

# EAORC BULLETIN 907 – 1 November 2020

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## EAORC NOTICES

### PUBLICATION ALERTS

If you have had a paper or book published, or you see something which would be of interest to the group, do please send me a publication alert so that I can include it in the newsletter. Many thanks to those who have already sent in alerts.

If there is a journal you feel I should be tracking on a regular basis, do let me know.

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

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## EAORC NEWS – Alternative contact email

If you have sent me an email and not received a reply, it may be because you are a victim of BT Yahoo's super-filter, which removes some emails before they reach their destination. If this is the case, you can contact me at [martin.1.edwardes@kcl.ac.uk](mailto:martin.1.edwardes@kcl.ac.uk).

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## ACADEMIA.EDU – The Evolution of Primate Communication and Metacommunication

*Mind & Language, Vol. 31, No. 2 April 2016, pp. 177–203.*

### JOËLLE PROUST – The Evolution of Primate Communication and Metacommunication

Against the prior view that primate communication is based only on signal decoding, comparative evidence suggests that primates are able, no less than humans, to intentionally perform or understand impulsive or habitual communicational actions with a structured evaluative nonconceptual content. These signals convey an affordance-sensing that immediately motivates conspecifics to act. Although humans have access to a strategic form of propositional communication adapted to teaching and persuasion, they share with nonhuman primates the capacity to communicate in impulsive or habitual ways. They are also similarly able to monitor fluency, informativeness and relevance of messages or signals through nonconceptual cues.

[https://www.academia.edu/33926374/The Evolution of Primate Communication and Metacommunication?email\\_work\\_card=title](https://www.academia.edu/33926374/The_Evolution_of_Primate_Communication_and_Metacommunication?email_work_card=title)

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## ACADEMIA.EDU – The cognitive bases of human tool use

*Behavioral and Brain Sciences (2012), 35:4, 203-18.*

### KRIST VAESSEN – The cognitive bases of human tool use

This article has two goals. The first is to assess, in the face of accruing reports on the ingenuity of great ape tool use, whether and in what sense human tool use still evidences unique, higher cognitive ability. To that effect, I offer a systematic comparison between humans and nonhuman primates with respect to nine cognitive capacities deemed crucial to tool use: enhanced hand-eye coordination, body schema plasticity, causal reasoning, function representation, executive control, social learning, teaching, social intelligence, and language. Since striking differences between humans and great apes stand firm in eight out of nine of these domains, I conclude that human tool use still marks a major cognitive discontinuity between us and our closest relatives. As a second goal of the paper, I address the evolution of human technologies. In particular, I show how the cognitive traits reviewed help to explain why technological accumulation evolved so markedly in humans, and so modestly in apes.

[https://www.academia.edu/21510274/The key to cultural innovation lies in the group dynamic rather than in the individual mind?email\\_work\\_card=title](https://www.academia.edu/21510274/The_key_to_cultural_innovation_lies_in_the_group_dynamic_rather_than_in_the_individual_mind?email_work_card=title)

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## NEWS

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### SCIENCE NEWS – How dogs tracked their humans across the ancient world

Sometime toward the end of the last ice age, a gray wolf gingerly approached a human encampment. Those first tentative steps set his species on the path to a dramatic transformation: By at least 15,000 years ago, those wolves had become dogs, and neither they nor their human companions would ever be the same. But just how this relationship evolved over the ensuing millennia has been a mystery. Now, in the most comprehensive comparison yet of ancient dog and human DNA, scientists are starting to fill in some of the blanks, revealing where dogs and humans traveled together—and where they may have parted ways.

[https://www.sciencemag.org/news/2020/10/how-dogs-tracked-their-humans-across-ancient-world?utm\\_campaign=news\\_daily\\_2020-10-29&et rid=17774313&et cid=3538160](https://www.sciencemag.org/news/2020/10/how-dogs-tracked-their-humans-across-ancient-world?utm_campaign=news_daily_2020-10-29&et rid=17774313&et cid=3538160)

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### SCIENCE NEWS – DNA tracks mysterious Denisovans to Chinese cave, just before modern humans arrived

For today's Buddhist monks, Baishiya Karst Cave, 3200 meters high on the Tibetan Plateau, is holy. For ancient Denisovans, extinct hominins known only from DNA, teeth, and bits of bone found in another cave 2800 kilometers away in Siberia, it was a home. Last year, researchers proposed that a jawbone found long ago in the Tibetan cave was Denisovan, based on its ancient proteins. But archaeologist Dongju Zhang of Lanzhou University and her team wanted more definitive evidence, including DNA, the molecular gold standard. So in December 2018, they began to dig, after promising the monks they would excavate only at night and in winter to avoid disturbing worshippers.

[https://www.sciencemag.org/news/2020/10/dna-tracks-mysterious-denisovans-chinese-cave-just-modern-humans-arrived-nearby?utm\\_campaign=news\\_daily\\_2020-10-29&et rid=17774313&et cid=3538160](https://www.sciencemag.org/news/2020/10/dna-tracks-mysterious-denisovans-chinese-cave-just-modern-humans-arrived-nearby?utm_campaign=news_daily_2020-10-29&et rid=17774313&et cid=3538160)

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### SOCIETY FOR SCIENCE – The longest trail of fossilized human footprints hints at a risky Ice Age trek

Researchers have discovered the world's longest trail of fossilized human footprints at White Sands National Park, New Mexico.

<http://click.societyforscience-email.com/?qs=115c2f041b4e1c9db5d3adae58db87572b63751afa19c58715f6b154a5c765fd06b4a95020714ed7551620d5cf57d8d589e16483a3e418c>

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### **BREAKING SCIENCE – Paleolithic Animal Engravings Found in Three Spanish Caves**

Archaeologists have discovered figures of animals, mainly bison, engraved in a Gravettian style in three caves in northern Spain. The three decorated caves, named Aitzbitarte III, V and IX, were discovered in 2015 in Aitzbitarte Hill in the easternmost part of Spain's Cantabrian region.

[http://feedproxy.google.com/~r/BreakingScienceNews/~3/sjkwDE3VCEU/paleolithic-animal-engravings-aitzbitarte-caves-09000.html?utm\\_source=feedburner&utm\\_medium=email](http://feedproxy.google.com/~r/BreakingScienceNews/~3/sjkwDE3VCEU/paleolithic-animal-engravings-aitzbitarte-caves-09000.html?utm_source=feedburner&utm_medium=email)

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### **BREAKING SCIENCE – Mountain Gorillas are Friendly to Familiar Neighbors**

Mountain gorillas (*Gorilla beringei beringei*) live in tight-knit groups, foraging, resting and sleeping together around a core home range and a wider peripheral range. These groups sometimes split permanently, separating gorillas that may have lived together for years and may be closely related.

[http://feedproxy.google.com/~r/BreakingScienceNews/~3/iOLOHhkuKnU/mountain-gorillas-friendly-familiar-neighbors-09002.html?utm\\_source=feedburner&utm\\_medium=email](http://feedproxy.google.com/~r/BreakingScienceNews/~3/iOLOHhkuKnU/mountain-gorillas-friendly-familiar-neighbors-09002.html?utm_source=feedburner&utm_medium=email)

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### **LIVESCIENCE – Naked mole rats kidnap each other's babies, and turn them into slaves**

Naked mole rats are beloved for having some of the strangest mammalian superpowers. They can resist cancers, defy the usual mammalian aging process, survive almost 20 minutes without oxygen, and tolerate surprisingly high levels of pain. But it turns out these highly social freaks of nature have a nasty little secret that makes them more supervillain than superhero. Naked mole rats (*Heterocephalus glaber*) kidnap each other's babies and turn them into slaves.

[https://www.livescience.com/naked-mole-rats-kidnap-other-babies.html?utm\\_source=Selligent&utm\\_medium=email&utm\\_campaign=9160&utm\\_content=LVS\\_newsletter+&utm\\_term=5353134&m\\_i=Apzl0y\\_ulsTjEZkw\\_a6d6O2MWP03kZvYL2fAvmcPgVihO2EY6mpwoM1AwAUGa6z5JkdAtV7OukuZ5xEn7TZ4laFlWY7gQ2fpwKvzYUAAAM](https://www.livescience.com/naked-mole-rats-kidnap-other-babies.html?utm_source=Selligent&utm_medium=email&utm_campaign=9160&utm_content=LVS_newsletter+&utm_term=5353134&m_i=Apzl0y_ulsTjEZkw_a6d6O2MWP03kZvYL2fAvmcPgVihO2EY6mpwoM1AwAUGa6z5JkdAtV7OukuZ5xEn7TZ4laFlWY7gQ2fpwKvzYUAAAM)

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### **SCIENCE DAILY – War songs and lullabies behind origins of music**

Love is not the primary reason humans developed music. A new evolutionary theory of the origins of music argues more evidence supports music coming from the need for groups to impress allies and foes, and for parents to signal their attention to infants. They also argue against the theory that making music arose out of a need for social bonding, or that it is 'auditory cheesecake' a fancy evolutionary byproduct with no purpose.

<https://www.sciencedaily.com/releases/2020/10/201026095422.htm>

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### **SCIENCE DAILY – Mountain gorillas are good neighbors - up to a point**

Mountain gorilla groups are friendly to familiar neighbors - provided they stay out of 'core' parts of their territory - new research shows.

<https://www.sciencedaily.com/releases/2020/10/201028082952.htm>

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### **SCIENCE DAILY – The rhythm of change: What a drum-beat experiment reveals about cultural evolution**

Living organisms aren't the only things that evolve over time. Cultural practices change, too, and in recent years social scientists have taken a keen interest in understanding this cultural evolution. A new experiment used drum-beats to investigate the role that environment plays on cultural shifts, confirming that different environments do indeed give rise to different cultural patterns.

<https://www.sciencedaily.com/releases/2020/10/201027192416.htm>

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### **SCIENCE DAILY – Denisovan DNA in the genome of early East Asians**

Researchers analyzed the genome of the oldest human fossil found in Mongolia to date and show that the 34,000-year-old woman inherited around 25 percent of her DNA from western Eurasians, demonstrating that people moved across the Eurasian continent shortly after it had first been settled by the ancestors of present-day populations. This individual and a 40,000-year-old individual from China also carried DNA from Denisovans, an extinct form of hominins that inhabited Asia before modern humans arrived.

<https://www.sciencedaily.com/releases/2020/10/201029141740.htm>

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### **NATURE BRIEFING – Ancient dog DNA reveals canine evolution**

The largest-ever study of ancient dog genomes has revealed a lot about our four-legged friends. The analysis of more than two dozen Eurasian dogs suggests that the animals were domesticated and became widespread well before 11,000 years ago. "Already, there were at least five different groups of dogs across the world, so the origin of dogs must have been

substantially earlier than that,” says population geneticist Pontus Skoglund. With so many genomes, the researchers could follow ancient dog populations as they moved and mixed and compare these shifts with those in human populations.

<https://email.bt.com/mail/index-rui.jsp?v=2.18.2#app/mail>

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## THE CONVERSATION – Scientists still haven’t figured out free will, but they’re having fun trying

In 1983, one study by an American physiologist set off an explosion of research about free will and the brain.

<https://theconversationuk.cmail20.com/t/r-l-jujutte-khhilalah-g/>

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## PUBLICATIONS

### Biology Letters

#### PAPERS

#### **STUART K. WATSON et al with SIMON W. TOWNSEND – An exploration of Menzerath's law in wild mountain gorilla vocal sequences**

Menzerath's law, traditionally framed as a negative relationship between the size of a structure and its constituent parts (e.g. sentences with more clauses have shorter clauses), is widespread across information-coding systems ranging from human language and the vocal and gestural sequences of primates and birds, to the building blocks of DNA, genes and proteins. Here, we analysed an extensive dataset of 'close-call' sequences produced by wild mountain gorillas (*Gorilla beringei beringei*, no. individuals = 10, no. sequences = 2189) to determine whether, in accordance with Menzerath's law, a negative relationship existed between the number of vocal units in a sequence and the duration of its constituent units. We initially found positive evidence for this but, on closer inspection, the negative relationship was driven entirely by the difference between single- and multi-unit (two to six unit) sequences. Once single-unit sequences were excluded from the analysis, we identified a relationship in the opposite direction, with longer sequences generally composed of longer units. The close-call sequences of mountain gorillas therefore represent an intriguing example of a non-human vocal system that only partially conforms to the predictions of Menzerath's law.

<https://royalsocietypublishing.org/doi/abs/10.1098/rsbl.2020.0380>

#### **S. J. CHARLES et al with R. I. M. DUNBAR – Blocking mu-opioid receptors inhibits social bonding in rituals**

Religious rituals are universal human practices that play a seminal role in community bonding. In two experiments, we tested the role of mu-opioids as the active factor fostering social bonding. We used a mu-opioid blocker (naltrexone) in two double-blind studies of rituals from different religious traditions. We found the same effect across both studies, with naltrexone leading to significantly lower social bonding compared with placebo. These studies suggest that mu-opioids play a significant role in experiences of social bonding within ritual contexts.

<https://royalsocietypublishing.org/doi/full/10.1098/rsbl.2020.0485>

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## Mind & Language

#### PAPERS

#### **ERIC FUNKHOUSER – A tribal mind: Beliefs that signal group identity or commitment**

People are biased toward beliefs that are welcomed by their in-group. Some beliefs produced by these biases—such as climate change denial and religious belief—can be fruitfully modeled by signaling theory. The idea is that the beliefs function so as to be detected by others and manipulate their behavior, primarily for the benefits that accrue from favorable tribal self-presentation. Signaling theory can explain the etiology, distinctive form, proper function, and alterability of these beliefs.

<https://onlinelibrary.wiley.com/doi/full/10.1111/mila.12326?campaign=wolearlyview>

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## Nature

#### ARTICLES

#### **SARA REARDON – Can lab-grown brains become conscious?**

A handful of experiments are raising questions about whether clumps of cells and disembodied brains could be sentient, and how scientists would know if they were.

<https://www.nature.com/articles/d41586-020-02986-y>

#### **YANG LUO – Neanderthal DNA highlights complexity of COVID risk factors**

A genetic analysis reveals that some people who have severe reactions to the SARS-CoV-2 virus inherited certain sections of their DNA from Neanderthals. However, our ancestors can't take all the blame for how someone responds to the virus.

<https://www.nature.com/articles/d41586-020-02957-3>

## PAPERS

### **ANANYO CHOUDHURY et al – High-depth African genomes inform human migration and health**

The African continent is regarded as the cradle of modern humans and African genomes contain more genetic variation than those from any other continent, yet only a fraction of the genetic diversity among African individuals has been surveyed<sup>1</sup>. Here we performed whole-genome sequencing analyses of 426 individuals—comprising 50 ethnolinguistic groups, including previously unsampled populations—to explore the breadth of genomic diversity across Africa. We uncovered more than 3 million previously undescribed variants, most of which were found among individuals from newly sampled ethnolinguistic groups, as well as 62 previously unreported loci that are under strong selection, which were predominantly found in genes that are involved in viral immunity, DNA repair and metabolism. We observed complex patterns of ancestral admixture and putative-damaging and novel variation, both within and between populations, alongside evidence that Zambia was a likely intermediate site along the routes of expansion of Bantu-speaking populations. Pathogenic variants in genes that are currently characterized as medically relevant were uncommon—but in other genes, variants denoted as ‘likely pathogenic’ in the ClinVar database were commonly observed. Collectively, these findings refine our current understanding of continental migration, identify gene flow and the response to human disease as strong drivers of genome-level population variation, and underscore the scientific imperative for a broader characterization of the genomic diversity of African individuals to understand human ancestry and improve health.

<https://www.nature.com/articles/s41586-020-2859-7>

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## Nature Communications

### PAPERS

### **SEBASTIAN BOBADILLA-SUAREZ, OLIVIA GUEST & BRADLEY C. LOVE – Subjective value and decision entropy are jointly encoded by aligned gradients across the human brain**

Recent work has considered the relationship between value and confidence in both behavioural and neural representation. Here we evaluated whether the brain organises value and confidence signals in a systematic fashion that reflects the overall desirability of options. If so, regions that respond to either increases or decreases in both value and confidence should be widespread. We strongly confirmed these predictions through a model-based fMRI analysis of a mixed gambles task that assessed subjective value (SV) and inverse decision entropy (iDE), which is related to confidence. Purported value areas more strongly signalled iDE than SV, underscoring how intertwined value and confidence are. A gradient tied to the desirability of actions transitioned from positive SV and iDE in ventromedial prefrontal cortex to negative SV and iDE in dorsal medial prefrontal cortex. This alignment of SV and iDE signals could support retrospective evaluation to guide learning and subsequent decisions.

<https://www.nature.com/articles/s42003-020-01315-3>

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## Nature Ecology & Evolution

### PAPERS

### **NATALIE TELIS, ROBIN AGUILAR & KELLEY HARRIS – Selection against archaic hominin genetic variation in regulatory regions**

Traces of Neandertal and Denisovan DNA persist in the modern human gene pool, but have been systematically purged by natural selection from genes and other functionally important regions. This implies that many archaic alleles harmed the fitness of hybrid individuals, but the nature of this harm is poorly understood. Here, we show that enhancers contain less Neandertal and Denisovan variation than expected given the background selection they experience, suggesting that selection acted to purge these regions of archaic alleles that disrupted their gene regulatory functions. We infer that selection acted mainly on young archaic variation that arose in Neandertals or Denisovans shortly before their contact with humans; enhancers are not depleted of older variants found in both archaic species. Some types of enhancer appear to have tolerated introgression better than others; compared with tissue-specific enhancers, pleiotropic enhancers show stronger depletion of archaic single-nucleotide polymorphisms. To some extent, evolutionary constraint is predictive of introgression depletion, but certain tissues’ enhancers are more depleted of Neandertal and Denisovan alleles than expected given their comparative tolerance to new mutations. Foetal brain and muscle are the tissues whose enhancers show the strongest depletion of archaic alleles, but only brain enhancers show evidence of unusually stringent purifying selection. We conclude that epistatic incompatibilities between human and archaic alleles are needed to explain the degree of archaic variant depletion from foetal muscle enhancers, perhaps due to divergent selection for higher muscle mass in archaic hominins compared with humans.

<https://www.nature.com/articles/s41559-020-01284-0>

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## Nature Humanities & Social Sciences Communications

### PAPERS

### **SANDRO SESSAREGO – Not all grammatical features are robustly transmitted during the emergence of creoles**

This paper addresses the long-standing debate on the nature and complexity of creole languages. Contrary to what has been claimed in the literature, it is argued that grammars are neither robustly transmitted during the emergence of creoles nor that creole languages represent the simplest grammars in the world. On the contrary, after laying down a theoretical

framework that spells out the existence of at least three distinct second-language acquisition (SLA) processes shaping creoles, it is shown how different aspects of the ancestor grammars (and their potential complexities) may or may not be transmitted to the emerging creoles and why.

<https://www.nature.com/articles/s41599-020-00611-x>

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## Nature Neuroscience

### PAPERS

#### **JANINE BUJSTERBOSCH et al – Challenges and future directions for representations of functional brain organization**

A key principle of brain organization is the functional integration of brain regions into interconnected networks. Functional MRI scans acquired at rest offer insights into functional integration via patterns of coherent fluctuations in spontaneous activity, known as functional connectivity. These patterns have been studied intensively and have been linked to cognition and disease. However, the field is fractionated. Diverging analysis approaches have segregated the community into research silos, limiting the replication and clinical translation of findings. A primary source of this fractionation is the diversity of approaches used to reduce complex brain data into a lower-dimensional set of features for analysis and interpretation, which we refer to as brain representations. In this Primer, we provide an overview of different brain representations, lay out the challenges that have led to the fractionation of the field and that continue to form obstacles for convergence, and propose concrete guidelines to unite the field.

<https://www.nature.com/articles/s41593-020-00726-z>

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## Nature Scientific Data

### PAPERS

#### **EWA DUTKIEWICZ et al – SignBase, a collection of geometric signs on mobile objects in the Paleolithic**

In the Paleolithic, geometric signs are abundant. They appear in rock art as well as on mobile objects like artworks, tools, or personal ornaments. These signs are often interpreted as a reflection of symbolic thought and associated with the origin of cognitively modern behavior. SignBase is a project collecting the wealth of geometric signs on mobile objects in the European Upper Paleolithic, African Middle Stone Age (MSA), as well as selected sites from the Near East and South East Asia.

Currently, more than 500 objects of the Aurignacian techno-complex (ca. 43,000 to 30,000 years BP) are registered in SignBase. They are linked to information about geographic and archaeological provenience, the type of object and material, size and preservation, and respective literature references. We identify around 30 different sign types found on these objects across Europe in the Aurignacian and illustrate how SignBase can be used to analyze geographical clusters. Ultimately, we aim to enable quantitative analyses of abstract graphical expression before the emergence of writing.

<https://www.nature.com/articles/s41597-020-00704-x>

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## Nature Scientific Reports

### PAPERS

#### **YURI KAWAGUCHI, KOYO NAKAMURA & MASAKI TOMONAGA – Colour matters more than shape for chimpanzees' recognition of developmental face changes**

Social primates must recognise developmental stages of other conspecifics in order to behave appropriately. Infant faces have peculiar morphological characteristics—relatively large eyes, a small nose, and small mouth—known as baby schema. In addition, the infant faces of many primate species have unique skin coloration. However, it is unclear which features serve as critical cues for chimpanzees to recognise developmental changes in their faces. The present study aimed to investigate the relative contributions of facial shape and colour to age categorisation in chimpanzees. We used a symbolic matching-to-sample task in which chimpanzees were trained to discriminate between adult and infant faces. Then, we tested how their age category judgments transferred to a series of morphed faces which systematically differed in facial shape and colour. Statistical image quantification analysis revealed significant differences both in shape and colour between adult and infant faces. However, we found that facial coloration contributed to age categorisation in chimpanzees more than facial shape. Our results showed that chimpanzees use unique infantile facial coloration as a salient cue when discriminating between adult and infant faces. The display of their developmental stages through facial colour may help chimpanzees to induce appropriate behaviour from other individuals.

<https://www.nature.com/articles/s41598-020-75284-2>

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#### **JEROEN M. VAN BAAR et al – Stable distribution of reciprocity motives in a population**

Evolutionary models show that human cooperation can arise through direct reciprocity relationships. However, it remains unclear which psychological mechanisms proximally motivate individuals to reciprocate. Recent evidence suggests that the psychological motives for choosing to reciprocate trust differ between individuals, which raises the question whether these differences have a stable distribution in a population or are rather an artifact of the experimental task. Here, we combine data from three independent trust game studies to find that the relative prevalence of different reciprocity motives is highly stable across participant samples. Furthermore, the distribution of motives is relatively unaffected by changes to the salient features of the experimental paradigm. Finally, the motive classification assigned by our computational modeling analysis corresponds to the participants' own subjective experience of their psychological decision process, and no existing models of

social preference can account for the observed individual differences in reciprocity motives. These findings support the view that reciprocal decision-making is not just regulated by individual differences in 'pro-social' versus 'pro-self' tendencies, but also by trait-like differences across several alternative pro-social motives, whose distribution in a population is stable.

<https://www.nature.com/articles/s41598-020-74818-y>

### **DIMITRIOS KOURTIS et al with DAN SPERBER – Making sense of human interaction benefits from communicative cues**

We investigated whether communicative cues help observers to make sense of human interaction. We recorded EEG from an observer monitoring two individuals who were occasionally communicating with each other via either mutual eye contact and/or pointing gestures, and then jointly attending to the same object or attending to different objects that were placed on a table in front of them. The analyses were focussed on the processing of the interaction outcome (i.e. presence or absence of joint attention) and showed that its interpretation is a two-stage process, as reflected in the N300 and the N400 potentials. The N300 amplitude was reduced when the two individuals shared their focus of attention, which indicates the operation of a cognitive process that involves the relatively fast identification and evaluation of actor–object relationships. On the other hand, the N400 was insensitive to the sharing or distribution of the two individuals' attentional focus. Interestingly, the N400 was reduced when the interaction outcome was preceded either by mutual eye contact or by a perceived pointing gesture. This shows that observation of communication “opens up” the mind to a wider range of action possibilities and thereby helps to interpret unusual outcomes of social interactions.

<https://www.nature.com/articles/s41598-020-75283-3>

### **JIN LI et al – Innate connectivity patterns drive the development of the visual word form area**

What determines the functional organization of cortex? One hypothesis is that innate connectivity patterns, either structural or functional connectivity, set up a scaffold upon which functional specialization can later take place. We tested this hypothesis by asking whether the visual word form area (VWFA), an experience-driven region, was already functionally connected to proto language networks in neonates scanned within one week of birth. Using the data from the Human Connectome\* Project (HCP) and the Developing Human Connectome Project (dHCP), we calculated intrinsic functional connectivity during resting-state functional magnetic resonance imaging (fMRI), and found that neonates showed similar functional connectivity patterns to adults. We observed that (1) language regions connected more strongly with the putative VWFA than other adjacent ventral visual regions that also show foveal bias, and (2) the VWFA connected more strongly with frontotemporal language regions than with regions adjacent to these language regions. These data suggest that the location of the VWFA is earmarked at birth due to its connectivity with the language network, providing evidence that innate connectivity instructs the later refinement of cortex.

{\* *This is a typo. Connectome is a very boring version of Connectfour: first player always wins.*}

<https://www.nature.com/articles/s41598-020-75015-7>

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## Neuroscience of Consciousness

### PAPERS

#### **JOHNJOE MCFADDEN – Integrating information in the brain's EM field: the cemi field theory of consciousness**

A key aspect of consciousness is that it represents bound or integrated information, prompting an increasing conviction that the physical substrate of consciousness must be capable of encoding integrated information in the brain. However, as Ralph Landauer insisted, 'information is physical' so integrated information must be physically integrated. I argue here that nearly all examples of so-called 'integrated information', including neuronal information processing and conventional computing, are only temporally integrated in the sense that outputs are correlated with multiple inputs: the information integration is implemented in time, rather than space, and thereby cannot correspond to physically integrated information. I point out that only energy fields are capable of integrating information in space. I describe the conscious electromagnetic information (cemi) field theory which has proposed that consciousness is physically integrated, and causally active, information encoded in the brain's global electromagnetic (EM) field. I here extend the theory to argue that consciousness implements algorithms in space, rather than time, within the brain's EM field. I describe how the cemi field theory accounts for most observed features of consciousness and describe recent experimental support for the theory. I also describe several untested predictions of the theory and discuss its implications for the design of artificial consciousness. The cemi field theory proposes a scientific dualism that is rooted in the difference between matter and energy, rather than matter and spirit.

<https://academic.oup.com/nc/article/2020/1/niaa016/5909853>

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## PeerJ

### PAPERS

#### **AMIE WHEELDON et al – Structure and functions of Yellow-breasted Boubou (*Laniarius atroflavus*) solos and duets**

Birds have extremely well-developed acoustic communication and have become popular in bioacoustics research. The majority of studies on bird song have been conducted in the temperate zones where usually males of birds sing to attract females and defend territories. In over 360 bird species mostly inhabiting the tropics both males and females sing together in duets. Avian duets are usually formed when a male and female coordinate their songs. We focused on a species with relatively weakly coordinated duets, with male solo as the prevailing vocalisation type.

Yellow-breasted Boubou is a duetting species in which males are much more vocal than females and duetting is not a dominating type of vocal activity. Duet structure, context and timing of daily production support the joint resource defence hypothesis and mate guarding/prevention hypotheses, however maintaining pair contact also seems to be important. This study provides for the first time the basic quantitative data describing calls, solos and duet songs in the Yellow-breasted Boubou.

<https://peerj.com/articles/10214/>

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## PLoS One

### PAPERS

#### **DIEGO GARATE et al – Redefining shared symbolic networks during the Gravettian in Western Europe: New data from the rock art findings in Aitzbitarte caves (Northern Spain)**

The renewal of the archaeological record, mainly through the discovery of unpublished sites, provides information that sometimes qualifies or even reformulates previous approaches. One of the latter cases is represented by the three new decorated caves found in 2015 in Aitzbitarte Hill. Their exhaustive study shows the presence of engraved animals, mainly bison, with formal characteristics unknown so far in the Palaeolithic art of the northern Iberian Peninsula. However, parallels are located in caves in southern France such as Gargas, Cussac, Roucadour or Cosquer. All of them share very specific graphic conventions that correspond to human occupations assigned basically to the Gravettian cultural complex. The new discovery implies the need to reformulate the iconographic exchange networks currently accepted, as well as their correspondence with other elements of the material culture at the same sites. Thus, we have carried out a multiproxy approach based in statistical analysis. The updated data reveals a greater complexity in artistic expression during the Gravettian that had not been considered so far, and also challenges the traditional isolation that had been granted to Cantabrian symbolic expressions during pre-Magdalenian times.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0240481>

#### **SHAI GORDIN et al – Reading Akkadian cuneiform using natural language processing**

In this paper we present a new method for automatic transliteration and segmentation of Unicode cuneiform glyphs using Natural Language Processing (NLP) techniques. Cuneiform is one of the earliest known writing system in the world, which documents millennia of human civilizations in the ancient Near East. Hundreds of thousands of cuneiform texts were found in the nineteenth and twentieth centuries CE, most of which are written in Akkadian. However, there are still tens of thousands of texts to be published. We use models based on machine learning algorithms such as recurrent neural networks (RNN) with an accuracy reaching up to 97% for automatically transliterating and segmenting standard Unicode cuneiform glyphs into words. Therefore, our method and results form a major step towards creating a human-machine interface for creating digitized editions. Our code, Akkademia, is made publicly available for use via a web application, a python package, and a github repository.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0240511>

#### **J. JESSICA WANG et al – Why are listeners sometimes (but not always) egocentric? Making inferences about using others' perspective in referential communication**

Theory of Mind (ToM) is the ability to understand others' mental states, and that these mental states can differ from our own. Although healthy adults have little trouble passing conceptual tests of ToM (e.g., the false belief task), they do not always succeed in using ToM. In order to be successful in referential communication, listeners need to correctly infer the way in which a speaker's perspective constrains reference and inhibit their own perspective accordingly. However, listeners may require prompts to take these effortful inferential steps. The current study investigated the possibility of embedding prompts in the instructions for listeners to make inference about using a speaker's perspective. Experiment 1 showed that provision of a clear introductory example of the full chain of inferences resulted in large improvement in performance. Residual egocentric errors suggested that the improvement was not simply due to superior comprehension of the instructions. Experiment 2 further dissociated the effect by placing selective emphasis on making inference about inhibiting listeners' own perspective versus using the speaker's perspective. Results showed that only the latter had a significant effect on successful performance. The current findings clearly demonstrated that listeners do not readily make inferences about using speakers' perspectives, but can do so when prompted.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0240521>

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## PNAS

### PAPERS

#### **JÖRG GROSS & ROBERT BÖHM – Voluntary restrictions on self-reliance increase cooperation and mitigate wealth inequality**

Humans are considered a highly cooperative species. Through cooperation, we can tackle shared problems like climate change or pandemics and cater for shared needs like shelter, mobility, or healthcare. However, cooperation invites free-riding and can easily break down. Maybe because of this reason, societies also enable individuals to solve shared problems individually, like in the case of private healthcare plans or private retirement planning. Such "self-reliance" allows individuals

to avoid problems related to public goods provision, like free-riding or underprovision, and decreases social interdependence. However, not everyone can equally afford to be self-reliant, and amid shared problems, self-reliance may lead to conflicts within groups on how to solve shared problems. In two preregistered studies, we investigate how the ability of self-reliance influences collective action and cooperation. We show that self-reliance crowds out cooperation and exacerbates inequality, especially when some heavily depend on collective action while others do not. However, we also show that groups are willing to curtail their ability of self-reliance. When given the opportunity, groups overwhelmingly vote in favor of abolishing individual solutions to shared problems, which, in turn, increases cooperation and decreases inequality, particularly between group members that differ in their ability to be self-reliant. The support for such endogenously imposed interdependence, however, reduces when individual solutions become more affordable, resonating with findings of increased individualism in wealthier societies and suggesting a link between wealth inequality and favoring individual independence and freedom over communalism and interdependence.

<https://www.pnas.org/content/early/2020/10/27/2013744117.abstract?etoc>

### **ALIZÉE LOPEZ-PERSEM et al – Differential functional connectivity underlying asymmetric reward-related activity in human and nonhuman primates**

The orbitofrontal cortex (OFC) is a key brain region involved in complex cognitive functions such as reward processing and decision making. Neuroimaging studies have reported unilateral OFC response to reward-related variables; however, those studies rarely discussed this observation. Nevertheless, some lesion studies suggest that the left and right OFC contribute differently to cognitive processes. We hypothesized that the OFC asymmetrical response to reward could reflect underlying hemispherical difference in OFC functional connectivity. Using resting-state and reward-related functional MRI data from humans and from rhesus macaques, we first identified an asymmetrical response of the lateral OFC to reward in both species. Crucially, the subregion showing the highest reward-related asymmetry (RRA) overlapped with the region showing the highest functional connectivity asymmetry (FCA). Furthermore, the two types of asymmetries were found to be significantly correlated across individuals. In both species, the right lateral OFC was more connected to the default mode network compared to the left lateral OFC. Altogether, our results suggest a functional specialization of the left and right lateral OFC in primates.

<https://www.pnas.org/content/early/2020/10/27/2000759117.abstract?etoc>

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## Proceedings of the Royal Society B

### PAPERS

### **MOHAMMAD ATARI, MARK H. C. LAI & MORTEZA DEGHANI – Sex differences in moral judgements across 67 countries**

Most of the empirical research on sex differences and cultural variations in morality has relied on within-culture analyses or small-scale cross-cultural data. To further broaden the scientific understanding of sex differences in morality, the current research relies on two international samples to provide the first large-scale examination of sex differences in moral judgements nested within cultures. Using a sample from 67 countries (Study 1;  $n = 336\ 691$ ), we found culturally variable sex differences in moral judgements, as conceptualized by Moral Foundations Theory. Women consistently scored higher than men on Care, Fairness, and Purity. By contrast, sex differences in Loyalty and Authority were negligible and highly variable across cultures. Country-level sex differences in moral judgements were also examined in relation to cultural, socioeconomic, and gender-equality indicators revealing that sex differences in moral judgements are larger in individualist, Western, and gender-equal societies. In Study 2 (19 countries;  $n = 11\ 969$ ), these results were largely replicated using Bayesian multi-level modelling in a distinct sample. The findings were robust when incorporating cultural non-independence of countries into the models. Specifically, women consistently showed higher concerns for Care, Fairness, and Purity in their moral judgements than did men. Sex differences in moral judgements were larger in individualist and gender-equal societies with more flexible social norms. We discuss the implications of these findings for the ongoing debate about the origin of sex differences and cultural variations in moral judgements as well as theoretical and pragmatic implications for moral and evolutionary psychology.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.1201>

### **HELENA MITON et al with DAN SPERBER – Motor constraints influence cultural evolution of rhythm**

While widely acknowledged in the cultural evolution literature, ecological factors—aspects of the physical environment that affect the way in which cultural productions evolve—have not been investigated experimentally. Here, we present an experimental investigation of this type of factor by using a transmission chain (iterated learning) experiment. We predicted that differences in the distance between identical tools (drums) and in the order in which they are to be used would cause the evolution of different rhythms. The evidence confirms our predictions and thus provides a proof of concept that ecological factors—here a motor constraint—can influence cultural productions and that their effects can be experimentally isolated and measured. One noteworthy finding is that ecological factors can on their own lead to more complex rhythms.

<https://royalsocietypublishing.org/doi/abs/10.1098/rspb.2020.2001>

**KAROLINA A. ŚCIGAŁA, CHRISTOPH SCHILD & INGO ZETTLER – Dishonesty as a signal of trustworthiness: Honesty-Humility and trustworthy dishonesty**

Trustworthiness is a foundation of well-functioning relationships and societies, and thus often perceived as a socially normative behaviour. Correspondingly, a broad array of research found that people tend to act in a trustworthy way and signal their trustworthiness to others, and that trustworthiness is rewarded. Herein, we explore whether this motivation to behave trustworthily can have socially undesirable effects in terms of leading to dishonesty targeted at fulfilling the trustor's expectations (i.e. trustworthy dishonesty). Furthermore, we examine how the basic trait of Honesty-Humility, which has consistently been found to be linked to both higher honesty and trustworthiness, relates to trustworthy dishonesty, where honesty and trustworthiness are at odds. Specifically, we conducted three pre-registered studies (N = 7080), introducing a novel behavioural game, the lying-trust game, where participants had a chance to lie to act trustworthily. In two studies, we found that, when offered 'full trust', participants high in Honesty-Humility (i.e. the top 10%) engaged in trustworthy dishonesty, i.e. lied in order to avoid maximizing their own incentive at the cost of minimizing the incentive of their trustor. This pattern was not present when the trustor offered minimal trust only, as well as among participants low in Honesty-Humility (i.e. the bottom 10%).

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.200685>

**LISA WENZEL et al – Actions do not speak louder than words in an interactive false belief task**

Traditionally, it had been assumed that meta-representational Theory of Mind (ToM) emerges around the age of 4 when children come to master standard false belief (FB) tasks. More recent research with various implicit measures, though, has documented much earlier competence and thus challenged the traditional picture. In interactive FB tasks, for instance, infants have been shown to track an interlocutor's false or true belief when interpreting her ambiguous communicative acts (Southgate et al. 2010). However, several replication attempts so far have produced mixed findings (e.g. Dörrenberg et al. 2018; Grosse Wiesmann et al. 2017; Király et al. 2018). Therefore, we conducted a systematic replication study, across two laboratories, of an influential interactive FB task (the so-called 'Sefo' tasks by Southgate et al. 2010). First, we implemented close direct replications with the original age group (17-month-olds) and compared their performance to those of 3-year-olds. Second, we designed conceptual replications with modifications and improvements regarding pragmatic ambiguities for 2-year-olds. Third, we validated the task with explicit verbal test versions in older children and adults. Results revealed the following: the original results could not be replicated, and there was no evidence for FB understanding measured by the Sefo task in any age group except for adults. Comparisons to explicit FB tasks suggest that the Sefo task may not be a sensitive measure of FB understanding in children and even underestimate their ToM abilities. The findings add to the growing replication crisis in implicit ToM research and highlight the challenge of developing sensitive, reliable and valid measures of early implicit social cognition.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.191998>

**GREGORY A. BRYANT, CHRISTINE S. WANG & RICCARDO FUSAROLI – Recognizing affiliation in colughter and cospeech**

Theories of vocal signalling in humans typically only consider communication within the interactive group and ignore intergroup dynamics. Recent work has found that colughter generated between pairs of people in conversation can afford accurate judgements of affiliation across widely disparate cultures, and the acoustic features that listeners use to make these judgements are linked to speaker arousal. But to what extent does colughter inform third party listeners beyond other dynamic information between interlocutors such as overlapping talk? We presented listeners with short segments (1–3 s) of colughter and simultaneous speech (i.e. cospeech) taken from natural conversations between established friends and newly acquainted strangers. Participants judged whether the pairs of interactants in the segments were friends or strangers. Colughter afforded more accurate judgements of affiliation than did cospeech, despite cospeech being over twice in duration relative to colughter on average. Sped-up versions of colughter and cospeech (proxies of speaker arousal) did not improve accuracy for either identifying friends or strangers, but faster versions of both modes increased the likelihood of tokens being judged as being between friends. Overall, results are consistent with research showing that laughter is well suited to transmit rich information about social relationships to third party overhearers—a signal that works between, and not just within conversational groups.

<https://royalsocietypublishing.org/doi/full/10.1098/rsos.201092>

**Denisovan DNA found in cave on Tibetan Plateau**

For today's Buddhist monks, Baishiya Karst Cave, 3200 meters high on the Tibetan Plateau, is holy. For ancient Denisovans, extinct hominins known only from DNA, teeth, and bits of bone found in another cave 2800 kilometers away in Siberia, it was a home. Last year, researchers proposed that a jawbone found long ago in the Tibetan cave was Denisovan, based on its ancient proteins. But archaeologist Dongju Zhang of Lanzhou University and her team wanted more definitive evidence,

including DNA, the molecular gold standard. So in December 2018, they began to dig, after promising the monks they would excavate only at night and in winter to avoid disturbing worshippers.

<https://science.sciencemag.org/content/370/6516/512>

## PAPERS

### **DIYENDO MASSILANI et al with JANET KELSO & SVANTE PÄÄBO – Denisovan ancestry and population history of early East Asians**

We present analyses of the genome of a ~34,000-year-old hominin skull cap discovered in the Salkhit Valley in northeastern Mongolia. We show that this individual was a female member of a modern human population that, following the split between East and West Eurasians, experienced substantial gene flow from West Eurasians. Both she and a 40,000-year-old individual from Tianyuan outside Beijing carried genomic segments of Denisovan ancestry. These segments derive from the same Denisovan admixture event(s) that contributed to present-day mainland Asians but are distinct from the Denisovan DNA segments in present-day Papuans and Aboriginal Australians.

<https://science.sciencemag.org/content/370/6516/579>

### **ANDERS BERGSTRÖM et mul with PONTUS SKOGLUND – Origins and genetic legacy of prehistoric dogs**

Dogs were the first domestic animal, but little is known about their population history and to what extent it was linked to humans. We sequenced 27 ancient dog genomes and found that all dogs share a common ancestry distinct from present-day wolves, with limited gene flow from wolves since domestication but substantial dog-to-wolf gene flow. By 11,000 years ago, at least five major ancestry lineages had diversified, demonstrating a deep genetic history of dogs during the Paleolithic. Coanalysis with human genomes reveals aspects of dog population history that mirror humans, including Levant-related ancestry in Africa and early agricultural Europe. Other aspects differ, including the impacts of steppe pastoralist expansions in West and East Eurasia and a near-complete turnover of Neolithic European dog ancestry.

<https://science.sciencemag.org/content/370/6516/557>

### **DONGJU ZHANG et al with JANET KELSO & SVANTE PÄÄBO – Denisovan DNA In Late Pleistocene sediments from Baishiya Karst Cave on the Tibetan Plateau**

A late Middle Pleistocene mandible from Baishiya Karst Cave (BKC) on the Tibetan Plateau has been inferred to be from a Denisovan, an Asian hominin related to Neanderthals, on the basis of an amino acid substitution in its collagen. Here we describe the stratigraphy, chronology, and mitochondrial DNA extracted from the sediments in BKC. We recover Denisovan mitochondrial DNA from sediments deposited ~100 thousand and ~60 thousand years ago (ka) and possibly as recently as ~45 ka. The long-term occupation of BKC by Denisovans suggests that they may have adapted to life at high altitudes and may have contributed such adaptations to modern humans on the Tibetan Plateau.

<https://science.sciencemag.org/content/370/6516/584>

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## Trends in Cognitive Sciences

### COMMENTARIES

#### **AXEL CLEEREMANS et al – Do You Need to Be Conscious to Learn to Be Conscious?**

Overgaard and Kirkeby-Hinrup conclude their comment on our Opinion article by asking, 'Does SOMA entail that animals, children and many adults are not conscious?' This question is indeed essential, and our answer is a clear: 'We do not know, nor does anyone else.' But we want to state right away that we believe they are. In this respect, Overgaard and Kirkeby-Hinrup's core critique is misguided. We need to carefully distinguish between ethical and scientific considerations. Scientific claims are based on what we think is the case, whereas ethical considerations are based on what we think ought to be the case. Thus, one might think that infants lack consciousness yet choose to act toward them as though they were. Hinduism considers that all living things are sacred and should not be harmed (ahimsa). Jainists go further and will wear masks to avoid accidentally breathing in insects. Such beliefs and practices are independent of our scientific knowledge. Although one may wish that our ethics be informed by science, the former is independent of the latter and should in no way be subsidiary to it. Appealing to ethical considerations to rebut scientific claims is rhetorically unsound.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(20\)30245-X?dgcid=raven\\_jbs\\_aip\\_email](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(20)30245-X?dgcid=raven_jbs_aip_email)

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