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Literatur

Aktuell

Entringer 2011

Sonja Entringer et al., *Stress exposure in intrauterine life is associated with shorter telomere length in young adulthood.* PNAS **108** (2011), 13377–13378.
pnas108-13377-Fulltext.pdf, pnas108-13377-Table.ldw, pnas108-13377-Table.WK1
Sonja Entringer, Elissa S. Epel, Robert Kumsta, Jue Lin, Dirk H. Hellhammer, Elizabeth H. Blackburn, Stefan Wüst and Pathik D. Wadhwa
Leukocyte telomere length (LTL) is a predictor of age-related disease onset and mortality. The association in adults of psychosocial stress or stress biomarkers with LTL suggests telomere biology may represent a possible underlying mechanism linking stress and health outcomes. It is, however, unknown whether stress exposure in intrauterine life can produce variations in LTL, thereby potentially setting up a long-term trajectory for disease susceptibility. We, therefore, as a first step, tested the hypothesis that stress exposure during intrauterine life is associated with shorter telomeres in adult life after accounting for the effects of other factors on LTL. LTL was assessed in 94 healthy young adults. Forty-five subjects were offspring of mothers who had experienced a severe stressor in the index pregnancy (prenatal stress group; PSG), and 49 subjects were offspring of mothers who had a healthy, uneventful index pregnancy (comparison group; CG). Prenatal stress exposure was a significant predictor of subsequent adult telomere length in the offspring (178-bp difference between prenatal stress and CG; d = 0.41 SD units; $P < 0.05$). The effect was substantially unchanged after adjusting for potential confounders (subject characteristics, birth weight percentile, and early-life and concurrent stress level), and was more pronounced in women (295-bp difference; d = 0.68 SD units; $P < 0.01$). To the best of our knowledge, this study provides the first evidence in humans of an association between prenatal stress exposure and subsequent shorter telomere length. This observation may help shed light on an important biological pathway underlying the developmental origins of adult health and disease risk.
developmental programming | fetal origin

Gullberg 2011

Erik Gullberg, Sha Cao, Otto G. Berg, Carolina Ilbäck, Linus Sandegren, Diarmaid Hughes & Dan I. Andersson, *Selection of Resistant Bacteria at Very Low Antibiotic Concentrations.* PLoS Pathogens **7** (2011), e1002158. <http://dx.doi.org/10.1371/journal.ppat.1002158>.
The widespread use of antibiotics is selecting for a variety of resistance mechanisms that seriously challenge our ability to treat bacterial infections. Resistant bacteria can be selected at the high concentrations of antibiotics used therapeutically, but what role the much lower antibiotic concentrations present in many environments plays in selection remains largely unclear. Here we show using highly sensitive competition experiments that selection of resistant bacteria occurs at extremely low antibiotic concentrations. Thus, for three clinically important antibiotics, drug concentrations up to several hundred-fold below the minimal inhibitory concentration of susceptible bacteria could enrich for resistant bacteria, even when present at a very low initial fraction. We also show that de novo mutants can be selected at sub-MIC concentrations of antibiotics, and we provide a mathematical model predicting how rapidly such mutants would take over in a susceptible population. These results add another dimension to the evolution of resistance and suggest that

the low antibiotic concentrations found in many natural environments are important for enrichment and maintenance of resistance in bacterial populations.

Horner 2011

Victoria Horner, J. Devyn Carter, Malini Suchak & Frans B. M. de Waal, *Spontaneous prosocial choice by chimpanzees*. PNAS **108** (2011), 13847–13851.

The study of human and primate altruism faces an evolutionary anomaly: There is ample evidence for altruistic preferences in our own species and growing evidence in monkeys, but one of our closest relatives, the chimpanzee (Pan troglodytes), is viewed as a reluctant altruist, acting only in response to pressure and solicitation. Although chimpanzee prosocial behavior has been reported both in observational captive studies and in the wild, thus far Prosocial Choice Tests have failed to produce evidence. However, methodologies of previous Prosocial Choice Tests may have handicapped the apes unintentionally. Here we present findings of a paradigm in which chimpanzees chose between two differently colored tokens: one "selfish" token resulting in a reward for the actor only (1/0), and the other "prosocial" token rewarding both the actor and a partner (1/1). Seven female chimpanzees, each tested with three different partners, showed a significant bias for the prosocial option. Prosocial choices occurred both in response to solicitation by the partner and spontaneously without solicitation. However, directed requests and pressure by the partner reduced the actor's prosocial tendency. These results draw into question previous conclusions indicating that chimpanzees have a limited sensitivity to the needs of others and behave prosocially only in response to significant prompting.
other-regarding | fairness | great ape

Kupferschmidt 2011

Kai Kupferschmidt, *Scourge of Snake Oil Salesmen Bids an Early Farewell*. science **333** (2011), 687.

Ernst didn't discover a single case in which a fundamentally implausible treatment, such as homeopathy's infinite solutions, had an effect. The stream of negative results angered CAM supporters. "They thought he was placed there to prove that alternative medicine works," Baum says. Meanwhile, Ernst took aim at others in the burgeoning field of CAM research as well. He's highly critical of the National Center for Complementary and Alternative Medicine at the U.S. National Institutes of Health, for instance; in a recent article in which he examined 27 NCCAM-funded trials of herbal medicine, he found "a plethora of serious concerns," including a lack of laboratory tests of key safety parameters and a low or moderate risk of bias in 15 of the studies.

Days before the report's publication, Ernst called it "outrageous and deeply flawed" in a newspaper article. "They were suggesting asthma could be treated with homeopathic medicine. That would have killed 150 patients a year," he says. The spat nearly cost him his job. "The university ceased all fundraising for my unit, and my department was systematically destroyed," he says. Recently, in exchange for an assurance that the department will live on, Ernst agreed with Exeter to officially retire.

Nunn 2011

Nathan Nunn & Nancy Qian, *The potato's contribution to population and urbanization: evidence from a historical experiment*. Quarterly Journal of Economics (2011) preprint, 1–58. <http://dx.doi.org/10.1093/qje/qjr009>.

We exploit regional variation in suitability for cultivating potatoes, together with time variation arising from their introduction to the Old World from the Americas, to estimate the impact of potatoes on Old World population and urbanization. Our results show that

the introduction of the potato was responsible for a significant portion of the increase in population and urbanization observed during the eighteenth and nineteenth centuries. According to our most conservative estimates, the introduction of the potato accounts for approximately one-quarter of the growth in Old World population and urbanization between 1700 and 1900. Additional evidence from within-country comparisons of city populations and adult heights also confirms the cross-country findings.
JEL Codes: J1, N1N5, O14.

Tombu 2011

Michael N. Tombu, Christopher L. Asplund, Paul E. Dux, Douglass Godwin, Justin W. Martin & René Marois, *A Unified attentional bottleneck in the human brain*. PNAS **108** (2011), 13426–13431.
Human information processing is characterized by bottlenecks that constrain throughput. These bottlenecks limit both what we can perceive and what we can act on in multitask settings. Although perceptual and response limitations are often attributed to independent information processing bottlenecks, it has recently been suggested that a common attentional limitation may be responsible for both. To date, however, evidence supporting the existence of such a "unified" bottleneck has been mixed. Here, we tested the unified bottleneck hypothesis using time-resolved fMRI. Experiment 1 isolated brain regions involved in the response selection bottleneck that limits speeded dual-task performance. These same brain regions were not only engaged by a perceptual encoding task in Experiment 2, their activity also tracked delays to a speeded decision-making task caused by concurrent perceptual encoding (Experiment 3). We conclude that a unified attentional bottleneck, including the inferior frontal junction, superior medial frontal cortex, and bilateral insula, temporally limits operations as diverse as perceptual encoding and decision-making.
attention | attentional blink | psychological refractory period

Anthropologie

Bar-Yosef 2010

Ofer Bar-Yosef & Jean-Guillaume Bordes, *Who were the makers of the Châtelperronian culture?* Journal of Human Evolution **59** (2010), 586–593.
Our brief re-investigation of the available data from Grotte du Renne and St. Cesaire casts serious doubts on the contexts of the Neanderthal human remains attributed to the Châtelperronian. Indeed, it is worth mentioning that several times during the 20th century, scholars have suggested that the Châtelperronian assemblages represent a mixture of Upper Palaeolithic components with the underlying Mousterian layers (e.g., Lynch, 1966; Rigaud, 1996; Pettitt, 1997). Misinterpretations concerning the Châtelperronian at Grotte du Renne and St. Cesaire may parallel problems that have been resolved by the actual dating of the supposedly Aurignacian skulls from Vogelherd to the Neolithic (Conard et al., 2004). We should therefore start afresh, testing hypotheses about the hominins responsible for the formation of Châtelperronian contexts, instead of giving credence to long gone beliefs based on assumptions drawn from the poorly excavated sites.

Kuhl 2011

Patricia K. Kuhl, *Who's Talking?* science **333** (2011), 529–530.
Neural systems in the human brain that process auditory information about who spoke and what they said are functionally integrated.

Mellars 2011

Paul Mellars & Jennifer C. French, *Tenfold Population Increase in Western Europe at the Neandertal-to-Modern Human Transition*. science **333** (2011), 623–627.

s333-0623-Supplement.pdf

European Neandertals were replaced by modern human populations from Africa ≈40,000 years ago. Archaeological evidence from the best-documented region of Europe shows that during this replacement human populations increased by one order of magnitude, suggesting that numerical supremacy alone may have been a critical factor in facilitating this replacement.

Perrachione 2011

Tyler K. Perrachione, Stephanie N. Del Tufo & John D. E. Gabrieli, *Human Voice Recognition Depends on Language Ability*. science **333** (2011), 595.

s333-0595-Supplement.pdf

Although the diagnostic criterion for dyslexia is impairment in developing typical reading abilities, these data show that reading difficulties are accompanied by impaired voice recognition. This inability to learn speaker-specific representations of phonetic consistency may reflect a weakness in language learning that contributes to impoverished long-term phonological representations in dyslexia.

Klima

Colville 2011

Elizabeth J. Colville et al., *Sr-Nd-Pb Isotope Evidence for Ice-Sheet Presence on Southern Greenland During the Last Interglacial*. science **333** (2011), 620–623.

s333-0620-Supplement.pdf

Elizabeth J. Colville, Anders E. Carlson, Brian L. Beard, Robert G. Hatfield, Joseph S. Stoner, Alberto V. Reyes & David J. Ullman

To ascertain the response of the southern Greenland Ice Sheet (GIS) to a boreal summer climate warmer than at present, we explored whether southern Greenland was deglaciated during the Last Interglacial (LIG), using the Sr-Nd-Pb isotope ratios of silt-sized sediment discharged from southern Greenland. Our isotope data indicate that no single southern Greenland geologic terrane was completely deglaciated during the LIG, similar to the Holocene. Differences in sediment sources during the LIG relative to the early Holocene denote, however, greater southern GIS retreat during the LIG. These results allow the evaluation of a suite of GIS models and are consistent with a GIS contribution of 1.6 to 2.2 meters to the ≥4-meter LIG sea-level highstand, requiring a significant sea-level contribution from the Antarctic Ice Sheet.

Funder 2011

Svend Funder et al., *A 10,000-Year Record of Arctic Ocean Sea-Ice Variability-View from the Beach*. science **333** (2011), 747–750.

s333-0747-Supplement.pdf

Svend Funder, Hugues Goosse, Hans Jepsen, Eigil Kaas, Kurt H. Kjær, Niels J. Korsgaard, Nicolaj K. Larsen, Hans Linderson, Astrid Lyså, Per Möller, Jesper Olsen, Eske Willerslev

We present a sea-ice record from northern Greenland covering the past 10,000 years. Multiyear sea ice reached a minimum between ≈8500 and 6000 years ago, when the limit of year-round sea ice at the coast of Greenland was located ≈1000 kilometers to the

north of its present position. The subsequent increase in multiyear sea ice culminated during the past 2500 years and is linked to an increase in ice export from the western Arctic and higher variability of ice-drift routes. When the ice was at its minimum in northern Greenland, it greatly increased at Ellesmere Island to the west. The lack of uniformity in past sea-ice changes, which is probably related to large-scale atmospheric anomalies such as the Arctic Oscillation, is not well reproduced in models. This needs to be further explored, as it is likely to have an impact on predictions of future sea-ice distribution.

Liu 2011

Zhengyu Liu, *Glacial Cycles and Indian Monsoon—A Southern Push*. science **333** (2011), 706–708.

An analysis of ancient lake bed sediments challenges traditional views of Indian monsoon dynamics.

Marcott 2011

Shaun A. Marcott et al., *Ice-shelf collapse from subsurface warming as a trigger for Heinrich events*. PNAS **108** (2011), 13415–13419.

Shaun A. Marcott,1, Peter U. Clark, Laurie Padman, Gary P. Klinkhammer, Scott R. Springer, Zhengyu Liu, Bette L. Otto-Bliesner, Anders E. Carlson, Andy Ungerer, June Padman, Feng He, Jun Cheng, and Andreas Schmittner

Episodic iceberg-discharge events from the Hudson Strait Ice Stream (HSIS) of the Laurentide Ice Sheet, referred to as Heinrich events, are commonly attributed to internal ice-sheet instabilities, but their systematic occurrence at the culmination of a large reduction in the Atlantic meridional overturning circulation (AMOC) indicates a climate control. We report Mg/Ca data on benthic foraminifera from an intermediate-depth site in the northwest Atlantic and results from a climate-model simulation that reveal basin-wide subsurface warming at the same time as large reductions in the AMOC, with temperature increasing by approximately 2 °C over a 1–2 kyr interval prior to a Heinrich event. In simulations with an ocean model coupled to a thermodynamically active ice shelf, the increase in subsurface temperature increases basal melt rate under an ice shelf fronting the HSIS by a factor of approximately 6. By analogy with recent observations in Antarctica, the resulting ice-shelf loss and attendant HSIS acceleration would produce a Heinrich event.

paleoceanography | paleoclimatology | abrupt climate change

Wolff 2011

Christian Wolff et al., *Reduced Interannual Rainfall Variability in East Africa During the Last Ice Age*. science **333** (2011), 743–747.

s333-0743-Supplement.pdf

Christian Wolff, Gerald H. Haug, Axel Timmermann, Jaap S. Sinninghe Damsté, Achim Brauer, Daniel M. Sigman, Mark A. Cane, Dirk Verschuren

Interannual rainfall variations in equatorial East Africa are tightly linked to the El Niño Southern Oscillation (ENSO), with more rain and flooding during El Niño and droughts in La Niña years, both having severe impacts on human habitation and food security. Here we report evidence from an annually laminated lake sediment record from southeastern Kenya for interannual to centennial-scale changes in ENSO-related rainfall variability during the last three millennia and for reductions in both the mean rate and the variability of rainfall in East Africa during the Last Glacial period. Climate model simulations support forward extrapolation from these lake sediment data that future warming will intensify the interannual variability of East Africa's rainfall.

Zhisheng 2011

An Zhisheng et al., *Glacial-Interglacial Indian Summer Monsoon Dynamics*. science **333** (2011), 719–723.

s333-0719-Supplement.pdf

An Zhisheng, Steven C. Clemens, Ji Shen, Xiaoke Qiang, Zhangdong Jin, Youbin Sun, Warren L. Prell, Jingjia Luo, Sumin Wang, Hai Xu, Yanjun Cai, Weijian Zhou, Xiaodong Liu, Weiguo Liu, Zhengguo Shi, Libin Yan, Xiayun Xiao, Hong Chang, Feng Wu, Li Ai, Fengyan Lu

The modern Indian summer monsoon (ISM) is characterized by exceptionally strong interhemispheric transport, indicating the importance of both Northern and Southern Hemisphere processes driving monsoon variability. Here, we present a high-resolution continental record from southwestern China that demonstrates the importance of interhemispheric forcing in driving ISM variability at the glacial-interglacial time scale as well. Interglacial ISM maxima are dominated by an enhanced Indian low associated with global ice volume minima. In contrast, the glacial ISM reaches a minimum, and actually begins to increase, before global ice volume reaches a maximum. We attribute this early strengthening to an increased cross-equatorial pressure gradient derived from Southern Hemisphere high-latitude cooling. This mechanism explains much of the nonorbital scale variance in the Pleistocene ISM record.

Kultur

Hvistendahl 2011

Mara Hvistendahl, *Young and Restless Can Be a Volatile Mix*. science **333** (2011), 552–554.

A new theory proposes that swelling groups of young people, or "youth bulges", lead to conflict.

Cincotta is candid about where his predictive model falls short. Although it works for military caretaker regimes, weak personal dictatorships, and partial democracies, it holds less true for countries ruled by strong, single-party governments or charismatic leaders, he says. His model suggests that Russia and Cuba should be liberalizing, which they're not. And China and Singapore both got through their youthful stages without either a significant conflict or a transition in government.

In the end, Goldstone says, demography has turned out to be a better tool for analysis than any alternatives-and the youth bulge theory works more than it fails. "In terms of broad probabilities," he says, "demography tells you almost everything you ought to know."

Malakoff 2011

David Malakoff, *Are More People Necessarily a Problem?* science **333** (2011), 544–546.

As world population surges, debate surrounds studies suggesting that population growth can have economic and environmental benefits

Neolithikum

Bocquet-Appel 2011

Jean-Pierre Bocquet-Appel, *When the World's Population Took Off: The Springboard of the Neolithic Demographic Transition*. science **333** (2011), 560–561.

During the economic transition from foraging to farming, the signal of a major demographic shift can be observed in cemetery data of world archaeological sequences. This signal is characterized by an abrupt increase in the proportion of juvenile skeletons and is interpreted as the signature of a major demographic shift in human history, known as the Neolithic Demographic Transition (NDT). This expresses an increase in the input into the age pyramids of the corresponding living populations with an estimated increase in the total fertility rate of two births per woman. The unprecedented demographic masses that the NDT rapidly brought into play make this one of the fundamental structural processes of human history.

Böttcher 2000

H. Böttcher, J. Garz & D. Weipert, *Auswirkungen unterschiedlicher Düngung auf Ertrag und Verarbeitungsqualität des Roggens bei langjährigem Anbau in Selbstfolge und Fruchtwechsel – Ergebnisse des Dauerversuches "Ewiger Roggenbau"*. Pflanzenbauwissenschaften **4** (2000), 1–8.

In dem Dauerversuch "Ewiger Roggenbau" wird Winterroggen (Secale cereale L.) auf einem aus Sandlöß hervorgegangenem Parabraunerde-Tschernosem seit 1878 in Selbstfolge angebaut. Die Düngungsvarianten sind: (I) "Stallmist I", (II) "-PK", (III) "NPK", (IV) "NPK + Stallmist" [seit 1991, vorher "N--"], (V) "ungedüngt", (VI) "Stallmist II" [bis 1952, seitdem ungedüngt]. Seit Teilung der Parzellen (1962) erfolgt der Anbau des Roggens auch in Fruchtwechsel mit Kartoffeln. Ziel der vorliegenden Arbeit war, den Einfluß der Fruchtfolge in Interaktion mit den Düngungsvarianten auf die Verarbeitungsqualität des Erntegutes zu prüfen. Untersucht wurde das Erntegut der Jahre 1993 und 1995. Auf "Ungedüngt", wo sich die NZufuhr seit langem auf den Eintrag aus der Luft (≈40 kg N ha-1 Jahr-1) beschränkt, lagen die Erträge (dem langjährigen Trend entsprechend) in diesen Jahren um 40 bzw. 48 % niedriger als auf "NPK". Ähnlich verhält es sich mit den Varianten II und VI. Bei Fruchtwechsel wurde im Mittel der Varianten ein Mehrertrag gegenüber der Selbstfolge (41,2 dt ha-1) von 9,4 dt ha-1 erzielt. In qualitativer Hinsicht bestanden zwischen den Düngungsvarianten weder im Hektolitergewicht und Tausendkorngewicht, noch in den geprüften Mahleigenschaften bemerkenswerte Unterschiede. Auch die verarbeitungstechnologischen Merkmale (Fallzahl, Verkleisterungseigenschaften der Stärke sowie Brotvolumen, Porenlockerung und Krumenelastizität des erbackenen Brotes) lassen keinen Einfluß von Düngung und Fruchtwechsel erkennen. Jahresunterschiede im Pentosangehalt, in der Fallzahl und den Verkleisterungseigenschaften der Stärke waren deutlich witterungsbedingt. Wenn die hohen düngungsbedingten Ertragsdifferenzen nur von geringen Qualitätsunterschieden begleitet waren, so steht das in Zusammenhang mit dem Fakt, daß die Ertragsunterschiede bei stabilem Tausendkorngewicht vor allem auf Veränderungen in der Kornanzahl je Fläche zurückzuführen sind.
In the long-term experiment "Eternal Rye Cropping" winter rye (Secale cereale L.) is continuously cropped on a Parabraunerde-Tschernosem derived from sandy loess since 1878. The treatments are: (I) "manure I", (II) "-PK" (III) "NPK", (IV) "NPK + manure" [since 1991, previously "N--"], (V) unfertilized", (VI) "manure II" [till 1952, then unfertilized]. After the subdivision of the initial plots (1962) rye was also cropped in rotation with potatoes. The present paper investigates the effect of crop rotation in interaction with fertilization on the processing performance of rye. Grain quality was analyzed in two years, 1993 and 1995. On the plots without any fertilization (V) where the N-input was confined to the atmogenic deposition (≈40 kg N ha-1 year-1), the yield in these years amounted (in accordance with the long-term trends) to less 40 and 48 % respectively than that on "NPK" plots. A similar response was observed with the treatments II and VI. Crop rotation incereased the grain yield on an average of all treatments by 9.4 dt ha-1 compared to continuous cropping (with 42.2 dt ha-1). With respect to quality there were no marked differences between the treatments, neither relating to the hectolitre weight and 1000 kernel weight nor to the tested milling properties. The same was true with pro-

cessing criteria of the flour (as Falling Number or pasting properties of starch) and also with the quality parameters of the baked bread (as bread volume, pore space continuity and crumb elasticity). Differences between the two years regarding pentosane content, Falling Number and pasting properties of starch have likely been caused by climatic condition. The observation that the remarkable yield differences resulting from differentiated fertilization are accompanied by only small differences in quality may be connected to the fact that these yield differences were due mainly to differences in the number of kernels per square meter without any significant change in 1000 kernel weight.
Schlüsselworte: Winterroggen, Dauerversuch, Düngung, Fruchtwechsel, Backeigenschaften
Keywords: winter rye, long term field trial, fertilization, crop rotation, baking performance

Ehrmann 2009

Otto Ehrmann, Manfred Rösch & Wolfram Schier, *Experimentelle Rekonstruktion eines jungneolithischen Wald-Feldbaus mit Feuereinsatz – ein multidisziplinäres Forschungsprojekt zur Wirtschaftsarchäologie und Landschaftsökologie*. Prähistorische Zeitschrift **84** (2009), 44–72.
Der Artikel fasst wichtige Ergebnisse eines multidisziplinären Langzeitversuchs zur Ökonomie und Ökologie eines für das Jungneolithikum Südwestdeutschlands rekonstruierten extensiven Brandfeldbaus zusammen. Über rund ein Jahrzehnt wurden frisch eingeschlagene Waldflächen mit Schwachholz überbrannt und darauf für das frühe Jungneolithikum belegtes Getreide angebaut. Im einjährigen Anbau konnten durchwegs hohe bis sehr hohe Erträge erzielt werden, während im Nachbau und auf gehackten Vergleichsflächen die Erträge, insbesondere auf Böden mittlerer und geringerer Güte, nur einen Bruchteil erreichten. Der Artikel dokumentiert die Ertragsdaten sowie ihre bodenkundlichen und agrartechnischen Rahmenbedingungen und stellt eine erste ökonometrische Gesamtbilanz des experimentellen Brandfeldbaus vor.
The article summarises the key findings of a multidisciplinary long-term experiment on the economy and ecology of extensive slash-and-burn agriculture, as reconstructed for the Upper Neolithic period in south-west Germany. For nearly a decade, forest areas were cleared and small timber was burned in preparation for grains cultivated at the beginning of the Upper Neolithic period. While it was possible to achieve high to very high yields in the first year of cultivation, in subsequent years and on reference land that had been hoed the yields were only a fraction of that, especially on soils of average or poor quality. The article documents the yields data as well as the pedological and agricultural conditions and presents the first econometric assessment of the slash-and-burn experiment.
Jungneolithikum; Brandfeldbau; experimentelle Archäologie; Wirtschaftsarchäologie; Archäobotanik; Landschaftsökologie; Agrarwissenschaft.
Néolithique récent; culture sur brûlis; archéologie expérimentale; paléoéconomie; archéobotanique; écologie du paysage; agronomie.
Upper Neolithic; slash-and-burn cultivation; experimental archaeology; economic archaeology; archaeobotany; landscape ecology; agriculture.

Story or Book

Robinson 2011

James A. Robinson, *History Strikes Back*. science **333** (2011), 525–526.
The Origins of Political Order, From Prehuman Times to the French Revolution. by Francis Fukuyama. Farrar, Straus and Giroux, New York, 2011. 601 pp. $ 35. ISBN 9780374227340.

While emphasizing adaption, Fukuyama also includes discussions of maladaption and considerations of arguments about how institutions tend to persist over time even though the circumstances that made them appropriate change. There can be no presumption that any particular change of institutions is better or worse. Ultimately, the answer to that question involves a very complex series of historical contingencies.

Fukuyama seems quite correct to grasp for this type of contingent theory, but I think he is wrong to believe that it cannot be formulated much more systematically, even mathematically. Although human society is immensely complex (as he observes), so are many physical systems. In the natural and social sciences alike, it is all a matter of getting the right abstraction. Incredibly ambitious and fun as The Origins of Political Order is, in a sense Fukuyama has not been ambitious enough. He finished too far toward the trees in the forest-trees trade-off. While there is a lot to enjoy among the trees, I hope for more forest in the next volume—which I eagerly await.