging success of a group in complex environments. In this context, we define collective learning as a coordinated change of behaviour within a group resulting from individual experiences and information transfer. We show that an initially scattered population of foragers visiting dispersed resources can gradually achieve cohesion and become selectively localized in space around the most salient resource sites. Coordination is lost when memory or information transfer among individuals is suppressed. The present modelling framework provides predictions for empirical studies of collective learning and could also find applications in swarm robotics and motivate new search algorithms based on reinforcement.
parasitic tactics can coexist stably in the same population. Success of parasites is constrained by reproductive trade-offs in which they are typically employed. We used the techniques from referential communication studies across three experiments to assess the effects of two social group factors—group size and amount of communally shared knowledge—on the brevity and transparency of linguistic conventions. In Experiment 1, we explored the effects of a manipulation of group size, comparing the conventions which develop from the interaction of two speakers, with those which develop between three speakers. In Experiment 2, we manipulated the extent to which groups of three speakers share talk-relevant contextual information. While we found the conditions that involve larger groups and less shared background information initially resulted in longer labels and a greater reliance on more literal descriptive terms, there was no effect of either factor in the longer term. In Experiment 3, we investigated the transparency of the conventions of Experiments 1 and 2 by assessing how well they could be matched to their intended referents by naive individuals. We found no evidence to support the claims that communicative contexts involving communicating with more individuals, or individuals with whom less relevant information is shared, produce more transparent conventions. Our experiments ultimately provide no support for the idea that the structure of linguistic conventions is shaped by the groups in which they develop.

https://academic.oup.com/jole/article/4/1/5146761

DAVID LINDSAY – When the Bough Breaks: A Contribution to Falk’s Hypothesis
Falk has proposed that a crucial event in the emergence of language arose when hominin infants could no longer cling to their mothers’ underbellies. As offspring came to be placed on the ground temporarily while their mothers foraged, the adaptive pressure favored the development of a protolanguage or motherese (Falk 2004, 2016). Falk’s hypothesis is important for many reasons, not least of which is its focus on the mother–child dyad, yet it omits what I believe to be a significant piece of the puzzle, which when put in place both strengthens her argument and opens new lines of inquiry.


ELENA MORGAN & GIOSUÈ BAGGIO – Language in Our Brain: The Origins of a Uniquely Human Capacity

https://academic.oup.com/jole/article/4/1/78/5106731?redirectedFrom=fulltext

When cooperators cheat
A study of a cuckoo species that usually shows cooperative nesting behaviour, but sometimes cheats at parenthood by laying eggs in others’ nests, reveals the benefits that have shaped the evolution of this parasitic tactic.

https://www.nature.com/articles/d41586-019-00643-7?WT.ec_id=NATURE-20190307&utm_source=nature_etoc&utm_medium=email&utm_campaign=20190307&sap-outbound-id=2E2B8592DB939D964A0C0BA42A46648B7CC13FAE

CHRISTINA RIEHL & MEGHAN J. STRONG – Social parasitism as an alternative reproductive tactic in a cooperatively breeding cuckoo
Cooperatively nesting birds are vulnerable to social parasites that lay their eggs in host nests but provide no parental care. Most previous research has focused on the co-evolutionary arms race between host defences and the parasites that attempt to circumvent them, but it remains unclear why females sometimes cooperate and sometimes parasitize, and how parasitic tactics arise in cooperative systems. Here we show that cooperative and parasitic reproductive strategies result in approximately equal fitness pay-offs in the greater ani (Crotophaga major), a long-lived tropical cuckoo, using an 11-year dataset and comprehensive genetic data that enable comparisons of the life-histories of individual females. We found that most females in the population nested cooperatively at the beginning of the breeding season; however, of those birds that had their first nests destroyed, a minority subsequently acted as reproductive parasites. The tendency to parasitize was highly repeatable, which indicates individual specialization. Across years, the fitness pay-offs of the two strategies were approximately equal: females who never parasitized (a ‘pure cooperative’ strategy) laid larger clutches and fledged more young from their own nests than did birds that both nested and parasitized (a ‘mixed’ strategy). Our results suggest that the success of parasites is constrained by reproductive trade-offs as well as by host defences, and illustrate how cooperative and parasitic tactics can coexist stably in the same population.
Nature Scientific Reports

PAPERS

DANIELLE R. PERSZYK & SANDRA R. WAXMAN – Infants’ advances in speech perception shape their earliest links between language and cognition

The power of human language derives not only from the precision of its signal or the complexity of its grammar, but also from its links to cognition. Infants as young as 3 months have begun to link language and core cognitive capacities. At 3 and 4 months, this link is not exclusive to human language: listening to vocalizations of nonhuman primates also supports infant cognition. By 6 months, infants have tuned this link to human speech alone. Here we provide evidence that infants’ increasing precision in speech perception shapes which signals they will link to cognition. Infants listening to German, a nonnative language that shares key rhythmic and prosodic properties with their own native language (English), successfully formed object categories. In contrast, those listening to Cantonese, a language that differs considerably in these suprasegmental properties, failed. This provides the first evidence that infants’ increasingly precise perceptual tuning to the sounds of their native language sets constraints on the range of human languages they will link to cognition: infants begin to specify which human languages they will link to core cognitive capacities even before they sever the link between nonhuman primate vocalizations and cognition.

https://www.nature.com/articles/s41598-019-39511-9

STEFANIA VAI et al – Ancestral mitochondrial N lineage from the Neolithic ‘green’ Sahara

Because Africa’s climate hampers DNA preservation, knowledge of its genetic variability is mainly restricted to modern samples, even though population genetics dynamics and back-migrations from Eurasia may have modified haplotype frequencies, masking ancient genetic scenarios. Thanks to improved methodologies, ancient genetic data for the African continent are now increasingly available, starting to fill in the gap. Here we present newly obtained mitochondrial genomes from two ~7000-year-old individuals from Takarkori rockshelter, Libya, representing the earliest and first genetic data for the Sahara region. These individuals carry a novel mutation motif linked to the haplogroup N root. Our result demonstrates the presence of an ancestral lineage of the N haplogroup in the Holocene “Green Sahara”, associated to a Middle Pastoral (Neolithic) context.

https://www.nature.com/articles/s41598-019-39802-1

FELIPE CRIADO-BOADO et al – Coevolution of visual behaviour, the material world and social complexity, depicted by the eye-tracking of archaeological objects in humans

We live in a cluttered visual world that is overflowing with information, the continuous processing of which would be a truly daunting task. Nevertheless, our brains have evolved to select which part of a visual scene is to be prioritized and analysed in detail, and which parts can be discarded or analysed at a later stage. This selection is in part determined by the visual stimuli themselves, and is known as “selective attention”, which, in turn, determines how we explore and interact with our environment, including the distinct human artefacts produced in different socio-cultural contexts. Here we hypothesize that visual responses and material objects should therefore co-evolve to reflect changes in social complexity and culture throughout history. Using eye-tracking, we analysed the eye scan paths in response to prehistoric pottery ranging from the Neolithic through to the Iron Age (ca 6000–2000 BP), finding that each ceramic style caused a particular pattern of visual exploration. Horizontal movements become dominant in earlier periods, while vertical movements are more frequent in later periods that were marked by greater social complexity.

https://www.nature.com/articles/s41598-019-39661-w

PLoS One

PAPERS

YE-SEUL LEE et al – Altruistic decisions are influenced by the allocation of monetary incentives in a pain-sharing game

Altruistic behavior is essential to the sustainability of society, but our current understanding of its underlying motivation is limited. In addition to the intrinsic motives to help others, based on empathy, extrinsic motives such as monetary incentives and social reputation influence prosociality. The purpose of this study was to examine the underlying motivations of prosocial behavior under constant or increasing extrinsic motivation settings. Prosocial behavior was influenced by the presence, as well as the form, of the extrinsic monetary incentives. Our study shows that rewards incentivize individuals to demonstrate a higher level of prosocial behavior, implying that prosocial behavior is itself a mixture of intrinsic and extrinsic motivations, and that an effectively designed rewards system may function to enhance prosocial behavior.

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0213104
LAURA B. SCHEINFELDT et al – Genomic evidence for shared common ancestry of East African hunting-gathering populations and insights into local adaptation

Anatomically modern humans arose in Africa ~300,000 years ago, but the demographic and adaptive histories of African populations are not well-characterized. Here, we have generated a genome-wide dataset from 840 Africans, residing in western, eastern, southern, and northern Africa, belonging to 50 ethnicities, and speaking languages belonging to four language families. In addition to agriculturalists and pastoralists, our study includes 16 populations that practice, or until recently have practiced, a hunting-gathering (HG) lifestyle. We observe that genetic structure in Africa is broadly correlated not only with geography, but to a lesser extent, with linguistic affiliation and subsistence strategy. Four East African HG (EHG) populations that are geographically distant from each other show evidence of common ancestry: the Hadza and Sandawe in Tanzania, who speak languages with clicks classified as Khoisan; the Dahalo in Kenya, whose language has remnant clicks; and the Sabue in Ethiopia, who speak an unclassified language. Additionally, we observed common ancestry between central African rainforest HGs and southern African San, the latter of whom speak languages with clicks classified as Khoisan. With the exception of the EHG, central African rainforest HGs, and San, other HG groups in Africa appear genetically similar to neighboring agriculturalist or pastoralist populations. We additionally demonstrate that infectious disease, immune response, and diet have played important roles in the adaptive landscape of African history. However, while the broad biological processes involved in recent human adaptation in Africa are often consistent across populations, the specific loci affected by selective pressures more often vary across populations.

https://www.pnas.org/content/116/10/4166.abstract?etoc

HONGJING LU, YING NIAN WU & KEITH J. HOLYOAK – Emergence of analogy from relation learning

By middle childhood, humans are able to learn abstract semantic relations (e.g., antonym, synonym, category membership) and use them to reason by analogy. A deep theoretical challenge is to show how such abstract relations can arise from nonrelational inputs, thereby providing key elements of a protosymbolic representation system. We have developed a computational model that exploits the potential synergy between deep learning from “big data” (to create semantic features for individual words) and supervised learning from “small data” (to create representations of semantic relations between words). Given as inputs labeled pairs of lexical representations extracted by deep learning, the model creates augmented representations by remapping features according to the rank of differences between values for the two words in each pair. These augmented representations aid in coping with the feature alignment problem (e.g., matching those features that make “love-hate” an antonym with the different features that make “rich-poor” an antonym). The model extracts weight distributions that are used to estimate the probabilities that new word pairs instantiate each relation, capturing the pattern of human typicality judgments for a broad range of abstract semantic relations. A measure of relational similarity can be derived and used to solve simple verbal analogies with human-level accuracy. Because each acquired relation has a modular representation, basic symbolic operations are enabled (notably, the converse of any learned relation can be formed without additional training). Abstract semantic relations can be induced by bootstrapping from nonrelational inputs, thereby enabling relational generalization and analogical reasoning.

https://www.pnas.org/content/116/10/4176.abstract?etoc

BJÖRN LINDSTRÖM et al – Social threat learning transfers to decision making in humans

In today’s world, mass-media and online social networks present us with unprecedented exposure to second-hand, vicarious experiences and thereby the chance of forming associations between previously innocuous events (e.g., being in a subway station) and aversive outcomes (e.g., footage or verbal reports from a violent terrorist attack) without direct experience. Such social threat, or fear, learning can have dramatic consequences, as manifested in acute stress symptoms and maladaptive fears. However, most research has so far focused on socially acquired threat responses that are expressed as increased arousal rather than active behavior. In three experiments (n = 120), we examined the effect of indirect experiences on behaviors by establishing a link between social threat learning and instrumental decision making. We contrasted learning from direct experience (e.g., Pavlovian conditioning) (experiment 1) against two common forms of social threat learning—social observation (experiment 2) and verbal instruction (experiment 3)—and how this learning transferred to subsequent instrumental decision making using behavioral experiments and computational modeling. We found that both types of social threat learning transfer to decision making in a strong and surprisingly inflexible manner. Notably, computational modeling indicated that the transfer of observational and instructed threat learning involved different computational mechanisms. Our results demonstrate the strong influence of others’ expressions of fear on one’s own decisions and have important implications for understanding both healthy and pathological human behaviors resulting from the indirect exposure to threatening events.

https://www.pnas.org/content/116/10/4732.abstract?etoc

CLAIRE KABDEBON & GHISLAINE DEHAENE-LAMBERTZ – Symbolic labeling in 5-month-old human Infants

Humans’ ability to create and manipulate symbolic structures far exceeds that of other animals. We hypothesized that this ability rests on an early capacity to use arbitrary signs to represent any mental representation, even as abstract as an algebraic rule. In three experiments, we collected high-density EEG recordings while 150 5-month-old infants were presented
with speech triplets characterized by their abstract syllabic structure—the location of syllable repetition—which predicted a following arbitrary label (e.g., ABA words were followed by a fish picture, AAB words by a lion). After a brief learning phase, EEG responses to novel words revealed that infants built expectations about the upcoming label based on the triplet structure and were surprised when it happened to be incongruent. Preverbal infants were thus able to recode the incoming triplets into abstract mental variables to which arbitrary labels were flexibly assigned. Importantly, infants also generalized to novel trials in which the pairing order was reversed (with the label preceding the auditory structure). Beyond conditioned associations, infants instantly inferred a bidirectional mapping between the abstract structures and the following label, a foundational operation for any symbolic system.

https://www.pnas.org/content/early/2019/03/04/1809144116.abstract?etoc=

**COMMENTARIES**

**ROBERT KILEY & ROBERT-JAN SMITS – cOAlition S: Response to PNAS**

We thank Marcia McNutt for her opinion piece in PNAS where she supports the goal of open access (OA). We agree with her assertion that further changes in scholarly publishing are inevitable as it “aspires to serve science and society.” This ambition is at the heart of the Plan S principles. We seek to work in partnership with funders and other stakeholders—including learned societies—to ensure that the outputs of funded research can be accessed and used by all.

https://www.pnas.org/content/early/2019/03/01/1902136116?etoc=

**MARCIA MCNUTT – Reply to Kiley and Smits: Meeting Plan S’s goal of maximizing access to research**

Thank you for recognizing the value that scholarly societies bring to the research ecosystem and the scientific enterprise as a whole—and for recognizing the importance of their financial viability.

https://www.pnas.org/content/early/2019/03/01/1902498116?etoc=

**Royal Society Open Science**

**PAPERS**

**ALEXANDER KOPLENIK – Language structure is influenced by the number of speakers but seemingly not by the proportion of non-native speakers**

Large-scale empirical evidence indicates a fascinating statistical relationship between the estimated number of language users and its linguistic and statistical structure. In this context, the linguistic niche hypothesis argues that this relationship reflects a negative selection against morphological paradigms that are hard to learn for adults, because languages with a large number of speakers are assumed to be typically spoken and learned by greater proportions of adults. In this paper, this conjecture is tested empirically for more than 2000 languages. The results question the idea of the impact of non-native speakers on the grammatical and statistical structure of languages, as it is demonstrated that the relative proportion of non-native speakers does not significantly correlate with either morphological or information-theoretic complexity. While it thus seems that large numbers of adult learners/speakers do not affect the (grammatical or statistical) structure of a language, the results suggest that there is indeed a relationship between the number of speakers and (especially) information-theoretic complexity, i.e. entropy rates. A potential explanation for the observed relationship is discussed.

https://royalsocietypublishing.org/doi/full/10.1098/rsos.181274

**Science**

**ARTICLES**

**PHILIPPA BRAKES et al with ANDREW WHITEN – Animal cultures matter for conservation**

Animal culture, defined as “information or behavior—shared within a community—which is acquired from conspecifics through some form of social learning”, can have important consequences for the survival and reproduction of individuals, social groups, and potentially, entire populations. Yet, until recently, conservation strategies and policies have focused primarily on broad demographic responses and the preservation of genetically defined, evolutionarily significant units. A burgeoning body of evidence on cultural transmission and other aspects of sociality is now affording critical insights into what should be conserved (going beyond the protection of genetic diversity, to consider adaptive aspects of phenotypic variation), and why specific conservation programs succeed (e.g., through facilitating the resilience of cultural diversity) while others fail (e.g., by neglecting key repositories of socially transmitted knowledge). Here, we highlight how international legal instruments, such as the Convention on the Conservation of Migratory Species of Wild Animals (CMS), can facilitate smart, targeted conservation of a wide range of taxa, by explicitly considering aspects of their sociality and cultures.

http://science.sciencemag.org/content/363/6431/1032

**Science Advances**

**PAPERS**

**E. MORIN et al – New evidence of broader diets for archaic homo populations in the Northwestern Mediterranean**

Investigating diet breadth is critical for understanding how archaic homo populations, including Neanderthals, competed for seasonally scarce resources. The current consensus in western Europe is that ungulates formed the bulk of the human diet during the lower and middle Paleolithic, while small fast prey taxa were virtually ignored. Here, we present a multisite
taphonomic study of leporid assemblages from southern France that supports frequent exploitation of small fast game during marine isotope stages 11 to 3. Along with recent evidence from Iberia, our results indicate that the consumption of small fast game was more common prior to the upper Paleolithic than previously thought and that archaic hominins from the Northwestern Mediterranean had broader diets than those from adjacent regions. Although likely of secondary importance relative to ungulates, the frequent exploitation of leporids documented here implies that human diet breadths were substantially more variable within Europe than assumed by current evolutionary models.

http://advances.sciencemag.org/content/5/3/eaav9106?utm_campaign=toc_advances_2019-03-08&et_rid=17774313&et_cid=2705808

GUSTAVO G. POLITIS et al – Campo Laborde: a late Pleistocene giant ground sloth kill and butchering site in the Pampas

The extinction of Pleistocene megafauna and the role played by humans have been subjects of constant debate in American archeology. Previous evidence from the Pampas region of Argentina suggested that this environment might have provided a refugium for the Holocene survival of several megamammals. However, recent excavations and more advanced accelerator mass spectrometry radiocarbon dating at Campo Laborde site in the Argentinian Pampas challenge the Holocene survival of Pleistocene megamammals and provide original and high-quality information documenting direct human impact on the Pleistocene fauna. The new data offer definitive evidence for hunting and butchering of Megatherium americanum (giant ground sloth) at 12,600 cal years bp and dispute previous interpretations that Pleistocene megamammals survived into the Holocene in the Pampas.

http://advances.sciencemag.org/content/5/3/eaau4546?utm_campaign=toc_advances_2019-03-08&et_rid=17774313&et_cid=2705808

Trends in Cognitive Sciences

HYEONG-DONG PARK & OLAF BLANKE – Coupling Inner and Outer Body for Self-Consciousness

Although recent studies on self-consciousness emphasized the importance of bodily processing and multisensory integration, such research has focused solely on bodily signals originating from the outside of the body (i.e., exteroceptive bodily signals) or internal bodily signals from visceral organs (i.e., interoceptive bodily signals) and how each system contributes to self-consciousness, without much interaction between the two approaches. Reviewing the latest evidence on interoceptive bodily processing and the combination of exteroceptive and interoceptive bodily signals for self-consciousness, we propose an integrated neural system reconciling these two largely separated views and delineate how it accounts for fundamental aspects of self-consciousness such as self-identification and self-location, as well as its experienced global unity and temporal continuity.


JEAN-PAUL NOEL & ANDREA SERINO – High Action Values Occur Near Our Body

In a recent Opinion article Bufacchi and Iannetti (2018) claim that peripersonal space (PPS) – the space immediately adjacent to one’s body – is widely considered to be ‘a single entity, with binary in-or-out boundary, and mostly dependent on stimulus proximity to the body’. In counterpoint, the authors argue that PPS should not be conceived as an area of space demarked by a strong boundary but instead as ‘fields’ computing ‘contact-related behavioral relevance’. They argue that this conceptualization (i) allows PPS measures to change gradually with distance, (ii) reflects the fact that there are many different PPS measures showing different response profiles, and (iii) explains the functional significance of the values composing PPS. Regarding this last point, they suggest that ‘[t]here is no reason to think that … stimulus proximity is more important to PPS measures than any of the other factors they are sensitive to’. We fully agree with (i) and (ii); PPS should be conceived as a gradient and as plurality of representations. Contrarily, we argue that, although PPS can be conceived as a ‘value field’, and this definition indeed allows disparate neural networks (e.g., reward systems) to interact with the PPS network, ‘value’ for PPS neurons is nevertheless defined by proximity to the body and is encoded by a specific population of multisensory neurons.

https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(19)30015-4

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