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References

Aktuell

Bradshaw 2018

Nathan Bradshaw, *Finding a community in the lab.* science **360** (2018), 1038.

It is a rite of passage for every college student: English 101. The class began with introductions. At 28 years old, I knew that I would be older than the average student. After almost failing out of high school, I had enlisted in the U.S. Navy and spent the next 8 years operating the nuclear reactor on an aircraft carrier. But I was not prepared for the six precocious high school students who were in the community college class with me, getting some exposure to higher education and earning college credit. They hammered home the feeling I had been trying to keep at bay: I was too old to be starting this journey. I only returned for the next class because the Department of Veterans Affairs was paying me a living allowance while I attended college. But when my studies led me to my first research lab, I found some much needed common ground.

Elmassry 2018

Moamen Elmassry, *What I learned from teaching.* science **360** (2018), 934.

When I started my Ph.D. program, 3 years ago, I was excited to conduct cutting-edge research. But I wasn't so sure about the teaching that I would have to do every semester to fund my education. I saw it as a waste of time and energy that I could otherwise spend in the lab. The stereotype of the teaching assistant (TA) rushing between classes and spending weekends grading while guzzling coffee did not help. I had no experience teaching, and the idea of being in front of a class made me anxious. But if you ask me now, I would say that teaching has been one of the most rewarding parts of my Ph.D. experience.

Lapiedra 2018

Oriol Lapiedra, Thomas W. Schoener, Manuel Leal, Jonathan B. Losos & Jason J. Kolbe, *Predator-driven natural selection on risk-taking behavior in anole lizards.* science **360** (2018), 1017–1020.

Biologists have long debated the role of behavior in evolution, yet understanding of its role as a driver of adaptation is hampered by the scarcity of experimental studies of natural selection on behavior in nature. After showing that individual Anolis sagrei lizards vary consistently in risk-taking behaviors, we experimentally established populations on eight small islands either with or without Leiocephalus carinatus, a major ground predator. We found that selection predictably favors different risk-taking behaviors under different treatments: Exploratory behavior is favored in the absence of predators, whereas avoidance of the ground is favored in their presence. On predator islands, selection on behavior is stronger than selection on morphology, whereas the opposite holds on islands without predators. Our field experiment demonstrates that selection can shape behavioral traits, paving the way toward adaptation to varying environmental contexts.

Servick 2018

Kelly Servick, *The war on gluten*. science **360** (2018), 848–851.

Wheat sensitivity isn't imaginary, most researchers now agree. But what's really behind it?

"This is a real condition, and there can be objective, biological markers for it," Alaedini says. "That study changed a lot of minds, including my own."

Before analyzing patient responses, Lundin was confident that gluten would cause the worst symptoms. But when the study's blind was lifted, only the FODMAP symptoms even cleared the bar for statistical significance. Twenty-four of the 59 patients had their highest symptom scores after a week of the fructan-laced bars. Twenty-two responded most to the placebo, and just 13 to gluten, Lundin and his collaborators—who included Gibson—reported last November in the journal Gastroenterology. Lundin now believes FODMAPs explain the symptoms in most wheat-avoiding patients. "My main reason for doing that study was to find out a good method of finding gluten-sensitive individuals," he says. "And there were none. And that was quite amazing."

Amerika

Scheib 2018

C. L. Scheib et al., *Ancient human parallel lineages within North America contributed to a coastal expansion*. science **360** (2018), 1024–1027.

s360-1024-Supplement.pdf

C. L. Scheib, Hongjie Li, Tariq Desai, Vivian Link, Christopher Kendall, Genevieve Dewar, Peter William Griffith, Alexander Mörseburg, John R. Johnson, Amiee Potter, Susan L. Kerr, Phillip Endicott, John Lindo, Marc Haber, Yali Xue, Chris Tyler-Smith, Manjinder S. Sandhu, Joseph G. Lorenz, Tori D. Randall, Zuzana Faltyskova, Luca Pagani, Petr Danecek, Tamsin C. O'Connell, Patricia Martz, Alan S. Boraas, Brian F. Byrd, Alan Leventhal, Rosemary Cambra, Ronald Williamson, Louis Lesage, Brian Holguin, Ernestine Ygnacio-De Soto, JohnTommy Rosas, Mait Metspalu, Jay T. Stock, Andrea Manica, Aylwyn Scally, Daniel Wegmann, Ripan S. Malhi & Toomas Kivisild

Little is known regarding the first people to enter the Americas and their genetic legacy. Genomic analysis of the oldest human remains from the Americas showed a direct relationship between a Clovis-related ancestral population and all modern Central and South Americans as well as a deep split separating them from North Americans in Canada. We present 91 ancient human genomes from California and Southwestern Ontario and demonstrate the existence of two distinct ancestries in North America, which possibly split south of the ice sheets. A contribution from both of these ancestral populations is found in all modern Central and South Americans. The proportions of these two ancestries in ancient and modern populations are consistent with a coastal dispersal and multiple admixture events.

Bibel

Segal 2018

Michael Segal, *Calculating the End, Inner-Danielic Chronological Developments*. Vetus Testamentum **68** (2018), 272–296.

The prediction of the end of the period of persecution is a pervasive topic throughout Daniel 7-12. The references to these events are spread out throughout the four apocalypses found in the second half of Daniel (7:25; 8:13-14; 9:27; 12:7,11-12), and their presence in all of these contexts emphasizes the importance of chronological aspects within the apocalyptic worldview of the authors of Daniel. The current study offers an original interpretation of the earliest of these sources (7:25), reflecting its apocalyptic context, and consequently a new assessment of the interrelationships of the various dates in the Danielic apocalypses. Furthermore, it will be suggested that a combination of interpretive, calendrical and historical insights regarding these chronological elements perhaps offers a key towards tracing the process of literary development of the apocalyptic section of Daniel as a whole.

Keywords: Daniel | apocalypse | chronology | Antiochus IV | periodization | calendar | Innerbiblical Exegesis

Datierung

Bayliss 2009

Alex Bayliss, *Rolling Out Revolution, Using Radiocarbon Dating in Archaeology*. Radiocarbon **51** (2009), 123–147.

Sixty years ago, the advent of radiocarbon dating rewrote archaeological chronologies around the world. Forty years ago, the advent of calibration signaled the death knell of the diffusionism that had been the mainstay of archaeological thought for a century. Since then, the revolution has continued, as the extent of calibration has been extended ever further back and as the range of material that can be dated has been expanded. Now a new revolution beckons, one that could allow archaeology to engage in historical debate and usher in an entirely new kind of (pre)history. This paper focuses on more than a decade of experience in utilizing Bayesian approaches routinely for the interpretation of 14C dates in English archaeology, discussing both the practicalities of implementing these methods and their potential for changing archaeological thinking.

Bayliss 2015

Alex Bayliss, *Quality in Bayesian chronological models in archaeology*. World Archaeology **47** (2015), 677–700.

Bayesian chronological modelling is fast becoming the method of choice for the interpretation of radiocarbon dates in archaeological and palaeoenvironmental studies around the world. Although software enabling the routine application of the method has been available for more than twenty years, more than half of published models have appeared in the past five years. Unfortunately, the pace of development in statistical methodology has not been matched by the increased care in sample selection and reporting that is required for robust modelling. Barely half the applications considered in this article provide the information necessary to assess the models presented critically. This article discusses what information is required to allow the quality of Bayesian chronological models to be assessed, and provides check-lists for authors, editors and referees, in the hope of improving current practice.

Keywords: Bayesian statistics | chronological modelling | sample selection | radiocarbon dating | quality assurance.

Bronk Ramsey 1995

Christopher Bronk Ramsey, *Radiocarbon Calibration and Analysis of Stratigraphy, The OxCal Program*. Radiocarbon **37** (1995), 425–430.

People usually study the chronologies of archaeological sites and geological sequences using many different kinds of evidence, taking into account calibrated radiocarbon dates, other dating methods and stratigraphic information. Many individual case studies demonstrate the value of using statistical methods to combine these different types of information. I have developed a computer program, OxCal, running under Windows 3.1 (for IBM PCs), that will perform both 14C calibration and calculate what extra information can be gained from stratigraphic evidence. The program can perform automatic wiggle matches and calculate probability distributions for samples in sequences and phases. The program is written in C++ and uses Bayesian statistics and Gibbs sampling for the calculations. The program is very easy to use, both for simple calibration and complex site analysis, and will produce graphical output from virtually any printer.

Bronk Ramsey 1998

Christopher Bronk Ramsey, *Probability and Dating*. Radiocarbon **40** (1998), 461–474.

Statistical analysis is becoming much more widely used in conjunction with radiocarbon dating. In this paper I discuss the impact of Bayesian analysis (using computer programs such as OxCal) on archaeological research. In addition to simple analysis, the method has implications for the planning of dating projects and the assessment of the reliability of dates in their context.

A new formalism for describing chronological models is introduced here: the Chronological Query Language (CQL), an extension of the model definitions found in the program OxCal.

New methods of Bayesian analysis can be used to overcome some of the inherent biases in the uncertainty estimates of scientifc dating methods. Most of these methods, including 14C, uranium series and thermoluminescence (TL), tend to favor some calendar dates over others. 14C calibration overcomes the problem where this is possible, but a Bayesian approach can be used more generally.

Bronk Ramsey 2001

Christopher Bronk Ramsey, *Development of the Radiocarbon Calibration Program*. Radiocarbon **43** (2001), 355–363.

This paper highlights some of the main developments to the radiocarbon calibration program, OxCal. In addition to many cosmetic changes, the latest version of OxCal uses some different algorithms for the treatment of multiple phases. The theoretical framework behind these is discussed and some model calculations demonstrated. Significant changes have also been made to the sampling algorithms used which improve the convergence of the Bayesian analysis. The convergence itself is also reported in a more comprehensive way so that problems can be traced to specific parts of the model. The use of convergence data, and other techniques for testing the implications of particular models, are described.

Bronk Ramsey 2009

Christopher Bronk Ramsey, *Bayesian Analysis of Radiocarbon Dates*. Radiocarbon **51** (2009), 337–360.

If radiocarbon measurements are to be used at all for chronological purposes, we have to use statistical methods for calibration. The most widely used method of calibration can be seen as a simple application of Bayesian statistics, which uses both the information from the new measurement and information from the 14C calibration curve. In most dating applications, however, we have larger numbers of 14C measurements and we wish to relate those to events in the past. Bayesian statistics provides a coherent framework in which such analysis can be performed

and is becoming a core element in many 14C dating projects. This article gives an overview of the main model components used in chronological analysis, their mathematical formulation, and examples of how such analyses can be performed using the latest version of the OxCal software (v4). Many such models can be put together, in a modular fashion, from simple elements, with defined constraints and groupings. In other cases, the commonly used "uniform phase" models might not be appropriate, and ramped, exponential, or normal distributions of events might be more useful. When considering analyses of these kinds, it is useful to be able run simulations on synthetic data. Methods for performing such tests are discussed here along with other methods of diagnosing possible problems with statistical models of this kind.

Bronk Ramsey 2009

Christopher Bronk Ramsey, *Dealing With Outliers and Offsets in Radiocarbon Dating*. Radiocarbon **51** (2009), 1023–1045.

The wide availability of precise radiocarbon dates has allowed researchers in a number of disciplines to address chronological questions at a resolution which was not possible 10 or 20 years ago. The use of Bayesian statistics for the analysis of groups of dates is becoming a common way to integrate all of the 14C evidence together. However, the models most often used make a number of assumptions that may not always be appropriate. In particular, there is an assumption that all of the 14C measurements are correct in their context and that the original 14C concentration of the sample is properly represented by the calibration curve.

In practice, in any analysis of dates some are usually rejected as obvious outliers. However, there are Bayesian statistical methods which can be used to perform this rejection in a more objective way (Christen 1994b), but these are not often used. This paper discusses the underlying statistics and application of these methods, and extensions of them, as they are implemented in OxCal v 4.1. New methods are presented for the treatment of outliers, where the problems lie principally with the context rather than the 14C measurement. There is also a full treatment of outlier analysis for samples that are all of the same age, which takes account of the uncertainty in the calibration curve. All of these Bayesian approaches can be used either for outlier detection and rejection or in a model averaging approach where dates most likely to be outliers are downweighted.

Another important subject is the consistent treatment of correlated uncertainties between a set of measurements and the calibration curve. This has already been discussed by Jones and Nicholls (2001) in the case of marine reservoir offsets. In this paper, the use of a similar approach for other kinds of correlated offset (such as overall measurement bias or regional offsets in the calibration curve) is discussed and the implementation of these methods in OxCal v 4.0 is presented.

Hamilton 2018

W. Derek Hamilton & Anthony M. Krus, *The Myths and Realities of Bayesian Chronological Modeling Revealed*. American Antiquity **83** (2018), 187–203.

We review the history of Bayesian chronological modeling in archaeology and demonstrate that there has been a surge over the past several years in American archaeological applications. Most of these applications have been performed by archaeologists who are self-taught in this method because formal training opportunities in Bayesian chronological modeling are infrequently provided. We define and address misconceptions about Bayesian chronological modeling that we have encountered in conversations with colleagues and in anonymous reviews, some of which have been expressed in the published literature. Objectivity and scientific

rigor is inherent in the Bayesian chronological modeling process. Each stage of this process is described in detail, and we present examples of this process in practice. Our concluding discussion focuses on the potential that Bayesian chronological modeling has for enhancing understandings of important topics.

Judentum

Hempel 2018

Charlotte Hempel, *Where Are the Scribes in the Dead Sea Scrolls?* Biblical Archaeology Review **44** (2018), iv, 52+70.

Those who transmitted the extensive literature unearthed at Qumran may not have drawn attention to their scribal efforts. However, by composing and copying their own literature to the same standards as works of the past—and by modeling on David leading figures like the Maskil—they send subtle yet powerful signals of their own place, and that of the movement to which they belonged, in the long line of worthies of the past.

Lohse 1964

Eduard Lohse, *Die Texte aus Qumran, Hebräisch und deutsch mit masoretischer Punktation, Übersetzung, Einführung und Anmerkungen.* (München ^{2}1971).

Klima

Beck 2018

J. Warren Beck, Weijian Zhou, Cheng Li, Zhenkun Wu, Lara White, Feng Xian, Xianghui Kong & Zhisheng An, *A 550,000-year record of East Asian monsoon rainfall from ^{10}Be in loess.* science **360** (2018), 877–881.

s360-0877-Supplement.pdf

Cosmogenic 10Be flux from the atmosphere is a proxy for rainfall. Using this proxy, we derived a 550,000-year-long record of East Asian summer monsoon (EASM) rainfall from Chinese loess. This record is forced at orbital precession frequencies, with higher rainfall observed during Northern Hemisphere summer insolation maxima, although this response is damped during cold interstadials. The 10Be monsoon rainfall proxy is also highly correlated with global ice-volume variations, which differs from Chinese cave d18O, which is only weakly correlated. We argue that both EASM intensity and Chinese cave d18O are not governed by high-northern-latitude insolation, as suggested by others, but rather by low-latitude interhemispheric insolation gradients, which may also strongly influence global ice volume via monsoon dynamics.

Kingslake 2018

J. Kingslake et al., *Extensive retreat and re-advance of the West Antarctic Ice Sheet during the Holocene.* nature **558** (2018), 430–434.

n558-0430-Supplement.mp4

J. Kingslake, R. P. Scherer, T. Albrecht, J. Coenen, R. D. Powell, R. Reese, N. D. Stansell, S. Tulaczyk, M. G. Wearing & P. L. Whitehouse

To predict the future contributions of the Antarctic ice sheets to sea-level rise, numerical models use reconstructions of past ice-sheet retreat after the Last Glacial Maximum to tune model parameters1. Reconstructions of the West Antarctic Ice Sheet have assumed that it retreated progressively throughout the Holocene epoch (the past 11,500 years or so)2–4. Here we show, however, that over this period the grounding line of the West Antarctic Ice Sheet (which marks the point at which it is no longer in contact with the ground and becomes a floating ice shelf) retreated several hundred kilometres inland of today's grounding line, before isostatic rebound caused it to re-advance to its present position. Our evidence includes, first, radiocarbon dating of sediment cores recovered from beneath the ice streams of the Ross Sea sector, indicating widespread Holocene marine exposure; and second, ice-penetrating radar observations of englacial structure in the Weddell Sea sector, indicating iceshelf grounding. We explore the implications of these findings with an ice-sheet model. Modelled re-advance of the grounding line in the Holocene requires ice-shelf grounding caused by isostatic rebound. Our findings overturn the assumption of progressive retreat of the grounding line during the Holocene in West Antarctica, and corroborate previous suggestions of ice-sheet re-advance5. Rebound-driven stabilizing processes were apparently able to halt and reverse climate-initiated ice loss. Whether these processes can reverse present-day ice loss6 on millennial timescales will depend on bedrock topography and mantle viscosity—parameters that are difficult to measure and to incorporate into ice-sheet models.

McFarlin 2018

Jamie M. McFarlin, Yarrow Axford, Magdalena R. Osburn, Meredith A. Kelly, Erich C. Osterberg & Lauren B. Farnsworth, *Pronounced summer warming in northwest Greenland during the Holocene and Last Interglacial*. PNAS **115** (2018), 6357–6362.

pnas115-06357-Supplement.pdf

Projections of future rates of mass loss from the Greenland Ice Sheet are highly uncertain because its sensitivity to warming is unclear. Geologic reconstructions of Quaternary interglacials can illustrate how the ice sheet responded during past warm periods, providing insights into ice sheet behavior and important tests for data-model comparisons. However, paleoclimate records from Greenland are limited: Early Holocene peak warmth has been quantified at only a few sites, and terrestrial sedimentary records of prior interglacials are exceptionally rare due to glacial erosion during the last glacial period. Here, we discuss findings from a lacustrine archive that records both the Holocene and the Last Interglacial (LIG) from Greenland, allowing for direct comparison between two interglacials. Sedimentary chironomid assemblages indicate peak July temperatures 4.0 to 7.0 °C warmer than modern during the Early Holocene maximum in summer insolation. Chaoborus and chironomids in LIG sediments indicate July temperatures at least 5.5 to 8.5 °C warmer than modern. These estimates indicate pronounced warming in northwest Greenland during both interglacials. This helps explain dramatic ice sheet thinning at Camp Century in northwest Greenland during the Early Holocene and, for the LIG, aligns with controversial estimates of Eemianwarming from ice core data retrieved in northern Greenland. Converging geologic evidence for strong LIG warming is challenging to reconcile with inferred Greenland Ice Sheet extent during the LIG, and the two appear incompatible in many models of ice sheet evolution. An increase in LIG snowfall could help resolve this problem, pointing to the need for hydroclimate reconstructions from the region.

Keywords: Greenland | Holocene thermal maximum | Last Interglacial | Eemian | paleotemperature

Significance: Reconstructions of climate over Greenland during past warm periods provide crucial insights into the likely response of the Greenland Ice Sheet to future warming. However, limited preservation of interglacial archives due to extensive glacial scouring has hindered paleoclimate reconstructions along Greenland's margins. Here, we report a Greenland lake sediment record that preserves both the present and previous interglacial periods. This record, combined with prior studies, demonstrates exceptionally strong warming over the northern Greenland Ice Sheet. Pronounced summer warming in this region helps explain ice sheet changes in the Early Holocene, while highlighting seemingly incongruous evidence for ice sheet extent and temperatures during the Last Interglacial. These findings may portend large future warming in this high-latitude region.

Mathematik

Phillips 2018

David A. Phillips Jr., Helen J. Wearing & Jeffery J. Clark, *Village Growth, Emerging Infectious Disease, and the End of the Neolithic Demographic Transition in the Southwest United States and Northwest Mexico*. American Antiquity **83** (2018), 263–280.

In the final centuries prior to the arrival of the Spanish, the southwest United States and northwest Mexico underwent two major sociodemographic changes: (1) many people coalesced into large villages, and (2)most of the villageswere depopulated within two centuries. Basic epidemiological models indicate that village coalescence could have triggered epidemic diseases that caused the observed demographic decline. The models also link this decline to a global phenomenon, the Neolithic Demographic Transition.

Methoden

Achilli 2018

Alessandro Achilli, Anna Olivieri, Ornella Semino & Antonio Torroni, *Ancient human genomes—keys to understanding our past*. science **360** (2018), 964–965.

Ancient genomes from different times and continents are helping to understand past human migrations.

Cowgill 2015

George L. Cowgill, *Some Things I Hope You Will Find Useful Even if Statistics Isn't Your Thing*. Annual Review of Anthropology **44** (2015), 1–14.

I emphasize some common misuses of statistics that everyone, whether you do statistics or just read what others write, should be on the lookout for. I next discuss somewhat more complicated issues in archaeological method and theory and then conclude with a qualitative explanation of Bayesian methods and why they are often preferable to the frequentist methods advocated in many introductory statistics texts.

Keywords: statistics | estimation | settlement patterns | Bayes's rule | chronology

Mittelalter

Ebenesersdóttir 2018

S. Sunna Ebenesersdóttir et al., *Ancient genomes from Iceland reveal the making of a human population*. science **360** (2018), 1028–1032.

s360-1028-Supplement.pdf

S. Sunna Ebenesersdóttir, Marcela Sandoval-Velasco, Ellen D. Gunnarsdóttir, Anuradha Jagadeesan, Valdís B. Guðmundsdóttir, Elísabet L. Thordardóttir, Margrét S. Einarsdóttir, Kristjan H. S. Moore, Ásgeir Sigurðsson, Droplaug N. Magnúsdóttir, Hákon Jónsson, Steinunn Snorradóttir, Eivind Hovig, Pål Møller, Ingrid Kockum, Tomas Olsson, Lars Alfredsson, Thomas F. Hansen, Thomas Werge, Gianpiero L. Cavalleri, Edmund Gilbert, Carles Lalueza-Fox, Joe W. Walser III, Steinunn Kristjánsdóttir, Shyam Gopalakrishnan, Lilja Árnadóttir, Ólafur Þ. Magnússon, M. Thomas P. Gilbert, Kári Stefánsson & Agnar Helgason

Opportunities to directly study the founding of a human population and its subsequent evolutionary history are rare. Using genome sequence data from 27 ancient Icelanders, we demonstrate that they are a combination of Norse, Gaelic, and admixed individuals. We further show that these ancient Icelanders are markedly more similar to their source populations in Scandinavia and the British-Irish Isles than to contemporary Icelanders, who have been shaped by 1100 years of extensive genetic drift. Finally, we report evidence of unequal contributions from the ancient founders to the contemporary Icelandic gene pool. These results provide detailed insights into the making of a human population that has proven extraordinarily useful for the discovery of genotype-phenotype associations.

Politik

Allum 2018

Nick Allum, John Besley, Louis Gomez & Ian Brunton-Smith, *Disparities in science literacy*. science **360** (2018), 861–862.

Chen 2018

M. Keith Chen & Ryne Rohla, *The effect of partisanship and political advertising on close family ties*. science **360** (2018), 1020–1024.

s360-1020-Supplement.pdf

Research on growing American political polarization and antipathy primarily studies public institutions and political processes, ignoring private effects, including strained family ties. Using anonymized smartphone-location data and precinct-level voting, we show that Thanksgiving dinners attended by residents from opposing-party precincts were 30 to 50 minutes shorter than same-party dinners. This decline from a mean of 257 minutes survives extensive spatial and demographic controls. Reductions in the duration of Thanksgiving dinner in 2016 tripled for travelers from media markets with heavy political advertising—an effect not observed in 2015—implying a relationship to election-related behavior. Effects appear asymmetric: Although fewer Democratic-precinct residents traveled in 2016 than in 2015, Republican-precinct residents shortened their Thanksgiving dinners by more minutes in response to political differences. Nationwide, 34 million hours of cross-partisan Thanksgiving dinner discourse were lost in 2016 owing to partisan effects.

Story or Book

Friedman 2018

Richard Elliott Friedman, *Through the Lens of Archaeology, A High-Resolution Image of Ancient Israel*. Biblical Archaeology Review **44** (2018), iv, 56–58.

Beyond the Texts: An Archaeological Portrait of Ancient Israel and Judah. By William G. Dever. (Atlanta: SBL Press, 2017), 772 pp., $49.95 (hardcover)

Dever makes a solid case, now well known, against his frequent challenger Israel Finkelstein and especially against the writers known as minimalists. (Brief excursus: That doesn't make him a "maximalist." A Hassidic rabbi is a maximalist. An evangelical preacher is a maximalist. Biblical and archaeological researchers who refute so-called minimalists are not maximalists. They are [what term should we use?] scholars.)

Nikolopoulos 2018

George Nikolopoulos, *Going back for Hitler, The perils of time travel*. nature **558** (2018), 480.

I won't even know that I come from the 'future', but I will be subconsciously drawn to him and — although oblivious of the reason — I will hate him enough to kill him.