References

Afrika Neolithikum

Sadig 2010

Azhari Mustafa Sadig, *The Neolithic of the Middle Nile Region*, *An Archeology of Central Sudan and Nubia.* (Kampala 2010).

Current research has a major reevaluation of the evidence concerning the Neolithic. One of the issues that remain unsolved is the direction of the spread of these cultural development and the relations between different cultural areas and sites within these areas. The homogeneity of the "cultural" groups who inhabited the large area of the Nile is a major issue. Styles and adaptations of life vary from site to site and from one area to another, which may suggest the development of local cultural preferences. Yet in many aspects these sites reflect similarities were though they did not follow the same developments.

It seems that, in spite of the evidence of many excavated sites, evidence of the social organisation of the people of the Neolithic in Central Sudan will be limited to that derived from burial information. Although the hypothetical social classes reflected in the graves were not observed in the settlements, currently available evidence seems to indicate that the burial grounds at el Kadada and Kadero I illustrate well the process toward the end of the Neolithic of the increasing concentration of goods and power by a social "elite".

It is clear that the social structure in Central Sudan during the Neolithic period exhibited more or less inseparable economic and settlement patterns, which are in turn witness to developmental stages extending from the Early Neolithic to the complex picture of the Late Neolithic.

Although the degree of permanency varies from one site to another, reaching its zenith at Kadero I and el Kadada, a mobile pattern exists throughout, and this started to invade a regular schedule of movement through the different microenvironments in later times. Another question relates to the relation between settlement patterns and social and ethnic affiliation during the Neolithic. Certainly, much can be learned about the various subsistence patterns of different "archaeological groups" but it is not possible, for the Neolithic period, to go beyond this and attach linguistic or ethnic labels to archaeological cultures, since it is doubtful that much can be learned about ethnic identity in the absence of written information.

Aktuell

Baskin-Sommers 2016

Arielle Baskin-Sommers, Allison M. Stuppy-Sullivan & Joshua W. Buckholtz, *Psychopathic individuals exhibit but do not avoid regret during counterfactual decision making.* PNAS **113** (2016), 14438–14443.

Psychopathy is associated with persistent antisocial behavior and a striking lack of regret for the consequences of that behavior. Although explanatory models for psychopathy have largely focused on deficits in affective responsiveness, recent work indicates that aberrant value-based decision making may also play a role. On that basis, some have suggested that psychopathic individuals may be unable to effectively use prospective simulations to update action value estimates during

cost–benefit decision making. However, the specific mechanisms linking valuation, affective deficits, and maladaptive decision making in psychopathy remain unclear. Using a counterfactual decision-making paradigm, we found that individuals who scored high on a measure of psychopathy were as ormore likely than individuals low on psychopathy to report negative affect in response to regret-inducing counterfactual outcomes. However, despite exhibiting intact affective regret sensitivity, they did not use prospective regret signals to guide choice behavior. In turn, diminished behavioral regret sensitivity predicted a higher number of prior incarcerations, and moderated the relationship between psychopathy and incarceration history. These findings raise the possibility that maladaptive decision making in psychopathic individuals is not a consequence of their inability to generate or experience negative emotions. Rather, antisocial behavior in psychopathy may be driven by a deficit in the generation of forward models that integrate information about rules, costs, and goals with stimulus value representations to promote adaptive behavior.

Keywords: psychopathy | counterfactual reasoning | affect | decision making | reward

Significance: Psychopathic individuals display a chronic and flagrant disregard for social norms through their callous behavior and lack of regret for its consequences. Although psychopathy research largely attributes this to deficits in affective responsiveness, recent proposals suggest that value-based decision making may also contribute to the maladaptive behavior of psychopathic individuals. Using a counterfactual decision-making paradigm, we found that higher scores on psychopathy were associated with higher levels of retrospective regret. Despite this, however, individuals higher on psychopathy made riskier choices and were less influenced by prospective regret when making decisions. These findings support the idea that the maladaptive behavior of psychopathic individuals is related to deficits in domain-general cognitive processes, such as counterfactual decision making, rather than a primary affective deficit.

Lo 2016

Adeline Lo, Herman Chernoff, Tian Zheng & Shaw-Hwa Lo, *Framework for making better predictions by directly estimating variables' predictivity.* PNAS **113** (2016), 14277–14282.

We propose approaching prediction from a framework grounded in the theoretical correct prediction rate of a variable set as a parameter of interest. This framework allows us to define a measure of predictivity that enables assessing variable sets for, preferably high, predictivity. We first define the prediction rate for a variable set and consider, and ultimately reject, the naive estimator, a statistic based on the observed sample data, due to its inflated bias for moderate sample size and its sensitivity to noisy useless variables. We demonstrate that the I-score of the PR method of VS yields a relatively unbiased estimate of a parameter that is not sensitive to noisy variables and is a lower bound to the parameter of interest. Thus, the PR method using the I-score provides an effective approach to selecting highly predictive variables. We offer simulations and an application of the I-score on real data to demonstrate the statistic's predictive performance on sample data. We conjecture that using the partition retention and I-score can aid in finding variable sets with promising prediction rates; however, further research in the avenue of sample-based measures of predictivity is much desired.

Keywords: prediction | variable selection | high-dimensional data | predictivity

Significance: Good prediction, especially in the context of big data, is important. Common approaches to prediction include using a significance-based criterion for evaluating variables to use in models and evaluating variables and models simul-

taneously for prediction using cross-validation or independent test data. The first approach can lead to choosing less-predictive variables, because significance does not imply predictivity. The second approach can be improved through considering a variable's predictivity as a parameter to be estimated. The literature currently lacks measures that do this. We suggest a measure that evaluates variables' abilities to predict, the I-score. The I-score is effective in differentiating between noisy and predictive variables in big data and can be related to a lower bound for the correct prediction rate.

Urgolites 2016

Zhisen J. Urgolites, Soyun Kim, Ramona O. Hopkins & Larry R. Squire, *Map reading, navigating from maps, and the medial temporal lobe.* PNAS **113** (2016), 14289–14293.

We administered map-reading tasks in which participants navigated an array of marks on the floor by following paths on hand-held maps that made up to nine turns. The burden on memory was minimal because the map was always available. Nevertheless, because the map was held in a fixed position in relation to the body, spatial computations were continually needed to transform map coordinates into geographical coordinates as participants followed the maps. Patients with lesions limited to the hippocampus (n = 5) performed similar to controls at all path lengths (experiment 1). They were also intact at executing single moves to an adjacent location, even when trials began by facing in a direction that put the map coordinates and geographical coordinates into conflict (experiment 2). By contrast, one patient with large medial temporal lobe (MTL) lesions performed poorly overall in experiment 1 and poorly in experiment 2 when trials began by facing in the direction that placed themap coordinates and geographical coordinates in maximal conflict. Directly after testing, all patients were impaired at remembering factual details about the task. The findings suggest that the hippocampus is not needed to carry out the spatial computations needed formap reading and navigating from maps. The impairment in map reading associated with large MTL lesions may depend on damage in or near the parahippocampal cortex.

Keywords: hippocampus | memory | spatial navigation

Significance: The hippocampus has been linked to both memory and spatial cognition, but these ideas are not entirely compatible. We administered navigation tasks in which participants transformed map coordinates into geographical coordinates to follow paths indicated on maps. Patients with limited hippocampal lesions performed normally. A patient with large lesions that damaged the hippocampus as well as the adjacent parahippocampal gyrus was impaired. All the patients were impaired at remembering facts about the task. The findings suggest that the spatial computations needed for navigating from maps are independent of the hippocampus. The impairment after large medial temporal lobe lesions may result from damage to the posterior parahippocampal gyrus. The findings emphasize the importance of the hippocampus for memory functions.

Williamson 2016

Phil Williamson, *Take the time and effort to correct misinformation.* nature **540** (2016), 171.

Scientists should challenge online falsehoods and inaccuracies — and harness the collective power of the Internet to fight back, argues Phil Williamson.

Most researchers who have tried to engage online with ill-informed journalists or pseudoscientists will be familiar with Brandolini's law (also known as the Bullshit Asymmetry Principle): the amount of energy needed to refute bullshit is an order of magnitude bigger than that needed to produce it. Is it really worth taking the

time and effort to challenge, correct and clarify articles that claim to be about science but in most cases seem to represent a political ideology? I think it is.

Yet the rising tide of populism threatens the future of evidence-based governance. Social media and websites, lacking quality control, are replacing newspapers as the main information sources for the public and many politicians, even at the highest level. Not much can be done about this nonsense online, but 'not much' is still something.

Anthropologie

Ruff 2016

Christopher B. Ruff, M. Loring Burgess, Richard A. Ketcham & John Kappelman, *Limb Bone Structural Proportions and Locomotor Behavior in A.L. 288-1 ("Lucy").* PLoS ONE **11** (2016), e166095. DOI:10.1371/journal.pone.0166095.

While there is broad agreement that early hominins practiced some form of terrestrial bipedality, there is also evidence that arboreal behavior remained a part of the locomotor repertoire in some taxa, and that bipedal locomotion may not have been identical to that of modern humans. It has been difficult to evaluate such evidence, however, because of the possibility that early hominins retained primitive traits (such as relatively long upper limbs) of little contemporaneous adaptive significance. Here we examine bone structural properties of the femur and humerus in the Australopithecus afarensis A.L. 288 ± 1 ("Lucy", 3.2 Myr) that are known to be developmentally plastic, and compare them with other early hominins, modern humans, and modern chimpanzees. Cross-sectional images were obtained from micro-CT scans of the original specimens and used to derive section properties of the diaphyses, as well as superior and inferior cortical thicknesses of the femoral neck. A.L. 288 ± 1 shows femoral/humeral diaphyseal strength proportions that are intermediate between those of modern humans and chimpanzees, indicating more mechanical loading of the forelimb than in modern humans, and by implication, a significant arboreal locomotor component. Several features of the proximal femur in A.L. 288 ± 1 and other australopiths, including relative femoral head size, distribution of cortical bone in the femoral neck, and cross-sectional shape of the proximal shaft, support the inference of a bipedal gait pattern that differed slightly from that of modern humans, involving more lateral deviation of the body center of mass over the support limb, which would have entailed increased cost of terrestrial locomotion. There is also evidence consistent with increased muscular strength among australopiths in both the forelimb and hind limb, possibly reflecting metabolic trade-offs between muscle and brain development during hominin evolution. Together these findings imply significant differences in both locomotor behavior and ecology between australopiths and later Homo.

Sasai 2016

Shuntaro Sasai, Melanie Boly, Armand Mensen & Giulio Tononi, *Functional split brain in a driving/listening paradigm.* PNAS **113** (2016), 14444–14449.

We often engage in two concurrent but unrelated activities, such as driving on a quiet road while listening to the radio. When we do so, does our brain split into functionally distinct entities? To address this question, we imaged brain activity with fMRI in experienced drivers engaged in a driving simulator while listening either to global positioning system instructions (integrated task) or to a radio show (split task). We found that, compared with the integrated task, the split task was

characterized by reduced multivariate functional connectivity between the driving and listening networks. Furthermore, the integrated information content of the two networks, predicting their joint dynamics above and beyond their independent dynamics, was high in the integrated task and zero in the split task. Finally, individual subjects' ability to switch between high and low information integration predicted their driving performance across integrated and split tasks. This study raises the possibility that under certain conditions of daily life, a single brain may support two independent functional streams, a "functional split brain" similar to what is observed in patients with an anatomical split.

Significance: When one drives on an easy route and listens to a radio, it is at times as if one's brain splits into two separate entities: one that drives and one that listens. When, instead, one drives while listening to a global positioning system, there is only one functional stream. Here, using measures of information integration, we show that a brain may functionally split into two separate "driving" and "listening" systems when the listening task is unrelated to concurrent driving, but not when the two systems are related. This finding raises the possibility that under certain conditions of daily life, a single brain may support two independent functional streams, a "functional split brain" similar to what is observed in patients with an anatomical split.

Grabung

CROSS 1968

Frank Moore Cross, *The Phoenician Inscription from Brazil, A Nineteenth-Century Forgery.* Orientalia **37** (1968), 437–460.

The so-called Paraíba inscription is a pathetic mishmash of linguistic forms, of spellings and of scripts of various dates and places patched together from nineteenth-century handbooks. Nothing in the inscription, including many of its blunders, was unavailable in the scholarship of the eighteen-fifties or -sixties or from uninspired guesses. It was not a bad job of forgery for its day. Fortunately, the advance of Phoenician studies, especially our knowledge of the historical typology of the Canaanite dialects, Phoenician and Hebrew orthography, and the Phoenician scripts have advanced so far beyond the level of the forger's day that we can dismiss the Brazilian text once for all as a plain fraud.

Klima

BIERMAN 2016

Paul R. Bierman, Jeremy D. Shakun, Lee B. Corbett, Susan R. Zimmerman & Dylan H. Rood, *A persistent and dynamic East Greenland Ice Sheet over the past 7.5 million years.* nature **540** (2016), 256–260.

n540-0256-Supplement.xlsx

Climate models show that ice-sheet melt will dominate sea-level rise over the coming centuries, but our understanding of ice-sheet variations before the last interglacial 125,000 years ago remains fragmentary. This is because terrestrial deposits of ancient glacial and interglacial periods1–3 are overrun and eroded by more recent glacial advances, and are therefore usually rare, isolated and poorly dated4. In contrast, material shed almost continuously from continents is preserved as marine sediment that can be analysed to infer the time-varying state of major ice sheets. Here we show that the East Greenland Ice Sheet existed over the past 7.5

million years, as indicated by beryllium and aluminium isotopes (10Be and 26Al) in quartz sand removed by deep, ongoing glacial erosion on land and deposited offshore in the marine sedimentary record5,6. During the early Pleistocene epoch, ice cover in East Greenland was dynamic; in contrast, East Greenland was mostly ice-covered during the mid-to-late Pleistocene. The isotope record we present is consistent with distinct signatures of changes in ice sheet behaviour coincident with major climate transitions. Although our data are continuous, they are from low-deposition-rate sites and sourced only from East Greenland. Consequently, the signal of extensive deglaciation during short, intense interglacials could be missed or blurred, and we cannot distinguish between a remnant ice sheet in the East Greenland highlands and a diminished continent-wide ice sheet. A clearer constraint on the behaviour of the ice sheet during past and, ultimately, future interglacial warmth could be produced by 10Be and 26Al records from a coring site with a higher deposition rate. Nonetheless, our analysis challenges the possibility of complete and extended deglaciation over the past several million years.

Cuffey 2016

Kurt M. Cuffey et al., *Deglacial temperature history of West Antarctica.* PNAS **113** (2016), 14249–14254.

Kurt M. Cuffey, Gary D. Clow, Eric J. Steig, Christo Buizert, T. J. Fudge, Michelle Koutnik, Edwin D. Waddington, Richard B. Alley & Jeffrey P. Severinghaus

The most recent glacial to interglacial transition constitutes a remarkable natural experiment for learning how Earth's climate responds to various forcings, including a rise in atmospheric CO2. This transition has left a direct thermal remnant in the polar ice sheets, where the exceptional purity and continual accumulation of ice permit analyses not possible in other settings. For Antarctica, the deglacial warming has previously been constrained only by the water isotopic composition in ice cores, without an absolute thermometric assessment of the isotopes' sensitivity to temperature. To overcome this limitation, we measured temperatures in a deep borehole and analyzed them together with ice-core data to reconstruct the surface temperature history of West Antarctica. The deglacial warming was 11.3 ± 1.8 C, approximately two to three times the global average, in agreement with theoretical expectations for Antarctic amplification of planetary temperature changes. Consistent with evidence from glacier retreat in Southern Hemisphere mountain ranges, the Antarctic warming was mostly completed by 15 kyBP, several millennia earlier than in the Northern Hemisphere. These results constrain the role of variable oceanic heat transport between hemispheres during deglaciation and quantitatively bound the direct influence of global climate forcings on Antarctic temperature. Although climate models perform well on average in this context, some recent syntheses of deglacial climate history have underestimated Antarctic warming and the models with lowest sensitivity can be discounted.

Significance: The magnitude and timing of Antarctic temperature change through the last deglaciation reveal key aspects of Earth's climate system. Prior attempts to reconstruct this history relied on isotopic indicators without absolute calibration. To overcome this limitation, we combined isotopic data with measurements of in situ temperatures along a 3.4-km-deep borehole. Deglacial warming in Antarctica was two to three times larger than the contemporaneous global temperature change, quantifying the extent to which feedback processes amplify global changes in polar regions, a key prediction of climate models. Warming progressed earlier in Antarctica than in the Northern Hemisphere but coincident with glacier recession in southern mountain ranges, a manifestation of changing oceanic heat transport, insolation, and atmospheric CO2 that can further test models.

GKINIS 2014

V. Gkinis, S. B. Simonsen, S. L. Buchardt, J. W. C. White & B. M.
Vinther, *Water isotope diffusion rates from the NorthGRIP ice core
for the last 16,000 years, Glaciological and paleoclimatic implications.*
arXiv (2014), 1404.4201. <http://arxiv.org/pdf/1404.4201> (2015-
03-17).

   A high resolution (0.05 m) water isotopic record (d18O) is available from the
NorthGRIP ice core. In this study we look into the water isotope diffusion history
as estimated by the spectral characteristics of the d18O time series covering the
last 16,000 years. Based on it we infer a temperature history signal for the site. We
use a water isotope diffusion model coupled to a steadystate densification model
in order to infer the temperature signal from the site, assuming the accumulation
and strain rate history as estimated using the GICC05 layer counted chronology
and a Dansgaard–Johnsen ice flow model. The necessary corrections regarding
ice diffusion and the discretized sampling of the dataset are also described. The
temperature reconstruction accurately captures the timing and magnitude of the
Bølling–Allerød and Younger Dryas transitions. A Holocene climatic optimum
is seen between 7 and 9 ky b2k with an apparent cooling trend thereafter. Our
temperature estimate for the Holocene climatic optimum, point to a necessary
adjustment of the total thinning function indicating that the ice flow model over-
estimates the accumulation rates by about 10 % at 8 ky b2k. This result, is also
supported by recent gas isotopic fractionation studies proposing a similar reduc-
tion for glacial conditions. Finally, the record presents a climatic variability over
the Holocene spanning millennial and centennial scales with a profound cooling oc-
curring at approximately 4000 years b2k. The new reconstruction technique is able
to provide past temperature estimates by overcoming the potential issues apparent
in the use of the classical d18O slope method, while it can in the same time resolve
temperature signals at low and high frequencies.

GLASSER 2016

Pierre-Henri Blard, Guillaume Leduc & Neil Glasser, *The history of
Greenland's ice.* nature **540** (2016), 202–203.

   Global sea levels would rise by several metres if the Greenland Ice Sheet melted
completely. Two studies have examined its past behaviour in an effort to evaluate
its vulnerability in a warming world — and have come to seemingly conflicting
conclusions. Two geochemists and a glaciologist discuss the issues.
The Papers in Brief
- Knowledge of the ancient history of ice sheets is needed to inform predictions of
their future response to climate change.
- On page 252, Schaefer et al.1 present measurements of beryllium-10 (10Be) and
aluminium-26 (26Al) from bedrock beneath the Greenland Ice Sheet.
- From their data, they propose that Greenland has undergone one or more epis-
odes of deglaciation during the past 1.1 million years.
- On page 256, Bierman et al.2 present 10Be and 26Al data from marine sediment
cores collected off the coast of Greenland.
- They conclude that the East Greenland Ice Sheet remained present during the
Pleistocene (the epoch that lasted from 2.6 million to 11,700 years ago), but grew
and shrank dynamically in response to climate.

MASLIN 2016

Mark Maslin, *Forty years of linking orbits to ice ages.* nature **540**
(2016), 208–210.

In 1976, it was demonstrated that tiny wobbles in Earth's orbit led to the great ice-age cycles of the past few million years. This finding had wide implications for climate science and the details remain hotly debated today.

Roland 2014

T. P. Roland, C. J. Caseldine, D. J. Charman, C. S. M. Turney & M. J. Amesbury, *Was there a '4.2 ka event' in Great Britain and Ireland? Evidence from the peatland record.* Quaternary Science Reviews **83** (2014), 11–27.

qsr083-0011-Supplement.docx

Palaeoenvironmental and archaeological data from several regions around the world show evidence of a multi-centennial climatic event occurring approximately 4200 cal yr BP (4.2 ka). Whilst the climatic change and/or impact of the 4.2 ka event is clear in certain regions, such as western Asia, evidence for the event has yet to be fully evaluated in northwest Europe. This study presents high-resolution, multi-proxy palaeoclimate records from sites in Northern Ireland, ideally located for an objective examination of the nature of the event in Great Britain and Ireland within the broader context of mid-Holocene climate change c. 6.5–2.5 ka. The peatlands of northwest Europe possess considerable potential for the examination of climatic change in the North Atlantic region, demonstrated by the range of palaeohydrological proxy data generated during this study (peat humification, plant macrofossil and testate amoebae analyses) supported by a high-resolution chronology (including comprehensive AMS 14C and tephrochronology). The inter-site testate amoebae reconstructions appear coherent and were combined to produce a regional climatic record, in marked contrast to the plant macrofossil and peat humification records that appear climatically complacent. The testate amoebae reconstruction, however, provides no compelling evidence for a 4.2 ka event signal and is consistent with previously reported studies from across northwest Europe, suggesting the origin and impact of this event is spatially complex.

Keywords: 4.2 ka event | 2.8 ka event | Multi-proxy | Peatlands | Great Britain and Ireland | Testate amoebae | Hekla 4 | Abrupt and extreme climate change

Schaefer 2016

Joerg M. Schaefer et al., *Greenland was nearly ice-free for extended periods during the Pleistocene.* nature **540** (2016), 252–255.

Joerg M. Schaefer, Robert C. Finkel, Greg Balco, Richard B. Alley, Marc W. Caffee, Jason P. Briner, Nicolas E. Young, Anthony J. Gow & Roseanne Schwartz

The Greenland Ice Sheet (GIS) contains the equivalent of 7.4 metres of global sea-level rise1. Its stability in our warming climate is therefore a pressing concern. However, the sparse proxy evidence of the palaeo-stability of the GIS means that its history is controversial (compare refs 2 and 3 to ref. 4). Here we show that Greenland was deglaciated for extended periods during the Pleistocene epoch (from 2.6 million years ago to 11,700 years ago), based on new measurements of cosmic-ray-produced beryllium and aluminium isotopes (10Be and 26Al) in a bedrock core from beneath an ice core near the GIS summit. Models indicate that when this bedrock site is ice-free, any remaining ice is concentrated in the eastern Greenland highlands and the GIS is reduced to less than ten per cent of its current volume. Our results narrow the spectrum of possible GIS histories: the longest period of stability of the present ice sheet that is consistent with the measurements is 1.1 million years, assuming that this was preceded by more than 280,000 years of ice-free conditions. Other scenarios, in which Greenland was ice-free during any or all Pleistocene interglacials, may be more realistic. Our observations are incompatible with most existing model simulations that present a continuously

8

existing Pleistocene GIS. Future simulations of the GIS should take into account that Greenland was nearly ice-free for extended periods under Pleistocene climate forcing.

Neolithikum

H ARLAN 1971

Jack R. Harlan, *Agricultural Origins, Centers and Noncenters.* science **174** (1971), 468–474.

Agriculture may originate in discrete centers or evolve over vast areas without definable centers.

I propose the theory that agriculture originated independently in three different areas and that, in each case, there was a system composed of a center of origin and a noncenter, in which activities of domestication were dispersed over a span of 5,000 to 10,000 kilometers. One system includes a definable Near East center and a noncenter in Africa; another system includes a North Chinese center and a noncenter in Southeast Asia and the South Pacific; the third system includes a Mesoamerican center and a South American noncenter. There are suggestions that, in each case, the center and noncenter interact with each other. Crops did not necessarily originate in centers (in any conventional concept of the term), nor did agriculture necessarily develop in a geographical "center."