

References

Aktuell

BRAND 2019

Jennie E. Brand, Ravaris Moore, Xi Song & Yu Xie, *Parental divorce is not uniformly disruptive to children's educational attainment*. [PNAS 116 \(2019\), 7266–7271](#).

[pnas116-07266-Supplement.pdf](#)

Children whose parents divorce tend to have worse educational outcomes than children whose parents stay married. However, not all children respond identically to their parents divorcing. We focus on how the impact of parental divorce on children's education varies by how likely or unlikely divorce was for those parents. We find a significant negative effect of parental divorce on educational attainment, particularly college attendance and completion, among children whose parents were unlikely to divorce. Families expecting marital stability, unprepared for disruption, may experience considerable adjustment difficulties when divorce occurs, leading to negative outcomes for children. By contrast, we find no effect of parental divorce among children whose parents were likely to divorce. Children of high-risk marriages, who face many social disadvantages over childhood irrespective of parental marital status, may anticipate or otherwise accommodate to the dissolution of their parents' marriage. Our results suggest that family disruption does not uniformly disrupt children's attainment.

Keywords: divorce | educational attainment | heterogeneity | causal analysis | propensity score

Significance: While parental divorce is generally associated with unfavorable outcomes for children, it does not follow that every divorce is equally bad for the children it affected. We find that parental divorce lowers the educational attainment of children who have a low likelihood of their parents' divorcing. For these children, divorce is an unexpected shock to an otherwise-privileged childhood. However, we find no impact of parents' divorcing on the education of children who have a high likelihood of a divorce occurring. Disadvantaged children of high-risk marriages may anticipate or otherwise accommodate to the dissolution of their parents' marriage. Social discourse and policy aimed at promoting marital stability among disadvantaged families, for whom unfortunate events are common, are misguided.

DELUCA 2019

Vincent DeLuca, Jason Rothman, Ellen Bialystok & Christos Pliatsikas, *Redefining bilingualism as a spectrum of experiences that differentially affects brain structure and function*. [PNAS 116 \(2019\), 7565–7574](#).

[pnas116-07565-Supplement.pdf](#)

Learning and using an additional language is shown to have an impact on the structure and function of the brain, including in regions involved in cognitive control and the connections between them. However, the available evidence remains variable in terms of the localization, extent, and trajectory of these effects. Variability likely stems from the fact that bilingualism has been routinely operationalized as a categorical variable (bilingual/monolingual), whereas it is a complex and

dynamic experience with a number of potentially deterministic factors affecting neural plasticity. Here we present a study investigating the combined effects of experience-based factors (EBFs) in bilingual language use on brain structure and functional connectivity. EBFs include an array of measures of everyday usage of a second language in different types of immersive settings (e.g., amount of use in social settings). Analyses reveal specific adaptations in the brain, both structural and functional, correlated to individual EBFs and their combined effects. Taken together, the data show that the brain adapts to be maximally efficient in the processing and control of two languages, although modulated ultimately by individual language experience.

Keywords: bilingualism | neuroplasticity | gray matter | white matter | resting-state functionality

Significance: This study sheds new light on the neuroanatomical adaptations resulting from bilingual language exposure and use, providing crucial insights into untangling the variability of findings in the existing literature. Our results demonstrate that differences in bilingual language experiences confer a range of systematic outcomes in terms of brain/mind adaptations. In doing so, our findings strongly support a shift away from traditional designs with bilingual vs. monolingual comparisons and toward an approach of modeling the experiences within bilingualism that give rise to neurocognitive adaptations. Crucially, we maintain that experience-based factors should be accounted for in all future studies investigating the effects of bilingualism on the brain and cognition.

GUPTA 2019

Ravindra K. Gupta et al., *HIV-1 remission following CCR5 Δ 32/ Δ 32 haematopoietic stem-cell transplantation.* *nature* **568** (2019), 244–248.

Ravindra K. Gupta, Sultan Abdul-Jawad, Laura E. McCoy, Hoi Ping Mok, Dimitra Peppas, Maria Salgado, Javier Martinez-Picado, Monique Nijhuis, Annemarie M. J. Wensing, Helen Lee, Paul Grant, Eleni Nastouli, Jonathan Lambert, Matthew Pace, Fanny Salasc, Christopher Monit, Andrew J. Innes, Luke Muir, Laura Waters, John Frater, Andrew M. L. Lever, Simon G. Edwards, Ian H. Gabriel & Eduardo Olavarria

A cure for HIV-1 remains unattainable as only one case has been reported, a decade ago^{1,2}. The individual—who is known as the ‘Berlin patient’—underwent two allogeneic haematopoietic stem-cell transplantation (HSCT) procedures using a donor with a homozygous mutation in the HIV coreceptor CCR5 (CCR5 Δ 32/ Δ 32) to treat his acute myeloid leukaemia. Total body irradiation was given with each HSCT. Notably, it is unclear which treatment or patient parameters contributed to this case of long-term HIV remission. Here we show that HIV-1 remission may be possible with a less aggressive and toxic approach. An adult infected with HIV-1 underwent allogeneic HSCT for Hodgkin’s lymphoma using cells from a CCR5 Δ 32/ Δ 32 donor. He experienced mild gut graft-versus-host disease. Antiretroviral therapy was interrupted 16 months after transplantation. HIV-1 remission has been maintained over a further 18 months. Plasma HIV-1 RNA has been undetectable at less than one copy per millilitre along with undetectable HIV-1 DNA in peripheral CD4 T lymphocytes. Quantitative viral outgrowth assays from peripheral CD4 T lymphocytes show no reactivatable virus using a total of 24 million resting CD4 T cells. CCR5-tropic, but not CXCR4-tropic, viruses were identified in HIV-1 DNA from CD4 T cells of the patient before the transplant. CD4 T cells isolated from peripheral blood after transplantation did not express CCR5 and were susceptible only to CXCR4-tropic virus *ex vivo*. HIV-1 Gag-specific CD4 and CD8 T cell responses were lost after transplantation, whereas cytomegalovirus-specific responses were detectable. Similarly, HIV-1-specific antibodies and avidities fell to levels comparable to those in the Berlin

patient following transplantation. Although at 18 months after the interruption of treatment it is premature to conclude that this patient has been cured, these data suggest that a single allogeneic HSCT with homozygous CCR5D32 donor cells may be sufficient to achieve HIV-1 remission with reduced intensity conditioning and no irradiation, and the findings provide further support for the development of HIV-1 remission strategies based on preventing CCR5 expression.

MARTINÓN-TORRES 2019

Marcos Martínón-Torres et al., *Surface chromium on Terracotta Army bronze weapons is neither an ancient anti-rust treatment nor the reason for their good preservation*. *Scientific Reports* **9** (2019), 5289. DOI:10.1038/s41598-019-40613-7.

SciRep09-05289-Supplement.pdf

Marcos Martínón-Torres, Xiuzhen Li, Yin Xia, Agnese Benzonelli, Andrew Bevan, Shengtao Ma, Jianhua Huang, Liang Wang, Desheng Lan, Jiangwei Liu, Siran Liu, Zhen Zhao, Kun Zhao & Thilo Rehren

For forty years, there has been a widely held belief that over 2,000 years ago the Chinese Qin developed an advanced chromate conversion coating technology (CCC) to prevent metal corrosion. This belief was based on the detection of chromium traces on the surface of bronze weapons buried with the Chinese Terracotta Army, and the same weapons' very good preservation. We analysed weapons, lacquer and soils from the site, and conducted experimental replications of CCC and accelerated ageing. Our results show that surface chromium presence is correlated with artefact typology and uncorrelated with bronze preservation. Furthermore we show that the lacquer used to cover warriors and certain parts of weapons is rich in chromium, and we demonstrate that chromium on the metals is contamination from nearby lacquer after burial. The chromium anti-rust treatment theory should therefore be abandoned. The good metal preservation probably results from the moderately alkaline pH and very small particle size of the burial soil, in addition to bronze composition.

SUGGITT 2019

Andy Suggitt, *Preparing for Brexit*. *science* **363** (2019), 1246.

The hubbub of conversation fills the air as 50 early-career researchers (ECRs) discuss our futures after Brexit. Flipboards around the room fill with sticky notes, each with a scribbled thought or idea. A board labeled “What will Brexit mean for your career?” Highlights the toll it has already taken. One scientist abandoned their application for the European Union’s Horizon 2020 funding program. Others are reluctantly making plans to leave the United Kingdom. A note with the word “uncertainty” stands out in the middle of the board. And yet, a month before the official Brexit date, the atmosphere is surprisingly positive. Coming together to discuss these challenges seems to be giving us confidence that we will find a way forward.

VOOSEN 2019

Paul Voosen, *Scheme to mine the abyss gets sea trial*. *science* **363** (2019), 1129–1130.

As collector robot gathers metal-rich nodules, scientists will monitor ecosystems.

Anthropologie

DÉTROIT 2019

Florent Détroit et al., *A new species of Homo from the Late Pleistocene of the Philippines*. *nature* **568** (2019), 181–186.

n568-0181-Supplement.pdf

Florent Détroit, Armand Salvador Mijares, Julien Corny, Guillaume Daver, Clément Zanolli, Eusebio Dizon, Emil Robles, Rainer Grün & Philip J. Piper

A hominin third metatarsal discovered in 2007 in Callao Cave (Northern Luzon, the Philippines) and dated to 67 thousand years ago provided the earliest direct evidence of a human presence in the Philippines. Analysis of this foot bone suggested that it belonged to the genus *Homo*, but to which species was unclear. Here we report the discovery of twelve additional hominin elements that represent at least three individuals that were found in the same stratigraphic layer of Callao Cave as the previously discovered metatarsal. These specimens display a combination of primitive and derived morphological features that is different from the combination of features found in other species in the genus *Homo* (including *Homo floresiensis* and *Homo sapiens*) and warrants their attribution to a new species, which we name *Homo luzonensis*. The presence of another and previously unknown hominin species east of the Wallace Line during the Late Pleistocene epoch underscores the importance of island Southeast Asia in the evolution of the genus *Homo*.

OLALDE 2019

Iñigo Olalde, Carles Lalueza-Fox & David Reich et al., *The genomic history of the Iberian Peninsula over the past 8000 years*. *science* **363** (2019), 1230–1234.

s363-1230-Supplement.pdf

We assembled genome-wide data from 271 ancient Iberians, of whom 176 are from the largely unsampled period after 2000 BCE, thereby providing a high-resolution time transect of the Iberian Peninsula. We document high genetic substructure between northwestern and southeastern hunter-gatherers before the spread of farming. We reveal sporadic contacts between Iberia and North Africa by ≈ 2500 BCE and, by ≈ 2000 BCE, the replacement of 40% of Iberia's ancestry and nearly 100% of its Y-chromosomes by people with Steppe ancestry. We show that, in the Iron Age, Steppe ancestry had spread not only into Indo-European-speaking regions but also into non-Indo-European-speaking ones, and we reveal that present-day Basques are best described as a typical Iron Age population without the admixture events that later affected the rest of Iberia. Additionally, we document how, beginning at least in the Roman period, the ancestry of the peninsula was transformed by gene flow from North Africa and the eastern Mediterranean.

Iñigo Olalde, Swapan Mallick, Nick Patterson, Nadin Rohland, Vanessa Villalba-Mouco, Marina Silva, Katharina Dulias, Ceiridwen J. Edwards, Francesca Gandini, Maria Pala, Pedro Soares, Manuel Ferrando-Bernal, Nicole Adamski, Nasreen Broomandkshobacht, Olivia Cheronet, Brendan J. Culleton, Daniel Fernandes, Ann Marie Lawson, Matthew Mah, Jonas Oppenheimer, Kristin Stewardson, Zhao Zhang, Juan Manuel Jiménez Arenas, Isidro Jorge Toro Moyano, Domingo C. Salazar-García, Pere Castanyer, Marta Santos, Joaquim Tremoleda, Marina Lozano, Pablo García Borja, Javier Fernández-Eraso, José Antonio Mujika-Alustiza, Cecilio Barroso, Francisco J. Bermúdez, Enrique Viguera Mínguez, Josep Burch, Neus Coromina, David Vivó, Artur Cebrià, Josep Maria Fullola, Oretó García-Puchol, Juan Ignacio Morales, F. Xavier Oms, Tona Majó, Josep Maria Vergès, Antònia Díaz-Carvajal, Imma Ollich-Castanyer, F. Javier López-Cachero, Ana

Maria Silva, Carmen Alonso-Fernández, Germán Delibes de Castro, Javier Jiménez Echevarría, Adolfo Moreno-Márquez, Guillermo Pascual Berlanga, Pablo Ramos-García, José Ramos-Muñoz, Eduardo Vijande Vila, Gustau Aguilera Arzo, Ángel Esparza Arroyo, Katina T. Lillios, Jennifer Mack, Javier Velasco-Vázquez, Anna Waterman, Luis Benítez de Lugo Enrich, María Benito Sánchez, Bibiana Agustí, Ferran Codina, Gabriel de Prado, Almudena Estalrich, Álvaro Fernández Flores, Clive Finlayson, Geraldine Finlayson, Stewart Finlayson, Francisco Giles-Guzmán, Antonio Rosas, Virginia Barciela González, Gabriel García Atiénzar, Mauro S. Hernández Pérez, Armando Llanos, Yolanda Carrión Marco, Isabel Collado Beneyto, David López-Serrano, Mario Sanz Tormo, António C. Valera, Concepción Blasco, Corina Liesau, Patricia Ríos, Joan Daura, María Jesús de Pedro Michó, Agustín A. Díez-Castillo, Raúl Flores Fernández, Joan Francès Farré, Rafael Garrido-Pena, Victor S. Gonçalves, Elisa Guerra-Doce, Ana Mercedes Herrero-Corral, Joaquim Juan-Cabanilles, Daniel López-Reyes, Sarah B. McClure, Marta Merino Pérez, Arturo Oliver Foix, Montserrat Sanz Borràs, Ana Catarina Sousa, Julio Manuel Vidal Encinas, Douglas J. Kennett, Martin B. Richards, Kurt Werner Alt, Wolfgang Haak, Ron Pinhasi, Carles Lalueza-Fox & David Reich

TOCHERI 2019

Matthew W. Tocheri, *Unknown human species found in Asia*. [nature 568 \(2019\), 176–178](#).

Excavations in southeast Asia have unearthed a previously unreported hominin species named *Homo luzonensis*. The discovery has implications for ideas about early hominin evolution and dispersal from Africa.

The discovery of *H. floresiensis* raised the question of whether it evolved from a species of early *Homo*^{7,10}, for which evidence of its existence outside Africa has yet to be documented. Scientists are still struggling to answer this definitively^{11,12}. The question is more pressing with the discovery of *H. luzonensis*, given the need to explain yet another hominin species that, like *H. floresiensis*, was around during part of the Late Pleistocene (defined as a period of time 126,000 to 11,700 years ago), had *Homo*-like teeth but australopith-like hands and feet, and that lived on an island only reachable after a major sea crossing.

VANDER LINDEN 2019

Marc Vander Linden, *Toward a clearer view into human prehistory*. [science 363 \(2019\), 1153–1154](#).

An ancient DNA study Highlights ancient population patterns on the Iberian Peninsula.

As with any destructive technique and given the cost of ancient DNA sequencing, simultaneous sampling for additional information should be undertaken systematically. For example, many samples are radiocarbon dated, but others are not, including those reported by Olalde et al. Aside from mitigating sample destruction, there are analytical advantages to iterative sampling. By combining ancient DNA sequencing with stable isotope and material culture studies, Knipper et al. showed that most Early Bronze Age women in the Lech valley (southern Germany) were nonlocal, whereas the men were mostly local, and that maternal lineages diversified over time. These multiple patterns point to women marrying outside their original social group, following strict rules adopted over several generations. Amorim et al. reported how two Early Medieval cemeteries from Hungary and Northern Italy were organized around biological kinship, with genetic differences echoed in diet, mobility patterns, and the deposition of grave goods, suggesting complex family and social systems.

Archäologie

DIETLER 1998

Michael Dietler, *Consumption, Agency, and Cultural Entanglement, Theoretical Implications of a Mediterranean Colonial Encounter*. In: JAMES G. CUSICK (Hrsg.), *Studies in Culture Contact, Interaction, Culture Change, and Archaeology*. Centre for Archaeological Investigations, Occasional Paper 25 (Carbondale 1998), 288–315.

A new interpretive perspective is proposed for exploring the early colonial encounter between the indigenous societies of Early Iron Age France and Etruscan and Greek states, and the wider implications for “culture contact” studies are discussed. Both currently popular “world system” and traditional “Hellenization” approaches are shown to be inadequate because they are structurally overdetermined, teleologically reductionist, and incapable of accommodating local agency. Moreover, they risk anachronistically misconstruing power relations by assuming that the dominance, extraction, and dependency that characterized later periods were necessarily a feature of the first stages of the encounter rather than a product of subsequent interaction. A focus on consumption during the initial phase of the encounter Highlights the specific processes that resulted in the entanglement of indigenous and colonial societies and how the early experience established the conditions for other unanticipated kinds of colonial relationships to develop. This approach requires that colonial interaction be locally contextualized and viewed from the standpoint of the social and cultural logic of indigenous societies with their proper institutions, cosmologies, and complex histories.

EGGERT 2007

Manfred K. H. Eggert, *Wirtschaft und Gesellschaft im früheisenzeitlichen Mitteleuropa, Überlegungen zum ‚Fürstenphänomen‘*. *Fundberichte aus Baden-Württemberg* 31 (2007), 255–302.

Die mit dem Historisieren einhergehende Fixierung auf den historischen Einzelfall ist bis zu einem gewissen Grade, beurteilt man es aus internationaler Perspektive, vielleicht eine spezifisch deutsche Besonderheit der Archäologie. Jedenfalls ist hierzulande immer noch ein sehr starker Vorbehalt gegen ‚Modelle‘ festzustellen. Dabei stehen Modelle doch nur für die in jeder Wissenschaft geläufige Notwendigkeit, die Probleme ständig aus einer vergleichenden Perspektive zu betrachten und in einen theoretisch fundierten Kontext einzuordnen. Wer diese Tatsache akzeptiert, wird selbstverständlich nicht annehmen, dass die wie immer gestalteten Modelle der komplexen historischen Wirklichkeit entsprechen. Sie sind vielmehr Abstraktionen und Generalisierungen, mithin Orientierungshilfen, um die Fülle der Erscheinungen überhaupt fassbar und historisch aussagefähig machen zu können. Vielleicht liegt es am Wesen der Archäologie, an der ihr eigenen Qualität, aus einem oft gänzlich unscheinbaren Terrain Ungeahntes, gar Gleißendes ans Tageslicht zu bringen, dass ihre Praktiker darüber so oft all das vergessen, was sich nicht unmittelbar erfassen lässt. Wie dem auch sei, wir sollten bei allen Erfolgen unserer Geländeforschung – und die entsprechende Bilanz ist alles andere als schlecht – nicht aus den Augen verlieren, dass man uns am Ende, sozusagen bei der ‚Rechnungslegung‘, nicht nur das, sondern auch die Integration der mannigfachen und vielgestaltigen empirischen Gegebenheiten in eine kohärente, theoretisch fundierte historisch-kulturwissenschaftliche Deutung abverlangen wird.

Keywords: Späthallstattzeit | Frühlatène | ‚Fürstenphänomen‘ | Wirtschaft | Gesellschaft | Heuneburg

FRANKENSTEIN 1978

Susan Frankenstein & M. J. Rowlands, *The internal structure and regional context of Early Iron Age society in south-western Germany*. *Bulletin of the Institute of Archaeology (London)* **15** (1978), 73–112.

The paper presents a reinterpretation of the political and economic structure of Early Iron Age society in south-western Germany. The available data has been reorganised and reinterpreted utilising concepts derived from anthropological theories on exchange in particular the political significance of control over prestige items needed in social transactions. In addition, stress is laid on the relationship of such structures to larger and more centralised states and their dependence on each other for further development.

KIMMIG 1969

Wolfgang Kimmig, *Zum Problem späthallstädtischer Adelssitze*. In: KARL-HEINZ OTTO & JOACHIM HERRMANN (Hrsg.), *Siedlung, Burg und Stadt: Studien zu ihren Anfängen, Paul Grimm zum 60. Geburtstag*. Deutsche Akademie der Wissenschaften zu Berlin, Schriften der Sektion für Vor- und Frühgeschichte 25 (Berlin 1969), 95–113.

Fragen über Fragen, die wir nicht mehr oder noch nicht entscheiden können. Gleichwohl wird man mit Sicherheit sagen können, daß es im 6. und 5. vorchristlichen Jahrhundert eine privilegierte Adelschicht gegeben haben muß, die zwar vielfältig differenziert gewesen sein dürfte, die jedoch gleichwohl einer ganzen Epoche ihren Stempel aufgedrückt hat. Ihr Kommen und Gehen zu verfolgen, ihre Lebensweise und ihr Wirken für die sich bildende keltische Nation zu beobachten und ihre Stellung gegenüber ihrer Klientel und der breiten Masse der Bevölkerung klarzulegen, ist eine Forschungsaufgabe von hohem Wert. Nicht zuletzt deswegen, da wir um die letzte vorchristliche Jahrtausendmitte auch in Mitteleuropa die Schwelle zu echten geschichtlichen Vorgängen überschritten haben.

KOSSACK 1974

Georg Kossack, *Prunkgräber, Bemerkungen zu Eigenschaften und Aussagewert*. In: GEORG KOSSACK & GÜNTER ULBERT (Hrsg.), *Studien zur vor- und frühgeschichtlichen Archäologie, Festschrift für Joachim Werner zum 65. Geburtstag, Band 1: Allgemeines, Vorgeschichte, Römerzeit*. (München 1974), 3–33.

Da uns solche Gefüge noch weitgehend unbekannt sind, drücken wir uns metaphorisch aus: in der Fachsprache des Archäologen steckt eine Fülle gleichnishafter Bezeichnungen, ein sicheres Zeichen dafür, daß man nur ahnt, wovon man spricht. Ähnlich ist es zu beurteilen, wenn man ungewöhnlich reich ausgerüstete Bestattungen, die häufig mit aufwendiger Bauart zusammengehen, "Adels- oder Fürstengräber" nennt. Man meint damit freilich anfänglich nichts weiter als eine Akkumulation von Sachgütern und Arbeit. Da hier wirtschaftliche und soziale Leistungen zusammenfließen, aktiviert durch religiöse Überzeugung und zwar zugunsten eines einzelnen oder einer Personengruppe, sieht man im "Fürstengrab" nun schon weitergehend Ansprüche herrschaftlicher Qualität verwirklicht, die nur einer privilegierten Schicht adäquat scheinen. Das führt dann schließlich dazu, den Adelsbegriff des hohen Mittelalters bei der Deutung auch prähistorischer Befunde zu benutzen.

Ich fürchte, dies ist eine Vereinfachung, die weder die Quelle selbst zum Sprechen bringt noch der Sozialstruktur antiker Randkulturen und der Mentalität ihrer Führungsschicht angemessen ist. Statt dessen kommt es in erster Linie

darauf an, die Eigenschaften der Prunkgrabsitte näher zu beschreiben, die Kriterien auf ihr Gewicht zu prüfen, welche die Topographie der Prachtgrabnekropolen liefert, insbesondere ihr Lageverhältnis zu den gleichzeitigen Ortsfriedhöfen, und die Merkmale zu nutzen, die in der Art der Verbreitung und in der Häufigkeit enthalten sind. Ein wesentliches Mittel zur Beurteilung scheint mir ferner die Dauerhaftigkeit des Brauchs zu sein, weil ein hervorragendes Kennzeichen seiner Überlieferung Lückenhaftigkeit ist. Bei dieser Frage habe ich zunächst den einzelnen Bestattungsort im Auge, meine aber genauso auch die Stabilität der Sitte innerhalb der Zonen, in denen sie vorkommt. Schließlich ist es die Art der Inventargestaltung, die wichtige Einsichten gestattet. Sie erst klärt bei vergleichender Untersuchung darüber auf, welche Verhaltensmuster im Bestattungsritual zum Ausdruck kommen, auf welche Ursachen die Imitation fremder Gebräuche und fremder Sachkultur zurückzuführen ist und welche Rolle die Entlehnung beim Wandel der Kulturen spielte.

Bibel

RÖMER 2018

Thomas Römer, *The Role of Egypt in the Formation of the Hebrew Bible*. [Journal of Ancient Egyptian Interconnections 18 \(2018\), 63–70](#).

The article deals with the manifold mentions of Egypt in the Hebrew Bible. Among them are many negative views, especially in the Exodus narrative, which originated in the Northern Kingdom and reached Judah after 722 BCE. Prophetic oracles also condemn Egypt and the attempts of Judean kings in the 8th to 6th century BCE to seek help in Egypt against the Assyrians. Later texts show a positive image of Egypt, especially the Joseph story, which probably originated in the Egyptian Diaspora. Other texts, such as 2 Chronicles 35 and Isaiah 19, also pursue this positive attitude towards Egypt. The article further discusses borrowings of Egyptian texts (Amenemope and the Tale of the Two Brothers) in the Hebrew Bible.

SCHIPPER 2018

Bernd U. Schipper, *Joseph, Ahiqar, and Elephantine, The Joseph Story as a Diaspora Novella*. [Journal of Ancient Egyptian Interconnections 18 \(2018\), 71–84](#).

The possible Egyptian background of the Joseph story has been discussed for decades. While previous research compared the Joseph story to Egyptian texts from the New Kingdom, the present article focuses on material from the 1st millennium BCE. By drawing from the term “diaspora novella,” introduced by Arndt Meinhold in 1975, the present article compares the plot of the Joseph story to two texts connected to Egypt: the story of Ahiqar, which was found at Elephantine, and Papyrus Berlin 23071 vs. In light of these texts, the non-priestly literary layer of the Joseph story appears to be a diaspora novella, presenting a concept of identity that can be connected to the “Judahite/Aramaic” diaspora in Egypt during the Persian period.

TUAT

OTTO KAISER (Hrsg.), *Texte aus der Umwelt des Alten Testaments*. (Darmstadt 2019).

Biologie

FORRISTER 2019

Dale L. Forrister, María-José Endara, Gordon C. Younkin, Phyllis D. Coley & Thomas A. Kursar, *Herbivores as drivers of negative density dependence in tropical forest saplings*. [science 363 \(2019\), 1213–1216](#).
[s363-1213-Supplement.pdf](#)

Ecological theory predicts that the high local diversity observed in tropical forests is maintained by negative density-dependent interactions within and between closely related plant species. By using long-term data on tree growth and survival for coexisting *Inga* (Fabaceae, Mimosoideae) congeners, we tested two mechanisms thought to underlie negative density dependence (NDD): competition for resources and attack by herbivores. We quantified the similarity of neighbors in terms of key ecological traits that mediate these interactions, as well as the similarity of herbivore communities. We show that phytochemical similarity and shared herbivore communities are associated with decreased growth and survival at the sapling stage, a key bottleneck in the life cycle of tropical trees. None of the traits associated with resource acquisition affect plant performance, indicating that competition between neighbors may not shape local tree diversity. These results suggest that herbivore pressure is the primary mechanism driving NDD at the sapling stage.

GUO 2019

Qinfeng Guo, Songlin Fei, Kevin M. Potter, Andrew M. Liebhold & Jun Wen, *Tree diversity regulates forest pest invasion*. [PNAS 116 \(2019\), 7382–7386](#).

[pnas116-07382-Supplement.pdf](#)

Nonnative pests often cause cascading ecological impacts, leading to detrimental socioeconomic consequences; however, how plant diversity may influence insect and disease invasions remains unclear. High species diversity in host communities may promote pest invasions by providing more niches (i.e., facilitation), but it can also diminish invasion success because low host dominance may make it more difficult for pests to establish (i.e., dilution). Most studies to date have focused on small-scale, experimental, or individual pest/disease species, while large-scale empirical studies, especially in natural ecosystems, are extremely rare. Using subcontinental-level data, we examined the role of tree diversity on pest invasion across the conterminous United States and found that the tree-pest diversity relationships are hump-shaped. Pest diversity increases with tree diversity at low tree diversity (because of facilitation or amplification) and is reduced at higher tree diversity (as a result of dilution). Thus, tree diversity likely regulates forest pest invasion through both facilitation and dilution that operate simultaneously, but their relative strengths vary with overall diversity. Our findings suggest the role of native species diversity in regulating nonnative pest invasions.

Keywords: biotic resistance | constraint envelope | facilitation | dilution | host vs. nonhost

Significance: Understanding the relationship between tree diversity and pest invasions is of critical importance both to the theoretical understanding of invasion ecology and to the development of effective pest management practices to mitigate the enormous damages caused by nonnative pests. However, evidence of facilitation and dilution remains elusive, especially in natural ecosystems at large scales. Using a unique large dataset encompassing 130,210 forest plots with county-level pest occurrence dataset across the United States, we show that tree-pest diversity relationships are hump-shaped. Both facilitation and dilution appear to coexist,

but their relative strength varies with overall native tree diversity. Our findings provide insight into the interaction between facilitation and dilution, which are critical for understanding the invasions of forests by nonnative pests.

Datierung

HÖFLMAYER 2019

Felix Höflmayer, *The Expulsion of the Hyksos and the End of the Middle Bronze Age, A Reassessment in Light of Recent Chronological Research*. [Journal of Ancient Egyptian Interconnections](#) **21** (2019), 20–30.

The end of the Middle Bronze Age and its connection with the end of the Second Intermediate Period in Egypt and the alleged expulsion of the Hyksos is of key-importance for understanding the development of the subsequent Late Bronze Age and the rising Egyptian interest in the region. For a long time it was assumed that the destruction levels observed at many Middle Bronze Age sites throughout the southern Levant could be linked to the Hyksos expulsion and the immediate aftermath. The low chronology of Manfred Bietak and others dated the end of the Middle Bronze Age to the early 18th Dynasty, up to the Thutmosid period and implicitly opened the possibility to connect these destructions with the atested military campaigns of the Thutmosid kings. Recent radiocarbon data, however, challenged both the low and the conventional chronology and placed the end of the Middle Bronze Age earlier, probably even before the start of the New Kingdom. This paper reviews both the chronologies and the historical narratives involved and argues for a new model for the transition from the Middle to the Late Bronze Age.

WEBSTER 2019

Lyndelle Webster, Katharina Streit, Michael Dee, Irka Hajdas & Felix Höflmayer, *Identifying the Lachish of Papyrus Hermitage 1116A Verso and the Amarna Letters, Implications of New Radiocarbon Dating*. [Journal of Ancient Egyptian Interconnections](#) **21** (2019), 88–99.

Difficulties reconciling Late Bronze Age archaeological remains in the southern Levant with the texts of the Amarna Age and preceding formative years of Late Bronze Age society have long been noted. At some prominent tell sites that according to the texts were major city-states, little to no settlement remains have been identified. Here we revisit this issue at Tel Lachish, showing on the basis of renewed radiocarbon dating that two previously exposed occupation layers should be re-assigned to this timeframe—one to the second half of the 15th century BCE, and the other predominantly to the first half of the 14th century BCE. These re-dated strata support the textual picture from Papyrus Hermitage 1116A and the Amarna Letters of a thriving town with which the Egyptians interacted.

Grabung

BONNET 1997

Charles Bonnet, Suzanne Plouin & François Lambach, *Chronologie et structures des tumulus du Kastenwald (Haut-Rhin), Relecture des données anciennes et mobilier funéraire inédit*. [Cahiers Alsaciens d'Archéologie, d'Art et d'Histoire](#) **40** (1997), 17–32.

Da unveröffentliche Grabbeigaben noch im Unterlindenmuseum aufbewahrt liegen, sind wir veranlasst, die im Kastenwald zwischen 1954 und 1965 durchgeführten Ausgrabungen wieder aufzunehmen und seine Ergebnisse wieder nachzuprüfen. Bearbeitet man die Funde und erwägt man erneut die damaligen Angaben, so wird es tatsächlich bestätigt, dass die meisten Grabhügel schon in der mittleren Bronzezeit gegründet wurden. Bloss der Hügel von Wolfgantzen schliesst sich aus, da er deutlich in der Hallstatt C errichtet wurde.

Klima

CIAIS 2019

P. Ciais et al., *Five decades of northern land carbon uptake revealed by the interhemispheric CO₂ gradient*. *nature* **568** (2019), 221–225.

P. Ciais, J. Tan, X. Wang, C. Roedenbeck, F. Chevallier, S.-L. Piao, R. Moriarty, G. Broquet, C. Le Quéré, J. G. Canadell, S. Peng, B. Poulter, Z. Liu & P. Tans

The global land and ocean carbon sinks have increased proportionally with increasing carbon dioxide emissions during the past decades¹. It is thought that Northern Hemisphere lands make a dominant contribution to the global land carbon sink^{2–7}; however, the long-term trend of the northern land sink remains uncertain. Here, using measurements of the interhemispheric gradient of atmospheric carbon dioxide from 1958 to 2016, we show that the northern land sink remained stable between the 1960s and the late 1980s, then increased by 0.5 ± 0.4 petagrams of carbon per year during the 1990s and by 0.6 ± 0.5 petagrams of carbon per year during the 2000s. The increase of the northern land sink in the 1990s accounts for 65% of the increase in the global land carbon flux during that period. The subsequent increase in the 2000s is larger than the increase in the global land carbon flux, suggesting a coincident decrease of carbon uptake in the Southern Hemisphere. Comparison of our findings with the simulations of an ensemble of terrestrial carbon models^{5,8} over the same period suggests that the decadal change in the northern land sink between the 1960s and the 1990s can be explained by a combination of increasing concentrations of atmospheric carbon dioxide, climate variability and changes in land cover. However, the increase during the 2000s is underestimated by all models, which suggests the need for improved consideration of changes in drivers such as nitrogen deposition, diffuse light and land-use change. Overall, our findings underscore the importance of Northern Hemispheric land as a carbon sink.

GRUBER 2019

Nicolas Gruber et al., *The oceanic sink for anthropogenic CO₂ from 1994 to 2007*. *science* **363** (2019), 1193–1199.

s363-1193-Supplement.pdf

Nicolas Gruber, Dominic Clement, Brendan R. Carter, Richard A. Feely, Steven van Heuven, Mario Hoppema, Masao Ishii, Robert M. Key, Alex Kozyr, Siv K. Lauvset, Claire Lo Monaco, Jeremy T. Mathis, Akihiko Murata, Are Olsen, Fiz F. Perez, Christopher L. Sabine, Toste Tanhua & Rik Wanninkhof

We quantify the oceanic sink for anthropogenic carbon dioxide (CO₂) over the period 1994 to 2007 by using observations from the global repeat hydrography program and contrasting them to observations from the 1990s. Using a linear regression-based method, we find a global increase in the anthropogenic CO₂ inventory of 34 ± 4 petagrams of carbon (Pg C) between 1994 and 2007. This is equivalent to an average uptake rate of 2.6 ± 0.3 Pg C year⁻¹ and represents $31 \pm 4\%$ of the global anthropogenic CO₂ emissions over this period. Although this

global ocean sink estimate is consistent with the expectation of the ocean uptake having increased in proportion to the rise in atmospheric CO₂, substantial regional differences in storage rate are found, likely owing to climate variability-driven changes in ocean circulation.

MISIOS 2019

Stergios Misios, Lesley J. Gray, Mads F. Knudsen, Christoffer Karoff, Hauke Schmidt & Joanna D. Haigh, *Slowdown of the Walker circulation at solar cycle maximum*. *PNAS* **116** (2019), 7186–7191.

[pnas116-07186-Supplement.pdf](#)

The Pacific Walker Circulation (PWC) fluctuates on interannual and multi-decadal timescales under the influence of internal variability and external forcings. Here, we provide observational evidence that the 11-y solar cycle (SC) affects the PWC on decadal timescales. We observe a robust reduction of east–west sea-level pressure gradients over the Indo-Pacific Ocean during solar maxima and the following 1–2 y. This reduction is associated with westerly wind anomalies at the surface and throughout the equatorial troposphere in the western/ central Pacific paired with an eastward shift of convective precipitation that brings more rainfall to the central Pacific. We show that this is initiated by a thermodynamical response of the global hydrological cycle to surface warming, further amplified by atmosphere–ocean coupling, leading to larger positive ocean temperature anomalies in the equatorial Pacific than expected from simple radiative forcing considerations. The observed solar modulation of the PWC is supported by a set of coupled ocean–atmosphere climate model simulations forced only by SC irradiance variations. We highlight the importance of a muted hydrology mechanism that acts to weaken the PWC. Demonstration of this mechanism acting on the 11-y SC timescale adds confidence in model predictions that the same mechanism also weakens the PWC under increasing greenhouse gas forcing.

Keywords: 11-y solar cycle | Walker circulation | GHG forcing | climate model

Significance: Influences of the 11-y solar cycle (SC) on climate have been speculated, but here we provide robust evidence that the SC affects decadal variability in the tropical Pacific. By analyzing independent observations, we demonstrate a slowdown of the Pacific Walker Circulation (PWC) at SC maximum. We find a muted hydrological cycle at solar maximum that weakens the PWC and this is amplified by a Bjerknes feedback. Given that a similar muted hydrological cycle has been simulated under increased greenhouse gas forcing, our results strengthen confidence in model predictions of a weakened PWC in a warmer climate. The results also suggest that SC forcing is a source of skill for decadal predictions in the Indo-Pacific region.

Kultur

BLASI 2019

D. E. Blasi, S. Moran, S. R. Moisik, P. Widmer, D. Dediu & B. Bickel, *Human sound systems are shaped by post-Neolithic changes in bite configuration*. *science* **363** (2019), 1192.

[s363-1192-Supplement.pdf](#)

Linguistic diversity, now and in the past, is widely regarded to be independent of biological changes that took place after the emergence of *Homo sapiens*. We show converging evidence from paleoanthropology, speech biomechanics, ethnography, and historical linguistics that labiodental sounds (such as “f” and “v”) were innovated after the Neolithic. Changes in diet attributable to food-processing

technologies modified the human bite from an edge-to-edge configuration to one that preserves adolescent overbite and overjet into adulthood. This change favored the emergence and maintenance of labiodentals. Our findings suggest that language is shaped not only by the contingencies of its history, but also by culturally induced changes in human biology.

CURRY 2019

Andrew Curry, *Rare diseases prompted care in ancient times*. [science](#) **363** (2019), 1136.

People with dwarfism and cleft palate may have been revered, bones suggest.

GIBBONS 2019

Ann Gibbons, *How farming reshaped our smiles and our speech*. [science](#) **363** (2019), 1131.

Soft diet led to overbite in adults, favoring sounds like “f “ and “v” in the languages of farming societies.

ONG 2019

Qiyang Ong, Walter Theseira & Irene Y. H. Ng, *Reducing debt improves psychological functioning and changes decision-making in the poor*. [PNAS](#) **116** (2019), 7244–7249.

[pnas116-07244-Supplement1.pdf](#), [pnas116-07244-Supplement2.csv](#), [pnas116-07244-Supplement3.csv](#), [pnas116-07244-Supplement4.txt](#)

We examine how chronic debt affects behavior by studying how a large, unanticipated debt-relief program affected psychological functioning and economic decision-making in beneficiaries. A charity granted low-income households debt relief worth up to Singapore dollars 5,000 (≈ 3 month’s household income). We exploited quasiexperimental variation in the structure of debt relief: For the same dollar amount of relief, some beneficiaries had more debt accounts eliminated, while others had fewer paid off. Comparing 196 beneficiaries before and after debt relief, and controlling for debt-relief amount, having an additional debt account paid off improves cognitive functioning by about one-quarter of a SD and reduces the likelihood of exhibiting anxiety by 11 % and of present bias by 10 %. To achieve the same effect on cognitive functioning of eliminating one debt account, a beneficiary must receive debt relief worth ≈ 1 month’s household income. There is no effect of debt-relief magnitude on anxiety and decision-making. We exclude training and calendar effects, debt-causing behaviors, and liquidity constraints as explanations. Instead, these results support the hypothesis that chronic debt impairs behavior because the mental-accounting costs of owing distinct debt accounts consume mental bandwidth. Poverty-alleviation policies aimed at the indebted poor should consider addressing mental accounting and bandwidth taxes.

Keywords: poverty | debt | mental accounting | cognitive functioning | present bias

Significance: The impact of chronic debt on the poor is psychological, not just financial. We hypothesize that chronic debt impairs psychological functioning and decision-making, contributing to the poverty trap. This is because debt is not considered fungible and is viewed as costly mental accounts that consume cognitive bandwidth. We test this using quasiexperimental evidence from a one-off, unanticipated debt-relief program worth several months’ household income. Comparing the poor before and after debt relief, those with more debt accounts paid off experienced greater improvements in cognitive functioning, reported less anxiety, and became less present-biased. These findings provide actionable evidence for poverty-alleviation policy.

Metallzeiten

FISCHER 1973

Franz Fischer, *Κεμνηλια: Bemerkungen zur kulturgeschichtlichen Interpretation des sogenannten Südimports in der späten Hallstatt- und frühen Latène-Kultur des westlichen Mitteleuropa*. *Germania* 51 (1973), 436–459.

Es wäre sicher verfrüht, wollte man auf Grund der hier skizzierten Gedanken sogleich weiträumige historische Überlegungen anstellen; doch sei es erlaubt, einige denkbare Konsequenzen wenigstens anzudeuten. Wir werden damit zu rechnen haben, daß zwischen dem Raum der späten Hallstatt- und der frühen Latène-Kultur nordwestlich der Alpen und dem mediterranen Süden – auch Ober- und Mittelitalien – nicht nur Handelsverbindungen, sondern auch Beziehungen politischer Natur bestanden haben; darin können sehr wohl auch politische Heiraten mit eingeschlossen gewesen sein, wie wir sie für die Beziehungen zwischen den phrygischen Königen in Gordion oder den lydischen Königen in Sardes und den ionischen Griechen an der Westküste Kleinasiens bezeugt finden.

Über die Hintergründe der Beziehungen zwischen den großen Hallstatt-Herren ersten Ranges und südlichen Machthabern sind vorläufig nur Vermutungen möglich. Es ist denkbar, daß hierbei auch wirtschaftliche Gründe eine Rolle gespielt haben. Allerdings verdient der Gedanke unmittelbarer Korrespondenz zwischen wirtschaftlicher Potenz und Grabausstattung in jener Zeit einige Skepsis; offenkundige Sonderfälle wie der Dürrnberg bei Hallein und Hallstatt dürfen nicht kurzweg verallgemeinert werden. Nach allem, was uns durch Homer und Herodot für mindestens ähnliche Zustände bekannt ist, waren die Beziehungen großer Herren jener Zeit weit mehr durch vordergründige Zweckallianzen und Konflikte von eher agonalem Charakter auf dem Hintergrund von Geltungsdrang, Ruhmsucht und Beutegier bestimmt als von wirtschaftspolitischen Erwägungen modernen Zuschnitts. Man wird daher als Hintergrund politischer Beziehungen auch die Anwerbung kleinerer oder größerer Gefolgschaftsheere im Herrschaftsbereich der großen Hallstatt-Herren nordwestlich der Alpen durch südliche Machthaber zu erwägen haben, wie das aus wenig späterer Zeit vielfach überliefert ist.

STEINMANN 2018

Bernhard Steinmann, *Mykene, Die sagenhafte Welt des Agamemnon*. (Karlsruhe 2018).

Die mykenische Kultur gilt als erste Hochkultur auf dem europäischen Festland. Auf der griechischen Halbinsel Peloponnes und in Mittelgriechenland erlebte sie ihren Höhepunkt zwischen 1600 und 1200 v. Chr. Heinrich Schliemann entdeckte ab 1874 durch seine Ausgrabungen in Mykene, Tiryns und Orchomenos diese prähistorische Kultur. Namengebend war Mykene mit seinen reichen, aus den Schachtgräbern stammenden Goldfunden.

Die mykenische Zeit, so glaubte man anfangs, war die Epoche der sagenhaften Helden und Könige aus den Epen Homers. Aber waren Mykenes Zyklopenmauern mit dem weltberühmten Löwentor wirklich die Burg Agamemnons, der die Griechen in den Krieg gegen Troja führte?

Der Katalog zur Ausstellung im Badischen Landesmuseum gibt einen neuen und profunden Überblick über Mythos und Wirklichkeit der mykenischen Kultur. Mehr als 350 erstmals der Öffentlichkeit präsentierte Funde illustrieren anschaulich Entwicklung und Kunst der mykenischen Ägäis.

Neolithikum

BARRAS 2019

Colin Barras, *History of Violence*. [NewScientist 2019, Mar. 30, 29–33](#).

Neolithic Europe was subjected to a devastating conquest. Colin Barras discovers the untold story hidden in ancient DNA.

4700 years ago Bell Beaker culture began to spread east, although the people more or less stayed put. By about 4600 years ago, it reached the most westerly Corded Ware people around where the Netherlands now lies. For reasons still unclear, the Corded Ware people fully embraced it. “They simply take on part of the Bell Beaker package and become Beaker people,” says Kristiansen.

In other words, there were now two types of Bell Beaker people: one with roots in Iberia and one with Corded Ware (and ultimately Yamnaya) roots. Kristiansen thinks the Yamnaya Beakers then took advantage of the maritime know-how of their Iberian friends and voyaged to Britain some 4400 years ago (see map, page 31). The fact that the genetic analysis showed the Britons then all-but disappeared within a couple of generations might be significant. It suggests the capacity for violence that emerged when the Yamnaya lived on the Eurasia steppe remained even as these people moved into Europe, switched identity from Yamnaya to Corded Ware, and then switched again from Corded Ware to Bell Beaker.

Religion

WHITEHOUSE 2019

Harvey Whitehouse et al., *Complex societies precede moralizing gods throughout world history*. [nature 568 \(2019\), 226–229](#).

n568-0226-Supplement1.pdf, n568-0226-Supplement2.csv, n568-0226-Supplement3.csv, n568-0226-Supplement4.xlsx, n568-0226-Supplement5.xlsx, n568-0226-Supplement6.xlsx, n568-0226-Supplement7.xlsx

Harvey Whitehouse, Pieter François, Patrick E. Savage, Thomas E. Currie, Kevin C. Feeney, Enrico Cioni, Rosalind Purcell, Robert M. Ross, Jennifer Larson, John Baines, Barend Ter Haar, Alan Covey & Peter Turchin

The origins of religion and of complex societies represent evolutionary puzzles^{1–8}. The ‘moralizing gods’ hypothesis offers a solution to both puzzles by proposing that belief in morally concerned supernatural agents culturally evolved to facilitate cooperation among strangers in large-scale societies^{9–13}. Although previous research has suggested an association between the presence of moralizing gods and social complexity^{3,6,7,9–18}, the relationship between the two is disputed^{9–13,19–24}, and attempts to establish causality have been hampered by limitations in the availability of detailed global longitudinal data. To overcome these limitations, here we systematically coded records from 414 societies that span the past 10,000 years from 30 regions around the world, using 51 measures of social complexity and 4 measures of supernatural enforcement of morality. Our analyses not only confirm the association between moralizing gods and social complexity, but also reveal that moralizing gods follow—rather than precede—large increases in social complexity. Contrary to previous predictions^{9,12,16,18}, powerful moralizing ‘big gods’ and prosocial supernatural punishment tend to appear only after the emergence of ‘megacities’ with populations of more than around one million people. Moralizing gods are not a prerequisite for the evolution of social complexity, but they may help to sustain and expand complex multi-ethnic empires after they have become established. By contrast, rituals that facilitate the standardization of religious traditions across large populations^{25,26} generally precede the appearance of

moralizing gods. This suggests that ritual practices were more important than the particular content of religious belief to the initial rise of social complexity.

Story or Book

ANNAS 2019

George J. Annas, *Marketing “healthy” babies*. *science* **363** (2019), 1158.

Does the rhetoric of consumer genetics aim to eliminate disability without mentioning it?

Fables and Futures. *Biotechnology, Disability, and the Stories We Tell Ourselves*. George Estreich. MIT Press, 2019. 237 pp.

Unlike most other medical tests, NIPS is sold directly to pregnant women by means of high-production video advertisements made by the for-profit companies that sell the test. These ads all tell the same basic story: “the good life, made possible by technology” as depicted by idealized images of a suburban family with a “chromosomally typical child cavorting in the meadow.” People with Down syndrome are not seen in such stories and “exist only as blurry, medicalized abstractions.” The message is that there is no actual decision to make here—have the blood test and be reassured. Marketing persuasion takes the place of informed consent.

I recommend *Fables and Futures* to anyone who wants to seriously engage in the human genome editing debate at the society and species levels. But I also recommend Estreich’s earlier book, *The Shape of the Eye*, lest in our abstraction of the human species, we forget what life itself is all about.

FARMELO 2019

Graham Farmelo, *Questioning the quantum*. *nature* **568** (2019), 166–167.

Graham Farmelo parses a takedown of the most successful physics theory ever.

Einstein’s Unfinished Revolution: The Search for What Lies Beyond the Quantum. Lee Smolin. Penguin Press (2019)

Like Einstein, Smolin is a philosophical ‘realist’ — someone who thinks that the real world exists independently of our minds and can be described by deterministic laws. These enable us, in principle, to predict the future of any particle if we have enough information about it. This view of the world is incompatible with the conventional interpretation of quantum mechanics, in which key features are unpredictability and the role of observers in the outcome of experiments. Thus, Einstein never accepted that quantum mechanics was anything but an impressive placeholder for a more fundamental theory conforming to his realist credo. Smolin agrees.

Yet it is far from clear whether Smolin’s new methods allow space and time to be investigated effectively. In recent decades, there have been many exciting advances in this subject, almost all made using standard quantum mechanics and Einstein’s theory of relativity. In my opinion, Smolin downplays the extraordinary success of this conservative approach. It is the basis of modern quantum field theory (a descendant of Maxwell’s theory of electricity and magnetism), which accounts for the results of all sub atomic experiments, some of them to umpteen decimal places. Despite the impression that Smolin gives, modern theoretical physics is thriving, with potentially revolutionary ideas about space and time emerging from a combination of the standard quantum mechanics and relativity

theory taught in universities for generations. Maybe the upheaval in physics that Smolin yearns for is simply unnecessary.

Rewarding as it is, I doubt Einstein's Unfinished Revolution will convert many of Smolin's critics. To do that, he will need to present his ideas more rigorously than he could reasonably do in a popular book.

One thing on which every physicist in Smolin's field can agree is that there is a crying need for more juicy clues from nature. There have been no surprises concerning the inner workings of atoms for some 20 years. It is experimental results that will decide whether Smolin is correct, or whether he protests too much.