References

Aktuell

Breda 2019

Thomas Breda & Clotilde Napp, *Girls' comparative advantage in reading can largely explain the gender gap in math-related fields.* PNAS **116** (2019), 15435–15440.

pnas116-15435-Supplement.pdf

Gender differences in math performance are now small in developed countries and they cannot explain on their own the strong underrepresentation of women in math-related fields. This latter result is however no longer true once gender differences in reading performance are also taken into account. Using individual-level data on 300,000 15-y-old students in 64 countries, we show that the difference between a student performance in reading and math is 80 % of a standard deviation (SD) larger for girls than boys, a magnitude considered as very large. When this difference is controlled for, the gender gap in students' intentions to pursue math-intensive studies and careers is reduced by around 75 %, while gender gaps in self-concept in math, declared interest for math or attitudes toward math entirely disappear. These latter variables are also much less able to explain the gender gap in intentions to study math than is students' difference in performance betweenmath and reading. These results are in line with choice models in which educational decisions involve intraindividual comparisons of achievement and self-beliefs in different subjects as well as cultural norms regarding gender. To directly show that intraindividual comparisons of achievement impact students' intended careers, we use differences across schools in teaching resources dedicated to math and reading as exogenous variations of students' comparative advantage for math. Results confirm that the comparative advantage in math with respect to reading at the time of making educational choices plays a key role in the process leading to women's underrepresentation in math-intensive fields.

Keywords: gender gap | math-intensive fields | comparative advantage | students' achievement

Significance: Women remain strongly underrepresented in math-related fields. This phenomenon is problematic because it contributes to gender inequalities in the labor market and can reflect a loss of talent. The current state of the art is that students' abilities are not able to explain gender differences in educational and career choices. Relying on the Programme for International Student Assessment (PISA) data, we show that female students who are good at math are much more likely than male students to be even better in reading. As a consequence, the difference between 15-y-old students' math and reading abilities, which is likely to be determined by earlier socialization processes, can explain up to 80 % of the gender gap in intentions to pursue math-studies and careers.

Dong 2019

Lei Dong, Carlo Ratti & Siqi Zheng, *Predicting neighborhoods' socioeconomic attributes using restaurant data.* PNAS **116** (2019), 15447–15452.

pnas116-15447-Supplement.pdf

Accessing high-resolution, timely socioeconomic data such as data on population, employment, and enterprise activity at the neighborhood level is critical for social scientists and policy makers to design and implement location-based policies. However, in many developing countries or cities, reliable local-scale socioeconomic data remain scarce. Here, we show an easily accessible and timely updated location attribute—restaurant—can be used to accurately predict a range of socioeconomic attributes of urban neighborhoods. We merge restaurant data from an online platform with 3 microdatasets for 9 Chinese cities. Using features extracted from restaurants, we train machine-learning models to estimate daytime and nighttime population, number of firms, and consumption level at various spatial resolutions. The trained model can explain 90 to 95 % of the variation of those attributes across neighborhoods in the test dataset. We analyze the tradeoff between accuracy, spatial resolution, and number of training samples, as well as the heterogeneity of the predicted results across different spatial locations, demographics, and firm industries. Finally, we demonstrate the cross-city generality of this method by training the model in one city and then applying it directly to other cities. The transferability of this restaurant model can help bridge data gaps between cities, allowing all cities to enjoy big data and algorithm dividends.

Significance: High-resolution socioeconomic data are crucial for place-based policy design and implementation, but it remains scarce for many developing cities and countries. We show that an easily accessible and timely updated neighborhood attribute, restaurant, when combined with machine-learning models, can be used to effectively predict a range of socioeconomic attributes. This approach allows us to collect training samples from representative neighborhoods and then use our trained model to infer unsampled neighborhoods in the city in a granular, timely, and low-cost manner. The good cross-city transferability performance of our model can also help bridge the "data gap" between cities, by training the model in cities with rich survey data and then applying it to cities where such data are unavailable.

Godfree 2019

Robert C. Godfree, Nunzio Knerr, Denise Godfree, John Busby, Bruce Robertson & Francisco Encinas-Viso, *Historical reconstruction unveils the risk of mass mortality and ecosystem collapse during pancontinental megadrought.* PNAS **116** (2019), 15580–15589.

pnas116-15580-Supplement.pdf

An important new hypothesis in landscape ecology is that extreme, decade-scale megadroughts can be potent drivers of rapid, macroscale ecosystem degradation and collapse. If true, an increase in such events under climate change could have devastating consequences for global biodiversity. However, because few megadroughts have occurred in the modern ecological era, the taxonomic breadth, trophic depth, and geographic pattern of these impacts remain unknown. Here we use ecohistorical techniques to quantify the impact of a record, pancontinental megadrought period (1891 to 1903 CE) on the Australian biota. We show that during this event mortality and severe stress was recorded in >45 bird, mammal, fish, reptile, and plant families in arid, semiarid, dry temperate, and Mediterranean ecosystems over at least 2.8 million km2 (36 %) of the Australian continent. Trophic analysis reveals a bottom-up pattern of mortality concentrated in primary producer, herbivore, and omnivore guilds. Spatial and temporal reconstruction of premortality rainfall shows that mass mortality and synchronous ecosystem-wide collapse emerged in multiple geographic hotspots after 2 to 4 y of severe

(>40 %) and intensifying rainfall deficits. However, the presence of hyperabundant herbivores significantly increased the sensitivity of ecosystems to overgrazing-induced meltdown and permanent ecosystem change. The unprecedented taxonomic breadth and spatial scale of these impacts demonstrate that continental-scale megadroughts pose a major future threat to global biodiversity, especially in ecosystems affected by intensive agricultural use, trophic simplification, and invasive species.

Keywords: megadrought | ecosystem collapse | mass mortality | trophic impact | Federation Drought

Significance: It is thought that extreme, decade-scale megadroughts pose a major future threat to global biodiversity under climate change. However, such events occur rarely and so their capacity to drive ecosystem change remains largely unknown. Here we address this question by reconstructing the impacts of an extreme, historical megadrought period (1891 to 1903) on plant and animal assemblages across the Australian continent. The geographic extent (≥2.8 million km2) and taxonomic depth (>45 families) of impacts observed during this eventwere remarkable and include mass population mortality and broad, bottom-up trophic collapse in multiple subcontinental hotspots. Our work provides insights into the potential pattern and magnitude of ecological change that can occur during continental-scale megadrought.

Pascual 2019

Juan Pascual & Christof Schneider, *A speculative claim of mass mortalities of honeybee colonies caused by fipronil in France is not supported by published field data.* PNAS **116** (2019), 15339–15340.

The risk from a pesticide (fipronil in this case) is determined by the combination of toxicity and exposure. Holder et al. (1) provide their own toxicity data from laboratory tests, but the assumptions about field exposure are unsupported and not in line with publicly available data. Holder et al. (1) fail to cite publications directly relevant to fipronil seed treatment uses, particularly in sunflowers. Because of such shortcomings, the main claim and title of the paper are highly speculative and not adequately supported by reliable data.

Anthropologie

Bokelmann 2019

Lukas Bokelmann & Matthias Meyer et al., *A genetic analysis of the Gibraltar Neanderthals.* PNAS **116** (2019), 15610–15615.

pnas116-15610-Supplement.pdf

Lukas Bokelmann, Mateja Hajdinjak, Stéphane Peyrégne, Selina Brace, Elena Essel, Cesare de Filippo, Isabelle Glocke, Steffi Grote, Fabrizio Mafessoni, Sarah Nagel, Janet Kelso, Kay Prüfer, Benjamin Vernot, Ian Barnes, Svante Pääbo, Matthias Meyer & Chris Stringer

The Forbes' Quarry and Devil's Tower partial crania from Gibraltar are among the first Neanderthal remains ever found. Here, we show that small amounts of ancient DNA are preserved in the petrous bones of the 2 individuals despite unfavorable climatic conditions. However, the endogenous Neanderthal DNA is present among an overwhelming excess of recent human DNA. Using improved DNA library construction methods that enrich for DNA fragments carrying deaminated cytosine residues, we were able to sequence 70 and 0.4 megabase pairs (Mbp) nuclear DNA of the Forbes' Quarry and Devil's Tower specimens, respectively, as well as large parts of the mitochondrial genome of the Forbes' Quarry individual. We

confirm that the Forbes' Quarry individual was a female and the Devil's Tower individual a male. We also show that the Forbes' Quarry individual is genetically more similar to the ≈120,000-y-old Neanderthals from Scladina Cave in Belgium (Scladina I-4A) and Hohlenstein-Stadel Cave in Germany, as well as to a ≈60,000- to 70,000-y-old Neanderthal from Russia (Mezmaiskaya 1), than to a ≈49,000-y-old Neanderthal from El Sidron (El Sidron 1253) in northern Spain and other younger Neanderthals from Europe and western Asia. This suggests that the Forbes' Quarry fossil predates the latter Neanderthals. The preservation of archaic human DNA in the warm coastal climate of Gibraltar, close to the shores of Africa, raises hopes for the future recovery of archaic human DNA from regions in which climatic conditions are less than optimal for DNA preservation.

Keywords: Gibraltar Neanderthal | Forbes' Quarry | paleogenetics | ancient DNA | library preparation

Significance: The remains of 2 Neanderthals were found in Gibraltar: the first at Forbes' Quarry in 1848 and the second at Devil's Tower in 1926. Since their discovery, present-day human DNA contamination has accumulated in the specimens. By developing a DNA library preparation method that reduces modern contamination before sequencing, we were able to isolate enough endogenous DNA from the specimens to determine their sex and to infer that the Forbes' Quarry Neanderthal is more similar to 60,000- to 120,000-y-old Neanderthal specimens in Europe and western Asia than to younger Neanderthals. The laboratory protocols presented here improve access to ancient DNA from specimens that are highly contaminated with present-day human DNA.

Joannes-Boyau 2019

Renaud Joannes-Boyau et al., *Elemental signatures of Australopithecus africanus teeth reveal seasonal dietary stress.* nature **572** (2019), 112–115.

n572-0112-Supplement.pdf

Renaud Joannes-Boyau, Justin W. Adams, Christine Austin, Manish Arora, Ian Moffat, Andy I. R. Herries, Matthew P. Tonge, Stefano Benazzi, Alistair R. Evans, Ottmar Kullmer, Stephen Wroe, Anthony Dosseto & Luca Fiorenza

Reconstructing the detailed dietary behaviour of extinct hominins is challenging1—particularly for a species such as Australopithecus africanus, which has a highly variable dental morphology that suggests a broad diet2,3. The dietary responses of extinct hominins to seasonal fluctuations in food availability are poorly understood, and nursing behaviours even less so; most of the direct information currently available has been obtained from high-resolution traceelement geochemical analysis of Homo sapiens (both modern and fossil), Homo neanderthalensis4 and living apes5. Here we apply high-resolution trace-element analysis to two A. africanus specimens from Sterkfontein Member 4 (South Africa), dated to 2.6–2.1 million years ago. Elemental signals indicate that A. africanus infants predominantly consumed breast milk for the first year after birth. A cyclical elemental pattern observed following the nursing sequence—comparable to the seasonal dietary signal that is seen in contemporary wild primates and other mammals—indicates irregular food availability. These results are supported by isotopic evidence for a geographical range that was dominated by nutritionally depauperate areas. Cyclical accumulation of lithium in A. africanus teeth also corroborates the idea that their range was characterized by fluctuating resources, and that they possessed physiological adaptations to this instability. This study provides insights into the dietary cycles and ecological behaviours of A. africanus in response to food availability, including the potential cyclical resurgence of milk intake during times of nutritional challenge (as observed in modern wild oran-

gutans5). The geochemical findings for these teeth reinforce the unique place of A. africanus in the fossil record, and indicate dietary stress in specimens that date to shortly before the extinction of Australopithecus in South Africa about two million years ago.

Paine 2019

Oliver C. C. Paine et al., *Seasonal and habitat effects on the nutritional properties of savanna vegetation, Potential implications for early hominin dietary ecology.* Journal of Human Evolution **133** (2019), 99–107.

Oliver C. C. Paine, Abigale Koppa, Amanda G. Henry, Jennifer N. Leichliter, Daryl Codron, Jacqueline Codron, Joanna E. Lambert & Matt Sponheimer

The African savannas that many early hominins occupied likely experienced stark seasonality and contained mosaic habitats (i.e., combinations of woodlands, wetlands, grasslands, etc.). Most would agree that the bulk of dietary calories obtained by taxa such as Australopithecus and Paranthropus came from the consumption of vegetation growing across these landscapes. It is also likely that many early hominins were selective feeders that consumed particular plants/plant parts (e.g., leaves, fruit, storage organs) depending on the habitat and season within which they were foraging. Thus, improving our understanding of how the nutritional properties of potential hominin plant foods growing in modern African savanna ecosystems respond to season and vary by habitat will improve our ability to model early hominin dietary behavior. Here, we present nutritional analyses (crude protein and acid detergent fiber) of plants growing in eastern and southern African savanna habitats across both wet and dry seasons. We find that many assumptions about savanna vegetation are warranted. For instance, plants growing in our woodland habitats have higher average protein/fiber ratios than those growing in our wetland and grassland transects. However, we find that the effects of season and habitat are complex, an example being the unexpectedly higher protein levels we observe in the grasses and sedges growing in our Amboseli wetlands during the dry season. Also, we find significant differences between the vegetation growing in our eastern and southern African field sites, particularly among plants using the C4 photosynthetic pathway. This may have implications for the differences we see between the stable carbon isotope compositions and dental microwear patterns of eastern and southern African Paranthropus species, despite their shared, highly derived craniodental anatomy.

Teixeira 2019

João C. Teixeira & Alan Cooper, *Using hominin introgression to trace modern human dispersals.* PNAS **116** (2019), 15327–15332.

The dispersal of anatomically modern human populations out of Africa and across much of the rest of the world around 55 to 50 thousand years before present (ka) is recorded genetically by the multiple hominin groups they met and interbred with along the way, including the Neandertals and Denisovans. The signatures of these introgression events remain preserved in the genomes of modern-day populations, and provide a powerful record of the sequence and timing of these early migrations, with Asia proving a particularly complex area. At least 3 different hominin groups appear to have been involved in Asia, of which only the Denisovans are currently known. Several interbreeding events are inferred to have taken place east of Wallace's Line, consistent with archaeological evidence of widespread and early hominin presence in the area. However, archaeological and fossil evidence indicates archaic hominins had not spread as far as the Sahul continent

(New Guinea, Australia, and Tasmania), where recent genetic evidence remains enigmatic.

Keywords: human evolution | archaic introgression | anthropology | genetics

Bibel

HONG 2017

Koog P. Hong, *Elohim, the Elohist, and the Theory of Progressive Revelation.* Biblica **98** (2017), 321–338.

Source critics have long maintained that the theory of progressive revelation holds the key for the non-use of YHWH in P and E. Yet the core features of this theory are rooted in P, and they appear to be projected onto E. This finding opens up an opportunity to narrow the gap between the Pentateuch and other parts of the Hebrew Bible regarding their use of ELOHIM by viewing this usage as a potential sign of relatively late origin, in line with the generally late ELOHIM phenomenon.

NA'AMAN 1998

Nadav Na'aman, *Jehu Son of Omri, Legitimizing a Loyal Vassal by his Overlord.* Israel Exploration Journal **48** (1998), 236–238.

Islam

EL-BADAWI 2015

Emran El-Badawi, *Syriac and the Qurʾān.* In: JANE DAMMEN MCAULIFFE (Hrsg.), *Encyclopaedia of the Qurʾān.* (Washington 2015).

Over the last two decades the academic research dedicated to analysing Syriac and the Qur'an has been both fruitful as well as unprecedented. This Syriac turn has revolutionized the field by providing new insights and raising new questions. Since Luxenberg's controversial study in 2000, the pendulum of Qur'anic study has swung wildly, both in the academe as well as in the public sphere. Among some academics of the Muslim world associating the Qur'an with the Syriac turn is an orientalist challenge to be confronted (al-Jamal, 105). For other academics and a growing educated public in the Muslim world, connected over the internet and social media, the Syriac turn has invigorated the critical study of the Qur'an, Muhammad, and Islamic tradition (Misilmani and al-Misiyyih, vol. 2).

Mittelalter

LEDGER 2019

Paul M. Ledger, Linus Girdland-Flink & Véronique Forbes, *New horizons at L'Anse aux Meadows.* PNAS **116** (2019), 15341–15343.

The UNESCO World Heritage site of L'Anse aux Meadows (LAM) in northern Newfoundland is the only undisputed site of pre-1492 presence of Europeans in the Americas. In August 2018, we undertook fieldwork at LAMto sample the peat bog 30meast of the Norse ruins for a multiproxy paleoenvironmental assessment of Norse settlement. Instead, we encountered a new cultural horizon. Here we report our fieldwork at this iconic site and a Bayesian analysis of legacy radiocarbon

data, which nuance previous conclusions and suggest Norse activity at LAM may have endured for a century. In light of these findings, we reflect on how the cultural horizon, containing nonnative ecofacts, may relate to indigenous or Norse activities.

Keywords: Norse | indigenous | Bayesian modeling | insects | pollen

Religion

ILAN 2019

David Ilan & Yorke Rowan, *Expediting Reincarnation in the Fifth Millennium BCE, Interpreting the Chalcolithic Ossuaries of the Southern Levant.* Oxford Journal of Archaeology **38** (2019), 248–270.

We examine and reinterpret the phenomenon of containers used for the secondary burial of human remains – ossuaries – in the Chalcolithic period of the southern Levant, c.4500–3700 BCE. Ossuary form and decoration, both plastic and painted, is evocative and symbol-laden. Since their first discovery in the 1930s, several hypotheses have sought to explain ossuary iconography, but none provides an integrated, holistic interpretation. Chalcolithic iconography, mortuary contexts, and archetypal mythologies suggest that ossuaries, mainly of clay, but also of stone, served as vehicles of reincarnation.