Liste erstellt am 2012-09-27

Literatur

Aktuell

Akçay 2012

Erol Akçay, Adam Meirowitz, Kristopher W. Ramsay & Simon A. Levin, *Evolution of cooperation and skew under imperfect information*. PNAS **109** (2012), 14936–14941.

The evolution of cooperation in nature and human societies depends crucially on how the benefits from cooperation are divided and whether individuals have complete information about their payoffs. We tackle these questions by adopting a methodology from economics called mechanism design. Focusing on reproductive skew as a case study,we show that full cooperation may not be achievable due to private information over individuals' outside options, regardless of the details of the specific biological or social interaction. Further, we consider how the structure of the interaction can evolve to promote the maximum amount of cooperation in the face of the informational constraints. Our results point to a distinct avenue for investigating how cooperation can evolve when the division of benefits is flexible and individuals have private information.

other-regarding preferences | social evolution | incentive compatibility | reproductive transactions | cheap-talk bargaining

Bains 2012

William Bains, *Comment on "Orthographic Processing in Baboons (Papio papio)"*. science **337** (2012), 1173.

Grainger et al. (Reports, 13 April 2012, p. 245) suggest that baboons can discriminate words from nonwords on the basis of two-letter (bigram) frequencies. This ability can also be attributed to baboons being able to recognize specific letters (i.e., shapes) in specific positions in their four-letter words, without reference to letter or bigram frequencies.

Bayon 2012

Germain Bayon, Bernard Dennielou, Joël Etoubleau, Emmanuel Ponzevera, Samuel Toucanne & Sylvain Bermell, *Response to Comments on "Intensifying Weathering and Land Use in Iron Age Central Africa"*. science **337** (2012), 1040.

Neumann et al. argue that terrestrial evidence does not support our interpretation of large-scale human land use in Central Africa about 2500 years ago and that climate was the main driver of the rainforest crisis at that time, and Maley et al. raise a number of concerns about our interpretation of data from chemical weathering proxies. Taking into account existing palaeoclimatic data and clarifying some misconceptions, we reassert that humans must also have contributed fundamentally to this large vegetation change.

To some extent, this relatively low temporal resolution (compared with terrestrial records) probably accounts for the smooth geochemical profiles in our core (1), possibly explaining why the minor millenial-scale events, which punctuated the central African climate during the Late Quaternary (e.g., at ≈8.2 kyr and 4 kyr B.P.), were not recorded at site KZAI-01. In this context, the sudden pulse of intensifying chemical weathering inferred from our sedimentary record after 3000 yr B.P., and its complete decoupling from the long-term weathering signal of the past 40,000 years, is also hard to reconcile with a "simple" climatic hypothesis.

Although the rise of Al/K ratios in core KZAI-01, initiated about 3000 years ago, coincided well with the arrival of the first Bantu-speaking farmers in Central Africa (2), we agree with Maley et al. that the Al/K decrease after 2000 yr B.P. may seem, at first glance, rather peculiar. One possible explanation for this trend actually also involves humans. Current archaeological evidence suggests that human populations in the Congo Basin crashed relatively abruptly ≈1500 years ago, resulting in widespread forest regeneration (24, 25). The observed hiatus lasted for about six centuries, before human activities started again after ≈1200 C.E. If correct, these observationswould be coherent with the observed decrease of Al/K ratios at site KZAI-01 between ≈2000 and 1400 years ago (i.e., the sediment age for the core top), which implies that forest regrowth at that time led to a decrease of soil erosion rates and chemical weathering processes in soils.

Beall 2012

Jeffrey Beall, *Predatory publishers are corrupting open access*. nature **489** (2012), 179.

Journals that exploit the author-pays model damage scholarly publishing and promote unethical behaviour by scientists, argues Jeffrey Beall.

To tackle the problem, scholars must resist the temptation to publish quickly and easily. The research community needs to use scholarly social networks such as Connotea and Mendeley to identify and share information on publishers that deceive, lack transparency or otherwise fail to follow industry standards.

Callaway 2012

Ewen Callaway, *Studies slow the human DNA clock*. nature **489** (2012), 343–344.

Revised estimates of mutation rates bring genetic accounts of human prehistory into line with archaeological data.

Although a slowed molecular clock may harmonize the story of human evolution, it does strange things when applied further back in time, says David Reich, an evolutionary geneticist at Harvard Medical School in Boston, Massachusetts. "You can't have it both ways."

Dillehay 2012

Tom D. Dillehay, *Selective complexity and adaptive mortuary behavior*. PNAS **109** (2012), 14722–14723.

Editorial 2012

Through the gaps. nature **489** (2012), 335.

A 20-year campaign of scientific fraud says as much about the research community as it does about the perpetrator. The system that allowed such deception to continue must be reformed.

It is important to note that although this latest case of fraud seems (again) to be an anomalous, extreme example involving one individual, the problems that allowed it to persist are endemic in scientific communities around the world. It is equally important to say (again) that they must be addressed in comprehensive fashion.

Goldstein 2012

Raymond E. Goldstein, Patrick B. Warren & Robin C. Ball, *Shape of a Ponytail and the Statistical Physics of Hair Fiber Bundles*. Physical Review Letters **108** (2012), 78101. DOI:10.1103/PhysRevLett.108.078101.

A general continuum theory for the distribution of hairs in a bundle is developed, treating individual fibers as elastic filaments with random intrinsic curvatures. Applying this

formalism to the iconic problem of the ponytail, the combined effects of bending elasticity, gravity, and orientational disorder are recast as a differential equation for the envelope of the bundle, in which the compressibility enters through an "equation of state." From this, we identify the balance of forces in various regions of the ponytail, extract a remarkably simple equation of state from laboratory measurements of human ponytails, and relate the pressure to the measured random curvatures of individual hairs.

Grainger 2012

Jonathan Grainger, Stéphane Dufau, Marie Montant, Johannes C. Ziegler & Joël Fagot, *Response to Comment on "Orthographic Processing in Baboons (Papio papio)"*. science **337** (2012), 1173.

Bains pointed out that some of our nonwords were in fact real words and that an algorithm using only information about single letters and their positions achieves the same level of accuracy as baboons in discriminating words from nonwords. We clarify the operational definition of words and nonwords in our study and point out possible limits of the proposed algorithm.

Maley 2012

Jean Maley, Pierre Giresse, Charles Doumenge & Charly Favier, *Comment on, "Intensifying Weathering and Land Use in Iron Age Central Africa"*. science **337** (2012), 1040.

Bayon et al. (Reports, 9 March 2012, p. 1219) claim that the "rainforest crisis" in Central Africa centered around 2500 years before the present "was not triggered by natural climatic factors" and that it was caused by widespread deforestation resulting from the arrival of the Bantu colonists. However, there is a consensus among palaeoecologists that this landscape change and the related physical erosion it caused was due mainly to a shift to more seasonal rainfall regime.

A study of the sediment fluxes of big rivers, including the Congo, concluded that "an inverse correlation between weathering intensities and suspended sediment concentrations is observed showing that the regions having the highest rates of physical denudation produce the least weathered sediments" (7). Had there been increasing deforestation and physical erosion from the Bantu expansion, less chemical weathering, not more, should have occurred. Therefore, the Bantu expansion alone cannot explain the increases in this index seen by Bayon et al.

If the authors' statement that "chemical alteration in the Congo Basin [which is confused here with Central Africa sensu lato] has responded quickly to regional climatic changes" is acceptable on the scale of 103 years, it is not acceptable on the much shorter scale of 102 years, which is that of the presumed catastrophic event of Bantu colonization. Therefore, the assertion that "an abrupt trend toward higher Al/K and Hf isotope values indicates rapidly intensifying chemical weathering ... centered at ≈2500 years B.P." seems to us exaggerated, especially when this episode is proposed to be the major weathering signal during the past 40,000 years.

Marquet 2012

Pablo A. Marquet et al., *Emergence of social complexity among coastal hunter-gatherers in the Atacama Desert of northern Chile*. PNAS **109** (2012), 14754–14760.

Pablo A. Marquet, Calogero M. Santoro, Claudio Latorre, Vivien G. Standen, Sebastián R. Abades, Marcelo M. Rivadeneira, Bernardo Arriaza and Michael E. Hochberg

The emergence of complex cultural practices in simple hunter-gatherer groups poses interesting questions on what drives social complexity and what causes the emergence and disappearance of cultural innovations. Here we analyze the conditions that underlie the

emergence of artificial mummification in the Chinchorro culture in the coastal Atacama Desert in northern Chile and southern Peru. We provide empirical and theoretical evidence that artificial mummification appeared during a period of increased coastal freshwater availability and marine productivity, which caused an increase in human population size and accelerated the emergence of cultural innovations, as predicted by recent models of cultural and technological evolution. Under a scenario of increasing population size and extreme aridity (with little or no decomposition of corpses) a simple demographic model shows that dead individuals may have become a significant part of the landscape, creating the conditions for the manipulation of the dead that led to the emergence of complex mortuary practices.
climate variability | coastal desert | cultural evolution

Mattila 2012

Anniina L. K. Mattila, Anne Duplou, Malla Kirjokanga, Rainer Lehtone, Pasi Rasta & Ilkka Hanski, *High genetic load in an old isolated butterfly population*. PNAS **109** (2012), 14744–14745.
pnas109-14744-Fulltext.pdf
We investigated inbreeding depression and genetic load in a small (Ne ≈ 100) population of the Glanville fritillary buttery (Melitaea cinxia), which has been completely isolated on a small island [Pikku Tytarsaari (PT)] in the Baltic Sea for at least 75 y. As a reference, we studied conspecific populations from the well-studied metapopulation in the Aland Islands (AL), 400 km away. A large population in Saaremaa, Estonia, was used as a reference for estimating genetic diversity and Ne. We investigated 58 traits related to behavior, development, morphology, reproductive performance, and metabolism. The PT population exhibited high genetic load (L = 1 – WPT/WAL) in a range of fitness-related traits including adult weight (L = 0.12), flight metabolic rate (L = 0.53), egg viability (L = 0.37), and lifetime production of eggs in an outdoor population cage (L = 0.70). These results imply extensive fixation of deleterious recessive mutations, supported by greatly reduced diversity in microsatellite markers and immediate recovery (heterosis) of egg viability and flight metabolic rate in crosses with other populations. There was no significant inbreeding depression in most traits due to one generation of full-sib mating. Resting metabolic rate was signicantly elevated in PT males, which may be related to their short lifespan (L = 0.25). The demographic history and the effective size of the PT population place it in the part of the parameter space in which models predict mutation accumulation. This population exemplifies the increasingly common situation in fragmented landscapes, in which small and completely isolated populations are vulnerable to extinction due to high genetic load.
fixation load | segregation load | hybrid vigor | persisting population | inbreeding avoidance

Min 2012

Kyung-Jin Min, Cheol-Koo Lee & Han-Nam Park, *The lifespan of Korean eunuchs*. Current Biology **22** (2012), R792–R793.
CurrBiol22-R792-Supplement.pdf
The average lifespan of eunuchs was 70.0 ± 1.76 years, which was 14.4–19.1 years longer than the lifespan of non-castrated men of similar socio-economic status.

Neumann 2012

K. Neumann et al., *Comment on, "Intensifying Weathering and Land Use in Iron Age Central Africa"*. science **337** (2012), 1040.
K. Neumann, M. K. H. Eggert, R. Oslisly, B. Clist, T. Denham, P. de Maret, S. Ozainne, E. Hildebrand, K. Bostoen, U. Salzmann, D. Schwartz, B. Eichhorn, B. Tchiengué, A. Höhn

Bayon et al. (Reports, 9 March 2012, p. 1219) interpreted unusually high aluminum-potassium ratio values in an Atlantic sediment core as indicating anthropogenic deforestation around 2500 years before the present (B.P.). We argue that there is no terrestrial evidence for forest destruction by humans and that the third millennium B.P. rainforest crisis can be clearly attributed mostly to climatic change.
Pollen data clearly show that expansion of this pioneer species always followed climatically induced openings of the rainforest (4, 12). Linguistic, archaeological, and archaeobotanical data are consistent with the hypothesis that the settlers took advantage of the secondary forest plant communities, which can be easily cleared and contain numerous useful tree species.

Anthropologie

Ashraf 2012

Quamrul Ashraf & Oded Galor, *The "Out of Africa" Hypothesis, Human Genetic Diversity, and Comparative Economic Development*. American Economic Review (2012) preprint, 1–109. <http://ideas.repec.org/p/bro/econwp/2010-7.html>.

This research advances and empirically establishes the hypothesis that, in the course of the prehistoric exodus of Homo sapiens out of Africa, variation in migratory distance to various settlements across the globe añected genetic diversity and has had a persistent hump-shaped –ñect on comparative economic development, reflecting the trade-oñ between the beneficial and the detrimental –ñects of diversity on productivity. While the low diversity of Native American populations and the high diversity of African populations have been detrimental for the development of these regions, the intermediate levels of diversity associated with European and Asian populations have been conducive for development.

Demeter 2012

Fabrice Demeter et al., *Anatomically modern human in Southeast Asia (Laos) by 46 ka*. PNAS **109** (2012), 14375–14380.

Fabrice Demeter, Laura L. Shackelford, Anne-Marie Bacon, Philippe Duringer, Kira Westaway, Thongsa Sayavongkhamdy, José Braga, Phonephanh Sichanthongtip, Phimmasaeng Khamdalavong, Jean-Luc Ponche, Hong Wang, Craig Lundstrom, Elise Patole-Edoumba and Anne-Marie Karpoff

Uncertainties surround the timing of modern human emergence and occupation in East and Southeast Asia. Although genetic and archeological data indicate a rapid migration out of Africa and into Southeast Asia by at least 60 ka, mainland Southeast Asia is notable for its absence of fossil evidence for early modern human occupation. Here we report on a modern human cranium from Tam Pa Ling, Laos, which was recovered from a secure stratigraphic context. Radiocarbon and luminescence dating of the surrounding sediments provide a minimum age of 51–46 ka, and direct U-dating of the bone indicates a maximum age of ≈63 ka. The cranium has a derived modern human morphology in features of the frontal, occipital, maxillae, and dentition. It is also differentiated from western Eurasian archaic humans in aspects of its temporal, occipital, and dental morphology. In the context of an increasingly documented archaic–modern morphological mosaic among the earliest modern humans in western Eurasia, Tam Pa Ling establishes a denitively modern population in Southeast Asia at ≈50 ka cal BP. As such, it provides the earliest skeletal evidence for fully modern humans in mainland Southeast Asia.
human migrations | eastern Eurasia

Gächter 2012

Simon Gächter, *A cooperative instinct*. nature **489** (2012), 374–375.
Acting on a gut feeling can sometimes lead to poor decisions. But it will usually support the common good, according to a study showing that human intuition favours cooperative, rather than selfish, behaviour.
Previous research on response time across a variety of decisions shows that people choose intuitive options more quickly than those requiring cognitive effort10, and results from a simple sharing experiment suggest that faster choices are more selfish11. However, this is not what Rand and colleagues found in their online experiments. Instead, their results indicate that contributions and decision time are negatively correlated – the faster half of the decisionmakers contributed, on average, about 67 % of their allocated resources, whereas the slower half contributed about 53 %. The authors also detected a similar relationship between response time and cooperation in experiments conducted in person, so the observed correlation seems to be robust.

Gibbons 2012

Ann Gibbons, *A Crystal-Clear View Of an Extinct Girl's Genome*. science **337** (2012), 1028–1029.
The new genome also suggests one odd result. By using the detailed Denisovan genome to sharpen the view of their close cousins the Neandertals, the team concludes that living East Asians have more Neandertal DNA than Europeans have. But most Neandertal fossils are from Europe; Klein calls the result "peculiar."

Rand 2012

David G. Rand, Joshua D. Greene & Martin A. Nowak, *Spontaneous giving and calculated greed*. nature **489** (2012), 427–430.
n489-0427-Supplement1.pdf
Cooperation is central to human social behaviour1-9. However, choosing to cooperate requires individuals to incur a personal cost to benefit others. Here we explore the cognitive basis of cooperative decision-making in humans using a dual-process framework10-18. We ask whether people are predisposed towards selfishness, behaving cooperatively only through active self-control; or whether they are intuitively cooperative, with reflection and prospective reasoning favouring 'rational' self-interest. To investigate this issue, we perform ten studies using economic games. We find that across a range of experimental designs, subjects who reach their decisions more quickly are more cooperative. Furthermore, forcing subjects to decide quickly increases contributions, whereas instructing them to reflect and forcing them to decide slowly decreases contributions. Finally, an induction that primes subjects to trust their intuitions increases contributions compared with an induction that promotes greater reflection.Toexplain these results, wepropose that cooperation is intuitive because cooperative heuristics are developed in daily life where cooperation is typically advantageous. We then validate predictions generated by this proposed mechanism. Our results provide convergent evidence that intuition supports cooperation in social dilemmas, and that reflection can undermine these cooperative impulses.

Riedl 2012

Katrin Riedl, Keith Jensen, Josep Call & Michael Tomasello, *No third-party punishment in chimpanzees*. PNAS **109** (2012), 14824–14829.
Punishment can help maintain cooperation by deterring freeriding and cheating. Of particular importance in large-scale human societies is third-party punishment in which individuals punish a transgressor or norm violator even when they themselves are not affected. Nonhuman primates and other animals aggress against conspecifics with some

regularity, but it is unclear whether this is ever aimed at punishing others for noncooperation, and whether third-party punishment occurs at all. Here we report an experimental study in which one of humans' closest living relatives, chimpanzees (Pan troglodytes), could punish an individual who stole food. Dominants retaliated when their own food was stolen, but they did not punish when the food of third-parties was stolen, even when the victim was related to them. Third-party punishment as a means of enforcing cooperation, as humans do, might therefore be a derived trait in the human lineage.
social evolution | human evolution | negative reciprocity | norm enforcement | great apes

Roffman 2012

Itai Roffman, Sue Savage-Rumbaugh, Elizabeth Rubert-Pugh, Avraham Ronen & Eviatar Nevo, *Stone tool production and utilization by bono-bo-chimpanzees (Pan paniscus)*. PNAS **109** (2012), 14500–14503.
pnas109-14500-Supplement.wmv
Using direct percussion, language-competent bonobo-chimpanzees Kanzi and Pan-Banisha produced a significantly wider variety of flint tool types than hitherto reported, and used them task-specifically to break wooden logs or to dig underground for food retrieval. For log breaking, small flakes were rotated drill-like or used as scrapers, whereas thick cortical flakes were used as axes or wedges, leaving consistent wear patterns along the glued slits, the weakest areas of the log. For digging underground, a variety of modified stone tools, as well as unmodified flint nodules, were used as shovels. Such tool production and utilization competencies reported here in Pan indicate that present-day Pan exhibits Homo-like technological competencies.
hominin | bonobo targeted tool use | stone tool wear pattern | food acquisition | bonobo survival strategy

Energie

Kumar 2008

Ashwin Kumar & M. V. Ramana, *Compromising Safety: Design Choices and Severe Accident Possibilities in India's Prototype Fast Breeder Reactor*. Science and Global Security **16** (2008), 87–114.
This article explores the safety capabilities of the 500 MWe Prototype Fast Breeder Reactor that is under construction in India, and which is to be the first of several similar reactors that are proposed to be built over the next few decades, to withstand severe accidents. Such accidents could potentially breach the reactor containment and disperse radioactivity to the environment. The potential for such accidents results from the reactor core not being in its most reactive configuration; further, when there is a loss of the coolant, the reactivity increases rather then decreasing as in the case of water-cooled reactors. The analysis demonstrates that the official safety assessments are based on assumptions about the course of accidents that are not justifiable empirically and the safety features incorporated in the current design are not adequate to deal with the range of accidents that are possible.

Klima

Aragão 2012

Luiz E. O. C. Aragão, *The rainforest's water pump*. nature **489** (2012), 217–218.

An investigation of naturally occurring water recycling in rainforests finally marries the results of global climate models with observations. Alarmingly, it also suggests that deforestation can greatly reduce tropical rainfall.

Hansen 2012

James Hansen, Makiko Sato & Reto Ruedy, *Perception of climate change*. PNAS **109** (2012), 14726–14727.

pnas109-14726-Fulltext.pdf

"Climate dice," describing the chance of unusually warm or cool seasons, have become more and more "loaded" in the past 30 y, coincident with rapid global warming. The distribution of seasonal mean temperature anomalies has shifted toward higher temperatures and the range of anomalies has increased. An important change is the emergence of a category of summertime extremely hot outliers, more than three standard deviations (3σ) warmer than the climatology of the 1951–1980 base period. This hot extreme, which covered much less than 1 % of Earth's surface during the base period, now typically covers about 10 % of the land area. It follows that we can state, with a high degree of confidence, that extreme anomalies such as those in Texas and Oklahoma in 2011 and Moscow in 2010 were a consequence of global warming because their likelihood in the absence of global warming was exceedingly small. Wediscuss practical implications of this substantial, growing, climate change.

climate impacts | climate anomalies | heat waves

Karl 2012

Thomas R. Karl & Richard W. Katz, *A new face for climate dice*. PNAS **109** (2012), 14720–14721.

North 2012

Gerald R. North, *Apportioning natural and forced components in climate change*. PNAS **109** (2012), 14285–14286.

Schmidt 2012

Matthew W. Schmidt, Ping Chang, Jennifer E. Hertzberg, Theodore R. Them II, Link J & Bette L. Otto-Bliesner, *Impact of abrupt deglacial climate change on tropical Atlantic subsurface temperatures*. PNAS **109** (2012), 14348–14352.

Both instrumental data analyses and coupled ocean-atmosphere models indicate that Atlantic meridional overturning circulation (AMOC) variability is tightly linked to abrupt tropical North Atlantic (TNA) climate change through both atmospheric and oceanic processes. Although a slowdown of AMOC results in an atmosphericinduced surface cooling in the entire TNA, the subsurface experiences an even larger warming because of rapid reorganizations of ocean circulation patterns at intermediate water depths. Here, we reconstruct high-resolution temperature records using oxygen isotope values and Mg/Ca ratios in both surface- and subthermoclinedwelling planktonic foraminifera from a sediment core located in the TNA over the last 22 ky. Our results show significant changes in the vertical thermal gradient of the upper water column, with the warmest subsurface temperatures of the last deglacial transition corresponding to the onset of the Younger Dryas. Furthermore, we present new analyses of a climate model simulation forced with freshwater discharge into the North Atlantic under Last Glacial Maximum forcings and boundary conditions that reveal a maximum subsurface warming in the vicinity of the core site and a vertical thermal gradient change at the onset of AMOC weakening, consistent with the reconstructed record. Together, our proxy reconstructions and modeling results provide convincing evidence for a subsurface oceanic teleconnection

linking high-latitude North Atlantic climate to the tropical Atlantic during periods of reduced AMOC across the last deglacial transition.
Mg/Ca paleothermometry | paleoclimate modeling | Bonaire Basin | Heinrich Event | sea surface temperature

Sirocko 2012

Frank Sirocko, Heiko Brunck & Stephan Pfahl, *Solar influence on winter severity in central Europe*. Geophysical Research Letters **39** (2012), L16704. DOI:10.1029/2012GL052412.

The last two winters in central Europe were unusually cold in comparison to the years before. Meteorological data, mainly from the last 50 years, and modelling studies have suggested that both solar activity and El Niño strength may influence such central European winter coldness. To investigate the mechanisms behind this in a statistically robust way and to test which of the two factors was more important during the last 230 years back into the Little Ice Age, we use historical reports of freezing of the river Rhine. The historical data show that 10 of the 14 freeze years occurred close to sunspot minima and only one during a year of moderate El Niño. This solar influence is underpinned by corresponding atmospheric circulation anomalies in reanalysis data covering the period 1871 to 2008. Accordingly, weak solar activity is empirically related to extremely cold winter conditions in Europe also on such long time scales. This relationship still holds today, however the average winter temperatures have been rising during the last decades.

Spracklen 2012

D. V. Spracklen, S. R. Arnold & C. M. Taylor, *Observations of increased tropical rainfall preceded by air passage over forests*. nature **489** (2012), 282–285.

n489-0282-Supplement.pdf

Vegetation affects precipitation patterns by mediating moisture, energy and trace-gas fluxes between the surface and atmosphere1. When forests are replaced by pasture or crops, evapotranspiration of moisture from soil and vegetation is often diminished, leading to reduced atmospheric humidity and potentially suppressing precipitation2,3. Climate models predict that large-scale tropical deforestation causes reduced regional precipitation4-10, although the magnitude of the effect is model9,11 and resolution8 dependent. In contrast, observational studies have linked deforestation to increased precipitation locally12-14 but have been unable to explore the impact of large-scale deforestation. Here we use satellite remote-sensing data of tropical precipitation and vegetation, combined with simulated atmospheric transport patterns, to assess the pan-tropical effect of forests on tropical rainfall. We find that for more than 60 per cent of the tropical land surface (latitudes 30 degrees south to 30 degrees north), air that has passed over extensive vegetation in the preceding few days produces at least twice as much rain as air that has passed over little vegetation. We demonstrate that this empirical correlation is consistent with evapotranspiration maintaining atmospheric moisture in air that passes over extensive vegetation. We combine these empirical relationships with current trends of Amazonian deforestation to estimate reductions of 12 and 21 per cent in wet-season and dry-season precipitation respectively across the Amazon basin by 2050, due to less-efficient moisture recycling. Our observation-based results complement similar estimates from climate models4-10, in which the physical mechanisms and feedbacks at work could be explored in more detail.

Taylor 2012

Christopher M. Taylor, Richard A. M. de Jeu, Françoise Guichard, Phil P. Harris & Wouter A. Dorigo, *Afternoon rain more likely over drier soils*. nature **489** (2012), 423–426.

n489-0423-Supplement1.pdf, n489-0423-Supplement2.zip
Land surface properties, such as vegetation cover and soil moisture, influence the partitioning of radiative energy between latent and sensible heat fluxes in daytime hours.During dry periods, soil-water deficit can limit evapotranspiration, leading to warmer and drier conditions in the lower atmosphere1,2. Soil moisture can influence the development of convective storms through suchmodifications of low-level atmospheric temperature and humidity1,3, which in turn feeds back on soilmoisture. Yet there is considerable uncertainty in how soil moisture affects convective storms across the world, owing to a lack of observational evidence and uncertainty in large-scale models4. Here we present a global-scale observational analysis of the coupling between soil moisture and precipitation. We show that across all six continents studied, afternoon rain falls preferentially over soils that are relatively dry compared to the surrounding area. The signal emerges most clearly in the observations over semi-arid regions, where surface fluxes are sensitive to soil moisture, and con- vective events are frequent. Mechanistically, our results are consistent with enhanced afternoon moist convection driven by increased sensible heat flux over drier soils, and/or mesoscale variability in soil moisture. We find no evidence in our analysis of a positive feedback-that is, a preference for rain over wetter soils-at the spatial scale (50-100 kilometres) studied. In contrast, we find that a positive feedback of soilmoisture on simulated precipitation does dominate in six state-of-the-art global weather and climatemodels—a difference that may contribute to excessive simulated droughts in large-scale models.

Wallace 2012

John M. Wallace, Qiang Fu, Brian V. Smoliak, Pu Lin & Celeste M. Johanson, *Simulated versus observed patterns of warming over the extratropical Northern Hemisphere continents during the cold season*. PNAS **109** (2012), 14337–14342.

A suite of the historical simulations run with the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC AR4) models forced by greenhouse gases, aerosols, stratospheric ozone depletion, and volcanic eruptions and a second suite of simulations forced by increasing CO2 concentrations alone are compared with observations for the reference interval 1965–2000. Surface air temperature trends are disaggregated by boreal cold (November-April) versus warm (May-October) seasons and by high latitude northern (N: 40°–90 °N) versus southern (S: 60 °S–40 °N) domains. A dynamical adjustment is applied to remove the component of the cold-season surface air temperature trends (over land areas poleward of 40 °N) that are attributable to changing atmospheric circulation patterns. The model simulations do not simulate the full extent of the wintertime warming over the high-latitude Northern Hemisphere continents during the later 20th century, much of which was dynamically induced. Expressed as fractions of the concurrent trend in global-mean sea surface temperature, the relative magnitude of the dynamically induced wintertime warming over domain N in the observations, the simulations with multiple forcings, and the runs forced by the buildup of greenhouse gases only is 7°2°1, and roughly comparable to the relative magnitude of the concurrent sea-level pressure trends. These results support the notion that the enhanced wintertime warming over high northern latitudes from 1965 to 2000 was mainly a reflection of unforced variability of the coupled climate system. Some of the simulations exhibit an enhancement of the warming along the Arctic coast, suggestive of exaggerated feedbacks.

spatial patterns of warming | climate model diagnostics | dynamically-induced warming | polar amplification

The AR4 models exhibit enhanced warming along the coast of the Arctic poleward of 65 °N that is not evident in the observations. This distinctive spatial signature is a prominent feature in both the historical simulations examined in this paper and in the climate projections for the 21st century (figures 10.8 and 10.9 in ref. (2)) and the IPCC Third

Assessment Report (figure 9.10 in ref. (15)). That it is common to the runs with multiple forcings (Fig. 2) and to the runs with CO2 forcing only (Fig. 5) indicates that it cannot have been induced by the seasonality in the simulated aerosols. That it is confined so close to the Arctic coast is suggestive of a localized amplification of the warming by feedbacks operating during the cold season that are overemphasized in the AR4 models.

Kultur

Dediu 2012

Dan Dediu & Stephen C. Levinson, *Abstract Profiles of Structural Stability Point to Universal Tendencies, Family-Specific Factors, and Ancient Connections between Languages.* PLoS ONE **7** (2012), e45198. DOI:10.1371/journal.pone.0045198.

pone07-e45198-Supplement1.pdf

Language is the best example of a cultural evolutionary system, able to retain a phylogenetic signal over many thousands of years. The temporal stability (conservatism) of basic vocabulary is relatively well understood, but the stability of the structural properties of language (phonology, morphology, syntax) is still unclear. Here we report an extensive Bayesian phylogenetic investigation of the structural stability of numerous features across many language families and we introduce a novel method for analyzing the relationships between the "stability profiles" of language families. We found that there is a strong universal component across language families, suggesting the existence of universal linguistic, cognitive and genetic constraints. Against this background, however, each language family has a distinct stability profile, and these profiles cluster by geographic area and likely deep genealogical relationships. These stability profiles seem to show, for example, the ancient historical relationships between the Siberian and American language families, presumed to be separated by at least 12,000 years, and possible connections between the Eurasian families. We also found preliminary support for the punctuated evolution of structural features of language across families, types of features and geographic areas. Thus, such higher-level properties of language seen as an evolutionary system might allow the investigation of ancient connections between languages and shed light on the peopling of the world.

Moorjani 2011

Priya Moorjani et al., *The History of African Gene Flow into Southern Europeans, Levantines, and Jews.* PLoS Genetics **7** (2011), iv, e1001373. DOI:10.1371/journal.pgen.1001373.

Priya Moorjani, Nick Patterson, Joel N. Hirschhorn, Alon Keinan, Li Hao, Gil Atzmon, Edward Burns, Harry Ostrer, Alkes L. Price, David Reich

Previous genetic studies have suggested a history of sub-Saharan African gene flow into some West Eurasian populations after the initial dispersal out of Africa that occurred at least 45,000 years ago. However, there has been no accurate characterization of the proportion of mixture, or of its date. We analyze genome-wide polymorphism data from about 40 West Eurasian groups to show that almost all Southern Europeans have inherited 1 %-3 % African ancestry with an average mixture date of around 55 generations ago, consistent with North African gene flow at the end of the Roman Empire and subsequent Arab migrations. Levantine groups harbor 4 %-15 % African ancestry with an average mixture date of about 32 generations ago, consistent with close political, economic, and cultural links with Egypt in the late middle ages. We also detect 3 %-5 % sub-Saharan African ancestry in all eight of the diverse Jewish populations that we analyzed. For the Jewish admixture, we obtain an average estimated date of about 72 generations. This

may reflect descent of these groups from a common ancestral population that already had some African ancestry prior to the Jewish Diasporas.

Methoden

Dyson 2004

Freeman Dyson, *A meeting with Enrico Fermi, How one intuitive physicist rescued a team from fruitless research.* nature **427** (2004), 297.

In desperation I asked Fermi whether he was not impressed by the agreement between our calculated numbers and his measured numbers. He replied, "How many arbitrary parameters did you use for your calculations?" I thought for a moment about our cut-off procedures and said, "Four." He said, "I remember my friend Johnny von Neumann used to say, with four parameters I can fit an elephant, and with five I can make him wiggle his trunk." With that, the conversation was over.

Neolithikum

Bernardini 2012

Federico Bernardini et al., *Beeswax as Dental Filling on a Neolithic Human Tooth.* PLoS ONE **7** (2012), e44904. DOI:10.1371/journal.pone.0044904.

Federico Bernardini, Claudio Tuniz, Alfredo Coppa, Lucia Mancini, Diego Dreossi, Diane Eichert, Gianluca Turco, Matteo Biasotto, Filippo Terrasi, Nicola De Cesare, Quan Hua, Vladimir Levchenko

Evidence of prehistoric dentistry has been limited to a few cases, the most ancient dating back to the Neolithic. Here we report a 6500-year-old human mandible from Slovenia whose left canine crown bears the traces of a filling with beeswax. The use of different analytical techniques, including synchrotron radiation computed micro-tomography (micro-CT), Accelerator Mass Spectrometry (AMS) radiocarbon dating, Infrared (IR) Spectroscopy and Scanning Electron Microscopy (SEM), has shown that the exposed area of dentine resulting from occlusal wear and the upper part of a vertical crack affecting enamel and dentin tissues were filled with beeswax shortly before or after the individual's death. If the filling was done when the person was still alive, the intervention was likely aimed to relieve tooth sensitivity derived from either exposed dentine and/or the pain resulting from chewing on a cracked tooth: this would provide the earliest known direct evidence of therapeutic-palliative dental filling.

Physik

Ramirez 2012

E. Minaya Ramirez et al., *Direct Mapping of Nuclear Shell Effects in the Heaviest Elements.* science **337** (2012), 1207–1210.

E. Minaya Ramirez, D. Ackermann, K. Blaum, M. Block, C. Droese, Ch. E. Düllmann, M. Dworschak, M. Eibach, S. Eliseev, E. Haettner, F. Herfurth, F. P. Heßberger, S. Hofmann, J. Ketelaer, G. Marx, M. Mazzocco, D. Nesterenko, Yu. N. Novikov, W. R. Plaß, D. Rodríguez, C. Scheidenberger, L. Schweikhard & P. G. Thirolf, C. Weber

Quantum-mechanical shell effects are expected to strongly enhance nuclear binding on an "island of stability" of superheavy elements. The predicted center at proton number Z = 114, 120, or 126 and neutron number N = 184 has been substantiated by the recent synthesis of new elements up to Z = 118. However, the location of the center and the extension of the island of stability remain vague. High-precision mass spectrometry

allows the direct measurement of nuclear binding energies and thus the determination of the strength of shell effects. Here, we present such measurements for nobelium and lawrencium isotopes, which also pin down the deformed shell gap at N = 152.

Story or Book

Gilbey 2012

John Gilbey, *Communicant*, *The ties that bind*. nature **489** (2012), 330.

Having worked in the industry for years, I know just what happens when you are working against a wildly optimistic deadline with a microscopic budget – and that isn't the sort of code I want plumbed permanently into my nervous system, even if it does mean I can read my e-mail while walking down the street.

Griss 2012

Rudolf Griss, *A Creation Story for Humanity*. science **337** (2012), 1041.

The Social Conquest of Earth. by Edward O. Wilson. Liveright (Norton), New York, 2012. 341 pp. $27.95, C$29.50, £18.99. ISBN 9780871404138.

Multilevel selection—the interplay between individual and group selection—provides the foundation for most of Wilson's explorations in the book. For example, he holds that it created the human dilemma of good and evil: Individual selection is responsible for the evil; within a group, selfish individuals win. But their success is countered by group selection, which is responsible for the good; a group of cooperating individuals wins against a group with selfish members. Humans are thus pulled toward selfishness by individual selection and toward altruism by group selection-destined to always be torn between the two sides.

Marks 2012

Jonathan Marks, *Making Race Without Racism?* science **337** (2012), 1174–1175.

Race Decoded. The Genomic Fight for Social Justice. by Catherine Bliss. Stanford University Press, Stanford, CA, 2012. 279 pp. $85. ISBN 9780804774079. Paper, $24.95. ISBN 9780804774086.

Catherine Bliss's Race Decoded begins with a paradox. Announcing the completion of the first human genome sequence in 2000, the leaders of the Human Genome Project declared that they had shown that race has no biological reality. But within a few years, race had become a centerpiece of human genomics. So, how did this "flip-flop" come to pass, and how do researchers in the field navigate this apparent contradiction, now often fundamental to their research?

Zhao 2012

Buyun Zhao, *The Source of Our Morality*. science **337** (2012), 1042.

Moral Origins. The Evolution of Virtue, Altruism, and Shame. by Christopher Boehm. Basic Books, New York, 2012. 426 pp. $28.99, C$33.50, £18.99. ISBN 9780465020485.

However, Boehm tactfully argues that understanding the rules of the social game should precede its true emotional internalization. He suggests that our conscience arose merely as a "Machiavellian risk calculator"—a process of thoughts that conceptualizes the game theory of prohibitive punishment costs versus defection benefits. This seems to me the most persuasive description of the emergence of conscience yet.

The book's greatest value lies in its elegant naturalistic explanation for morality, which dovetails Darwinian history with philosophy. Walking a fine line between loquacious charm and critical finesse, Boehm provides a stimulating account infused with probing thought experiments and open questions.