Liste erstellt am 2012-02-24

Literatur

Aktuell

Grieder 2012

Taryn E. Grieder, Olivier George, Huibing Tan, Susan R. George, Bernard Le Foll, Steven R. Laviolette & Derek van der Kooy, *Phasic D1 and tonic D2 dopamine receptor signaling double dissociate the motivational effects of acute nicotine and chronic nicotine withdrawal*. PNAS **109** (2012), 3101–3106.

Nicotine, the main psychoactive ingredient of tobacco smoke, induces negative motivational symptoms during withdrawal that contribute to relapse in dependent individuals. The neurobiological mechanisms underlying how the brain signals nicotine withdrawal remain poorly understood. Using electrophysiological, genetic, pharmacological, and behavioral methods, we demonstrate that tonic but not phasic activity is reduced during nicotine withdrawal in ventral tegmental area dopamine (DA) neurons, and that this pattern of signaling acts through DA D2 and adenosine A2A, but not DA D1, receptors. Selective blockade of phasic DA activity prevents the expression of conditioned place aversions to a single injection of nicotine in nondependent mice, but not to withdrawal from chronic nicotine in dependent mice, suggesting a shift from phasic to tonic dopaminergic mediation of the conditioned motivational response in nicotine dependent and withdrawn animals. Either increasing or decreasing activity at D2 or A2A receptors prevents the aversive motivational response to withdrawal from chronic nicotine, but not to acute nicotine. Modification of D1 receptor activity prevents the aversive response to acute nicotine, but not to nicotine withdrawal. This double dissociation demonstrates that the specific pattern of tonic DA activity at D2 receptors is a key mechanism in signaling the motivational effects experienced during nicotine withdrawal, and may represent a unique target for therapeutic treatments for nicotine addiction.

negative reinforcement | place conditioning | burst firing | population activity | osmotic minipumps

Luby 2012

Joan L. Luby et al., *Maternal support in early childhood predicts larger hippocampal volumes at school age*. PNAS **109** (2012), 2854–2859.

Joan L. Luby, Deanna M. Barch, Andy Belden, Michael S. Gaffrey, Rebecca Tillman, Casey Babb, Tomoyuki Nishino, Hideo Suzuki and Kelly N. Botteron

Early maternal support has been shown to promote specific gene expression, neurogenesis, adaptive stress responses, and larger hippocampal volumes in developing animals. In humans, a relationship between psychosocial factors in early childhood and later amygdala volumes based on prospective data has been demonstrated, providing a key link between early experience and brain development. Although much retrospective data suggests a link between early psychosocial factors and hippocampal volumes in humans, to date there has been no prospective data to inform this potentially important public health issue. In a longitudinal study of depressed and healthy preschool children who underwent neuroimaging at school age, we investigated whether early maternal support predicted later hippocampal volumes. Maternal support observed in early childhood was strongly predictive of hippocampal volume measured at school age. The positive effect of maternal support on hippocampal volumes was greater in nondepressed children. These findings provide prospective evidence in humans of the positive effect of early supportive

parenting on healthy hippocampal development, a brain region key to memory and stress modulation.
depression | parental support | nurturance | neurodevelopment

Lyon 2012

Gholson J. Lyon, *Bring clinical standards to human-genetics research.* nature **482** (2012), 300–301.

Study protocols need to be rigorous, because more than science is at stake. Sometimes participants' lives depend on the results, writes Gholson J. Lyon.
In the case of the woman who I suspected was carrying a male fetus with Ogden Synd rome, I faced a major dilemma owing to time constraints. Given that my results could have been incorrect, and might have caused undue stress and possibly even an unnecessary termination of the pregnancy, I chose to "first, do no harm" – I did not return my research result to her, and I instead attempted to validate it in a CLIA-certified lab at a major diagnostic facility. It was a long and bureaucratic process, but after several months, in July 2011, we had a formal, CLIA-certified genetic test for the specific mutation in NAA10, the gene associated with Ogden Syndrome. Unfortunately, by that time, the woman had given birth to her son. As I had feared, he had the disease. Sadly, he died in June 2011, four days before the paper describing the mutation that killed him was published.

Sesia 2012

Thibaut Sesia & Anthony A. Grace, *Shifting pharmacology of nicotine use and withdrawal: Breaking the cycle of drug abuse.* PNAS **109** (2012), 2697–2698.

Anthropologie

DeWitt 2012

Iain DeWitt & Josef P. Rauschecker, *Phoneme and word recognition in the auditory ventral stream.* PNAS **109** (2012), 2709–2710.

pnas109-02709-Fulltext.pdf
Pattern specificity within a hierarchical architecture implies that auditory cortex first conjoins low-level features into elemental forms (i.e., phonemes-analogous to letters in writing) and then concatenates these representations into phoneme sequences (i.e., sublexical and word-form representations). We therefore predicted experiments comparing speech and acoustically matched control sounds would show different localization for phoneme and word processing. We also considered studies using phrase-length stimuli, expecting these studies would show peak activation downstream of that for word-length stimuli. Spoken word recognition requires complex, invariant representations. Using a meta-analytic approach incorporating more than 100 functional imaging experiments, we show that preference for complex sounds emerges in the human auditory ventral stream in a hierarchical fashion, consistent with nonhuman primate electrophysiology. Examining speech sounds, we show that activation associated with the processing of short-timescale patterns (i.e., phonemes) is consistently localized to left mid-superior temporal gyrus (STG), whereas activation associated with the integration of phonemes into temporally complex patterns (i.e., words) is consistently localized to left anterior STG. Further, we show left midto anterior STG is reliably implicated in the invariant representation of phonetic forms and that this area also responds preferentially to phonetic sounds, above artificial control sounds or environmental sounds. Together, this shows increasing encoding specificity and invariance along the auditory ventral stream for temporally complex speech sounds.

functional MRI | meta-analysis | auditory cortex | object recognition | language

Pagel 2012

Mark Pagel, *Adapted to culture*. nature **482** (2012), 297–299.

Mark Pagel proposes that our ability to share and build on ideas is what made us human. The many peculiar acts of altruism that describe our ultra-social nature evolved as costly ways for us to demonstrate our commitment, and thus our worthiness, to our cooperative group. The clearest way to show others that you are an altruist is to behave altruistically. The good reputations we earn attract altruism from others, which in turn grants us access to the material and social rewards of our communities.

We take our ultra-sociality for granted, but once such a system got going we had no choice but to become altruism 'show-offs', to compete with others for a slice of the cooperative pie. Our ultra-helpful nature is the altruism equivalent of a peacock's tail, except that the peacock uses his tail to attract a mate – we use our altruism to secure the spoils of cooperation.

Other unique features of our psychology, including our norms and morality, our expectation of fairness and our tendency towards 'moralistic aggression' — punishing people who violate social rules — are emotions and social mechanisms we evolved to police those who might be tempted to exploit this fragile cooperative system.

Tollefson 2012

Jeff Tollefson, *Cultural Roots*. nature **482** (2012), 290–292.

A South African archaeologist digs into his own past to seek connections between climate change and human development.

The Still Bay culture was one of the most advanced Middle Stone Age groups in Africa when it emerged some 78,000 years ago in a startlingly early flourishing of the human mind. Henshilwood's excavations at Blombos Cave have revealed distinctive tools, including carefully worked stone points that probably served as knives and spear tips, and bits of rock inscribed with apparently symbolic designs. But evidence of the technology disappears abruptly in sediment about 71,000 years old, along with all proof of human habitation in southern Africa. It would be 7,000 years before a new culture appeared, with a markedly different toolkit, including crescent-shaped blades probably used as arrowheads.

What drove the coming and going of these early cultures? At about the time the Still Bay culture disappeared, the globe – already in the middle of a glacial period – began to cool even further, causing sea levels to fall (see 'Crucible of culture'). "Humans are very adaptable," says Henshilwood, "but I think climate must have played some role in the demise of the Still Bay." If there is a link, it may hold broader implications. Genetic data suggest that the entire population of modern humans contracted at around the same time, then rebounded and expanded in Africa and onto other continents.

Datierung

Michczyńska 2004

Danuta J Michczyńska & Anna Pazdur, *Shape analysis of cumulative probability density function of radiocarbon dates set in the study of climate change in the late glacial and holocene*. Radiocarbon **46** (2004), 733–744.

We report on a statistical analysis of a large set of radiocarbon dates for reconstruction of paleoclimate. Probability density functions were constructed by summing the probability distributions of individual 14C dates. Our analysis was based on 2 assumptions: 1) The amount of organic matter in sediments depends on paleogeographical conditions; 2) The number of 14C-dated samples is proportional to the amount of organic matter

deposited in sediments in the examined time intervals. We quantified how many dates are required to give statistically reliable results. As an example, 785 peat dates from Poland were selected. The dates encompassed the Holocene and Late Glacial period. All dates came from the Gliwice Radiocarbon Laboratory. Results were compared with other paleoenvironmental records. Detailed analysis of the frequency distributions showed that preferential sampling plays an important part in the shape determination. The general rule to take samples from locations where visible changes of sedimentation are apparent (e.g. from the top and the bottom of the peat layer) results in narrow peaks in the probability density function near the limits of the Holocene subdivision.

Michczyńska 2007

Danuta J Michczyńska, Adam Michczyński & Anna Pazdur, *Frequency distribution of radiocarbon dates as a tool for reconstructing environmental changes*. Radiocarbon **49** (2007), 799–806.

Large sets of radiocarbon dates of 1019 peat, 155 speleothem, and 100 tufa samples, as well as dates of 330 fluvial samples, were investigated in order to estimate environmental variability during the last 16,000 calendar years in Poland. All 14C dating was carried out in the Gliwice Radiocarbon Laboratory, and results are stored in the RoS database. Probability density functions (PDFs) were created by summing up (on the calendar timescale) individual age probability distributions of all dates for different types of material and for different regions of Poland. We used an updated version of the Gliwice Radiocarbon Laboratory calibration program GdCALIB. The 14C dates were calibrated using the IntCal04 calibration curve (Reimer et al. 2004), and results were compared with other paleoenvironmental records. The authors conclude that analyzing PDFs of different types of sediments can be helpful in the qualitative reconstruction of the past environment. The PDF for peat samples primarily reflects paleohydrological conditions; the PDFs for speleothem and tufa samples reflect changes in temperature and humidity, while analysis of the PDF created for fluvial data is in a general agreement with the PDFs constructed for peat samples.

Michczyński 2006

Adam Michczyński & Danuta J. Michczyńska, *The effect of PDF peaks' height increase during calibration of radiocarbon date sets*. Geochronometria **25** (2006), 1–4.

Large sets of dates are often used to construct frequency distributions to investigate variability of some events, which can follow an environmental change (eg. crystallization of speleothems depends on climatic conditions). Examples of such distributions are probability density functions (PDF) created for radiocarbon dates. In order to reach reliable conclusions concerning environmental changes, we should know how to interpret these distributions. In this study, the authors discuss the problem of a possible correlation between the presence of some high, narrow peaks in the probability density function and the shape of the calibration curve.

Key words: radiocarbon, calibration, large set of radiocarbon dates

Peros 2010

Matthew C. Peros, Samuel E. Munoz, Konrad Gajewski & André E. Viau, *Prehistoric demography of North America inferred from radiocarbon data*. Journal of Archaeological Science **37** (2010), 656–664.

Large radiocarbon datasets are increasingly used as a paleodemographic proxy, although potential sources of bias in such records are poorly understood. In this paper, we use more than 25,000 radiocarbon dates extracted from the Canadian Archaeological Radiocarbon Database (CARD) to estimate long-term population trends in North America,

while critically examining biases in such records. The frequency distribution of CARD dates shows a positive curvilinear pattern, such that older dates exist in lower numbers than more recent dates, which in part reflects the removal of cultural carbon from the archaeological record through processes such as erosion and dissolution. The average annual growth rate of radiocarbon dates in CARD was calculated and used to derive estimates of the population of North America from the Paleo-Indian to the Contact Periods. While taphonomic bias has likely affected the CARD data, other factors, such as the overrepresentation of Paleo-Indian and Archaic radiocarbon dates, may have offset any bias due to taphonomy. A quantitative reconstruction of Native American population shows that population increased rapidly around 2000 cal yr BP, reaching a maximum of 2,500,000 people by ≈AD 1150. From this time until European contact, the population declined, possibly due to the effects of increased sedentism and population density.
Keywords: Temporal frequency distributions | Prehistoric demography | Taphonomic bias | Radiocarbon dating

Surovell 2007

Todd A. Surovell & Jeffrey Brantingham, *A note on the use of temporal frequency distributions in studies of prehistoric demography*. Journal of Archaeological Science **34** (2007), 1868–1877.

Temporal frequency distributions of archaeological sites and radiocarbon dates are commonly used as proxies for prehistoric population levels based on the assumption that more people create a stronger archaeological signal. While this assumption is certainly correct, we question whether relative frequencies of sites or dates observed from prehistoric contexts are necessarily linked to human demography. In this paper, we demonstrate that the typical positive curvilinear frequency distributions observed in archaeological contexts also regularly occur in paleontological and geological contexts and are thus likely caused by the operation of time-dependent destructive processes, what we call "taphonomic bias." Using a simple model, which assumes a constant rate of site loss over time, we show how taphonomic bias can produce positive curvilinear frequency distributions through time even in cases of population stasis, decline, and fluctuation. We conclude that caution must be used when attempting to infer demographic trends from frequency distributions alone.
Keywords: Frequency distributions; Prehistoric demography; Taphonomy; Bias; Radiocarbon dating

Williams 2012

Alan N. Williams, *The use of summed radiocarbon probability distributions in archaeology: a review of methods*. Journal of Archaeological Science **39** (2012), 578–589.

JArchSci39-0578-Supplement1.xls, JArchSci39-0578-Supplement2.doc, JArchSci39-0578-Supplement2.pdf
Using a database of Australian archaeological radiocarbon dates (n = 2996), this paper explores three key methodological issues associated with the use of summed probability plots of radiocarbon data: 1) the minimum sample size needed for a statistically reliable plot; 2) the effect of radiocarbon calibration on the structure of these plots; and 3) the application of a taphonomic correction to such time-series data. The results identify several protocols, recommended as best-practice when using summed probability plots: 1) a minimum sample size of 500 radiocarbon dates should be used, and the sample size and the mean of the standard deviations of the radiocarbon dates (DT) in the sample should both be reported; 2) a moving average trendline of 500–800 years should be used to offset the effects of the calibration process; and 3) Surovell et al. "Correcting temporal frequency distributions for taphonomic bias" [Journal of Archaeological Science 36 (2009) 1715–1724] is explored, with modifications and temporal limits (<25,000 cal years BP)

proposed. Correction of time-series data using theoretical taphonomic correction curves is useful as a heuristic tool but can obscure real trends if applied routinely. Comparison between summed probability plots and other occupation data is presented and shows good correlation. However it is recommended that plots are supplemented by other archaeological indices and the crosscomparison of such multiple proxies will strengthen identification of occupation trends.
Keywords: Summed probability | Radiocarbon data | Sample size | Calibration curve effects | Taphonomic bias

Zare 2012

Richard N. Zare, *Ultrasensitive radiocarbon detection*. nature **482** (2012), 312–313.

Radiocarbon is rare, forming no more than one part per trillion of the total carbon content of the atmosphere. An optical method allows radiocarbon to be detected at roughly 25-fold lower levels than this, opening up fresh avenues of research.
Galli and colleagues say that the size of their experimental set-up is roughly two square metres in area, about 100 times smaller than the footprint of typical accelerator mass spectrometers. Furthermore, the equipment costs only about US$ 400,000 – many times less than an accelerator mass spectrometer. For widespread adoption of the infrared technology, however, it will be necessary to reduce the cost even further, say by a factor of five or ten. Even so, an infrared method for measuring isotope ratios represents a real breakthrough because of the many possible uses of the technique.

Isotope

Lightfoot 2012

Emma Lightfoot & Rhiannon E. Stevens, *Stable isotope investigations of charred barley (Hordeum vulgare) and wheat (Triticum spelta) grains from Danebury Hillfort: implications for palaeodietary reconstructions*. Journal of Archaeological Science **39** (2012), 656–662.

Palaeodietary studies typically focus on the analysis of bone collagen due to the limited availability of plant remains. Isotopic analysis of plant remains, however, allow for a more extensive consideration of the contribution of plants to the human diet and can potentially provide information about the environment in which the crops were grown. This paper reports the results of carbon and nitrogen isotope analyses performed on charred barley and wheat grains recovered from pits within Danebury Iron Age hillfort. To the best of our knowledge, this is the first Iron Age site in Britain from which charred grains have been isotopically analysed. Our results suggest that cereals found at the hillfort were grown in several different environmental contexts. The isotope data demonstrate that the herbivores were not consuming a diet primarily based on grains as the d15N values of the grains are very similar to those of the herbivores. Palaeodietary investigations typically assume that humans eating plant protein only would have the same d15N value as the local herbivores. This assumption is clearly invalid at Danebury, where the humans and animals appear to have consumed either different parts of the same plants or different plants. Researchers typically interpret high differences between human and animal d15N values as indicative of diets high in animal protein, however where major plant resources have d15N values similar to those of the herbivores our ability to distinguish between plant and animal sources of protein in the diet is limited. Our research has demonstrated that whenever possible it is desirable to measure the isotopic signatures of potential major plant resources in order to understand past subsistence strategies.
Keywords: Cereal | Palaeodiet | Carbon | Nitrogen | Iron Age | Collagen | Danebury

Methoden

Davis 2012

Loren G. Davis, Shane J. Macfarlan & Celeste N. Henrickson, *A PXRF-based chemostratigraphy and provenience system for the Cooper's Ferry site, Idaho*. Journal of Archaeological Science **39** (2012), 663–671.

Correlating archaeological finds with their associated stratigraphic context is elementary to modern excavation methods. Although micro-contextual approaches can provide invaluable perspectives, ascribing primary depositional status and associative context has traditionally been a qualitative exercise. To improve the empirical nature of this process as part of new excavations at the Cooper's Ferry site in western Idaho, we established a chemostratigraphic framework that enables us to quantitatively relate the elemental geochemistry of sediments associated with artifacts and other samples back to a master lithostratigraphic sequence.We subjected a total of 151 PXRF readings from six lithostratigraphic units to multiple discriminant function analysis, which led to the identification of characteristic elements. To test the site's chemostratigraphic framework, we collected PXRF readings from an infilled rodent burrow, which visually appeared to contain mixed sediments from multiple lithostratigraphic units. Statistical analysis could not relate the rodent burrow's sedimentary geochemistry well to any of the known lithostratigraphic units, thus marking it as potentially disturbed. This methodological approach allows us to make quantitative correlations between stratigraphic units across the site and most importantly, enables us to independently evaluate whether objects from any part of the site are in direct association with "anomalous" or "regular" sediments.

Keywords: Chemostratigraphy | Lithostratigraphy | Cooper's Ferry site | Idaho | Contextual association | Provenience | X-ray fluorescence | Multiple discriminant function analysis | Stratigraphic correlation

Story or Book

Richerson 2012

Peter Richerson, *Custom built*. nature **482** (2012), 304–305.

Culture is both a product and a driver of human evolution, finds Peter Richerson.

Wired for Culture: Origins of the Human Social Mind/The Natural History of Human Cooperation. Mark Pagel. W. W. Norton/Allen Lane: 2012. 432 pp. $29.95/£25

Pagel favours the view that even suicidal self-sacrifice can evolve as a result of self-interested benefits to individuals, rather than to their groups. He puts great weight on systems that use reputation to monitor and enforce good behaviour, arguing that the benefits of a good reputation, and the effects of a bad one, more than outweigh the personal costs of helping other members of your group. The resolution of this issue is perhaps the most important task in the study of human evolution, and it is a pity that Wired for Culture does not convey what is at stake. But scholarly quibbles aside, this is the best popular science book on culture so far.