Liste erstellt am 2017-06-25

References

Aktuell

Jokela 2017

Markus Jokela, Tuomas Pekkarinen, Matti Sarvimäki,c, Marko Terviö & Roope Uusitalo, *Secular rise in economically valuable personality traits*. PNAS **114** (2017), 6527–6532.

Although trends in many physical characteristics and cognitive capabilities of modern humans are well-documented, less is known about how personality traits have evolved over time. We analyze data from a standardized personality test administered to 79 % of Finnish men born between 1962 and 1976 (n = 419,523) and find steady increases in personality traits that predict higher income in later life. The magnitudes of these trends are similar to the simultaneous increase in cognitive abilities, at 0.2–0.6 SD during the 15-y window. When anchored to earnings, the change in personality traits amounts to a 12 % increase. Both personality and cognitive ability have consistent associations with family background, but the trends are similar across groups defined by parental income, parental education, number of siblings, and rural/ urban status. Nevertheless, much of the trends in test scores can be attributed to changes in the family background composition, namely 33 % for personality and 64 % for cognitive ability. These composition effects are mostly due to improvements in parents' education. We conclude that there is a "Flynn effect" for personality that mirrors the original Flynn effect for cognitive ability in magnitude and practical significance but is less driven by compositional changes in family background.

Keywords: personality traits | cognitive ability | cohort effects | earnings | Flynn effect

Significance: The secular rise in intelligence across birth cohorts is one of the most widely documented facts in psychology. This finding is important because intelligence is a key predictor of many outcomes such as education, occupation, and income. Although noncognitive skills may be equally important, there is little evidence on the long-term trends in noncognitive skills due to lack of data on consistently measured noncognitive skills of representative populations of successive cohorts. Using test score data based on an unchanged test taken by the population of Finnish military conscripts, we find steady positive trends in personality traits that are associated with high income. These trends are similar in magnitude and economic importance to the simultaneous rise in intelligence.

Notaras 2017

Michael Notaras, *Stressing mental health*. science **356** (2017), 878.

It was close to midnight and I was compiling my data on the long-term effects of stress hormones on the mouse brain. Like many scientists, I often found myself working late, so this day during the second year of my Ph.D. didn't seem all that unusual—except that it was Christmas. For the first time, I wondered whether there was a connection between my everyday life and my research topic. Many of my friends and family members who don't work in science were already worried that my long and unpredictable hours could have health implications. Upon reflection, I realized that this was the second year in a row that I had worked on Christmas Day, so maybe they had a point. But I felt fine, so why should I worry? I had work to do.

I began to recognize that, just as chronic stress modified the brains and behavior of my mice, my peers were experiencing something similar. We tended to refer to these changes—which included feeling downtrodden and anxious, withdrawing from social activities, and losing much of our enthusiasm for science—as the "third-year blues," which made them seem expected and even normal.

Ottoni 2017

Claudio Ottoni et al., *The palaeogenetics of cat dispersal in the ancient world*. Nature Ecology & Evolution **1** (2017), 139, 1–7.

Claudio Ottoni, Wim Van Neer, Bea De Cupere, Julien Daligault, Silvia Guimaraes, Joris Peters, Nikolai Spassov, Mary E. Prendergast, Nicole Boivin, Arturo Morales-Muñiz, Adrian Balasescu, Cornelia Becker, Norbert Benecke, Adina Boroneant, Hijlke Buitenhuis, Jwana Chahoud, Alison Crowther, Laura Llorente, Nina Manaseryan, Hervé Monchot, Vedat Onar, Marta Osypinska, Olivier Putelat, Eréndira M. Quintana Morales, Jacqueline Studer, Ursula Wierer, Ronny Decorte, Thierry Grange & Eva-Maria Geigl

The cat has long been important to human societies as a pest-control agent, object of symbolic value and companion animal, but little is known about its domestication process and early anthropogenic dispersal. Here we show, using ancient DNA analysis of geographically and temporally widespread archaeological cat remains, that both the Near Eastern and Egyptian populations of Felis silvestris lybica contributed to the gene pool of the domestic cat at different historical times. While the cat's worldwide conquest began during the Neolithic period in the Near East, its dispersal gained momentum during the Classical period, when the Egyptian cat successfully spread throughout the Old World. The expansion patterns and ranges suggest dispersal along human maritime and terrestrial routes of trade and connectivity. A coat-colour variant was found at high frequency only after the Middle Ages, suggesting that directed breeding of cats occurred later than with most other domesticated animals.

Voigt 2017

Rob Voigt et al., *Language from police body camera footage shows racial disparities in officer respect*. PNAS **114** (2017), 6521–6526.

Rob Voigt, Nicholas P. Camp, Vinodkumar Prabhakaran, William L. Hamilton, Rebecca C. Hetey, Camilla M. Griffiths, David Jurgens, Dan Jurafsky & Jennifer L. Eberhardt

Using footage from body-worn cameras, we analyze the respectfulness of police officer language toward white and black community members during routine traffic stops. We develop computational linguistic methods that extract levels of respect automatically from transcripts, informed by a thin-slicing study of participant ratings of officer utterances. We find that officers speak with consistently less respect toward black versus white community members, even after controlling for the race of the officer, the severity of the infraction, the location of the stop, and the outcome of the stop. Such disparities in common, everyday interactions between police and the communities they serve have important implications for procedural justice and the building of police–community trust.

Keywords: racial disparities | natural language processing | procedural justice | traffic stops | policing

Significance: Police officers speak significantly less respectfully to black than to white community members in everyday traffic stops, even after controlling for officer race, infraction severity, stop location, and stop outcome. This paper presents a systematic analysis of officer body-worn camera footage, using computational linguistic techniques to automatically measure the respect level that officers display

to community members. This work demonstrates that body camera footage can be used as a rich source of data rather than merely archival evidence, and paves the way for developing powerful languagebased tools for studying and potentially improving police– community relations.

Biologie

Murphy 2017

Michael L. M. Murphy, Sheldon Cohen, Denise Janicki-Deverts & William J. Doyle, *Offspring of parents who were separated and not speaking to one another have reduced resistance to the common cold as adults*. PNAS **114** (2017), 6515–6520.

Exposure to parental separation or divorce during childhood has been associated with an increased risk for physical morbidity during adulthood. Here we tested the hypothesis that this association is primarily attributable to separated parents who do not communicate with each other. We also examined whether early exposure to separated parents in conflict is associated with greater viral-induced inflammatory response in adulthood and in turn with increased susceptibility to viral-induced upper respiratory disease. After assessment of their parents' relationship during their childhood, 201 healthy volunteers, age 18–55 y, were quarantined, experimentally exposed to a virus that causes a common cold, and monitored for 5 d for the development of a respiratory illness. Monitoring included daily assessments of viral-specific infection, objective markers of illness, and local production of proinflammatory cytokines. Adults whose parents lived apart and never spoke during their childhood were more than three times as likely to develop a cold when exposed to the upper respiratory virus than adults from intact families. Conversely, individuals whose parents were separated but communicated with each other showed no increase in risk compared with those from intact families. These differences persisted in analyses adjusted for potentially confounding variables (demographics, current socioeconomic status, body mass index, season, baseline immunity to the challenge virus, affectivity, and childhood socioeconomic status). Mediation analyses were consistent with the hypothesis that greater susceptibility to respiratory infectious illness among the offspring of noncommunicating parents was attributable to a greater local proinflammatory response to infection.

Keywords: parental divorce | childhood adversity | adult health | cold susceptibility | inflammation

Significance: Adults whose parents separated during childhood are at increased risk for poorer health, although the underlying mechanisms remain unclear. Furthermore, increasing evidence suggests that aspects of the family environment following parental separation better predict a child's adjustment than the separation itself. Using a viral challenge study, we found that adults whose parents separated but remained on speaking terms during childhood were no more likely to develop a cold when exposed to a cold-causing virus than adults from intact childhood families. However, adults whose parents separated and did not speak to each other during childhood were more than three times as likely to develop a cold following viral exposure. This increased risk was attributed to heightened inflammation in response to infection.

Piperno 2017

Dolores R. Piperno, *Assessing elements of an extended evolutionary synthesis for plant domestication and agricultural origin research*. PNAS **114** (2017), 6429–6437.

The development of agricultural societies, one of the most transformative events in human and ecological history, was made possible by plant and animal domestication. Plant domestication began 12,000–10,000 y ago in a number of major world areas, including the New World tropics, Southwest Asia, and China, during a period of profound global environmental perturbations as the Pleistocene epoch ended and transitioned into the Holocene. Domestication is at its heart an evolutionary process, and for many prehistorians evolutionary theory has been foundational in investigating agricultural origins. Similarly, geneticists working largely with modern crops and their living wild progenitors have documented some of the mechanisms that underwrote phenotypic transformations from wild to domesticated species. Everimproving analytic methods for retrieval of empirical data from archaeological sites, together with advances in genetic, genomic, epigenetic, and experimental research on living crop plants and wild progenitors, suggest that three fields of study currently little applied to plant domestication processes may be necessary to understand these transformations across a range of species important in early prehistoric agriculture. These fields are phenotypic (developmental) plasticity, niche construction theory, and epigenetics with transgenerational epigenetic inheritance. All are central in a controversy about whether an Extended Evolutionary Synthesis is needed to reconceptualize how evolutionary change occurs. An exploration of their present and potential utility in domestication study shows that all three fields have considerable promise in elucidating important issues in plant domestication and in agricultural origin and dispersal research and should be increasingly applied to these issues.

Keywords: plant domestication | agricultural origins | agricultural dispersals | extended evolutionary synthesis

Datierung

Wilding 1967

L. P. Wilding, *Radiocarbon Dating of Biogenetic Opal*. science **156** (1967), 66–67.

Approximately 75 grams of biogenetic opal were isolated from 45 kilograms of soil by employing gross particle-size and sink-float specific gravity fractionation procedures. After pretreatment of the sample to remove extraneous organic and inorganic carbon contaminants, the carbon occluded within opal phytoliths was dated at $13{,}300 \pm 450$ years before the present. Therefore, biogenetic opal is stable for relatively long periods.

Zuo 2017

Xinxin Zuo, Houyuan Lu, Leping Jiang, Jianping Zhang, Xiaoyan Yang, Xiujia Huan, Keyang He, Can Wang & Naiqin Wu, *Dating rice remains through phytolith carbon-14 study reveals domestication at the beginning of the Holocene*. PNAS **114** (2017), 6486–6491.

Phytolith remains of rice (Oryza sativa L.) recovered from the Shangshan site in the Lower Yangtze of China have previously been recognized as the earliest examples of rice cultivation. However, because of the poor preservation of macroplant fossils, many radiocarbon dates were derived from undifferentiated organic materials in pottery sherds. These materials remain a source of debate because of potential contamination by old carbon. Direct dating of the rice remains might serve to clarify their age. Here, we first validate the reliability of phytolith dating in the study region through a comparison with dates obtained from other material from the same layer or context. Our phytolith data indicate that rice remains

retrieved from early stages of the Shangshan and Hehuashan sites have ages of approximately 9,400 and 9,000 calibrated years before the present, respectively. The morphology of rice bulliform phytoliths indicates they are closer to modern domesticated species than to wild species, suggesting that rice domestication may have begun at Shangshan during the beginning of the Holocene.

Keywords: rice domestication | radiocarbon dating | Shangshan | chronology | phytolith-occluded carbon

Significance: When the domestication of rice began in its homeland, China, is an enduring and important issue of debate for researchers from many different disciplines. Reliable chronological and robust identification criteria for rice domestication are keys to understanding the issue. Here, we first use phytolith dating to constrain the initial occupation of Shangshan, an important site with early rice remains located in the Lower Yangtze region of China. We then identify the rice phytoliths of Shangshan as partly domesticated based on their morphological characteristics. The results indicate that rice domestication may have begun at Shangshan in the Lower Yangtze during the beginning of the Holocene.

Mathematik Klima

Defrance 2017

Dimitri Defrance et al., *Consequences of rapid ice sheet melting on the Sahelian population vulnerability*. PNAS **114** (2017), 6533–6538.

Dimitri Defrance, Gilles Ramstein, Sylvie Charbit, Mathieu Vrac, Adjoua Moïse Famien, Benjamin Sultan, Didier Swingedouw, Christophe Dumas, François Gemenne, Jorge Alvarez-Solas & Jean-Paul Vanderlinden

The acceleration of ice sheet melting has been observed over the last few decades. Recent observations and modeling studies have suggested that the ice sheet contribution to future sea level rise could have been underestimated in the latest Intergovernmental Panel on Climate Change report. The ensuing freshwater discharge coming from ice sheets could have significant impacts on global climate, and especially on the vulnerable tropical areas. During the last glacial/deglacial period, megadrought episodes were observed in the Sahel region at the time of massive iceberg surges, leading to large freshwater discharges. In the future, such episodes have the potential to induce a drastic destabilization of the Sahelian agroecosystem. Using a climate modeling approach, we investigate this issue by superimposing on the Representative Concentration Pathways 8.5 (RCP8.5) baseline experiment a Greenland flash melting scenario corresponding to an additional sea level rise ranging from 0.5 m to 3 m. Our model response to freshwater discharge coming from Greenland melting reveals a significant decrease of the West African monsoon rainfall, leading to changes in agricultural practices. Combined with a strong population increase, described by different demography projections, important human migration flows could be potentially induced. We estimate that, without any adaptation measures, tens to hundreds million people could be forced to leave the Sahel by the end of this century. On top of this quantification, the sea level rise impact over coastal areas has to be superimposed, implying that the Sahel population could be strongly at threat in case of rapid Greenland melting.

Keywords: climate change | ice sheet melting | impact | vulnerability | Sahel

Significance: A major uncertainty concerning the 21st century climate is the ice sheet response to global warming. Paleodata indicate rapid ice sheet destabilizations during the last deglaciation, which could lead to an underestimation of sea level rise, as suggested in recent publications. Therefore, we explore the impact of different scenarios of Greenland partial melting in the very sensitive Sahel region. We first demonstrate that such a melting induces a drastic decrease of West

African monsoon precipitation. Moreover, we quantify the agricultural area losses due to monsoon changes. Consequently, we pinpoint a large potential for migration of millions of people in the coming decades. Thus, the ice sheet destabilization provokes not only coastal damages but also large population migration in monsoon area.

Mathematik Kultur

Lansing 2017

J. Stephen Lansing et al., *Adaptive self-organization of Bali's ancient rice terraces*. PNAS **114** (2017), 6504–6509.

J. Stephen Lansing, Stefan Thurner, Ning Ning Chung, Aurélie Coudurier-Curveur, Çağil Karakaş, Kurt A. Fesenmyer & Lock Yue Chew

Spatial patterning often occurs in ecosystems as a result of a selforganizing process caused by feedback between organisms and the physical environment. Here, we show that the spatial patterns observable in centuries-old Balinese rice terraces are also created by feedback between farmers' decisions and the ecology of the paddies, which triggers a transition from local to globalscale control of water shortages and rice pests. We propose an evolutionary game, based on local farmers' decisions that predicts specific power laws in spatial patterning that are also seen in a multispectral image analysis of Balinese rice terraces. The model shows how feedbacks between human decisions and ecosystem processes can evolve toward an optimal state in which total harvests are maximized and the system approaches Pareto optimality. It helps explain how multiscale cooperation from the community to the watershed scale could persist for centuries, and why the disruption of this self-organizing system by the Green Revolution caused chaos in irrigation and devastating losses from pests. The model shows that adaptation in a coupled human–natural system can trigger self-organized criticality (SOC). In previous exogenously driven SOC models, adaptation plays no role, and no optimization occurs. In contrast, adaptive SOC is a self-organizing process where local adaptations drive the system toward local and global optima.

Keywords: self-organization | criticality | irrigation | evolutionary games | Pareto optimality

Significance: In Bali, the cooperative management of rice terraces extends beyond villages to whole watersheds. To understand why, we created a model that explores how cooperation can propagate from pairs of individuals to extended groups, creating a resilient system of bottom-up management that both increases and equalizes harvests. Spatial patterns of collective crop management—observable in Google Earth—closely match the predictions of the model. The spatial patterning that emerges is nonuniform and scale-free. Although the model parameters here are tuned to Bali, similar mechanisms of emergent global control should be detectible in other anthropogenic landscapes using multispectral imagery. Recognizing this signature of emergent system-wide cooperation may help planners to avoid unproductive changes to successful bottom-up systems of environmental management.

Physik

Aharonov 2017

Yakir Aharonov, Eliahu Cohen, Fabrizio Colombo, Tomer Landsberger, Irene Sabadini, Daniele C. Struppa & Jeff Tollaksen, *Finally making sense of the double-slit experiment*. PNAS **114** (2017), 6480–6485.

Feynman stated that the double-slit experiment "... has in it the heart of quantum mechanics. In reality, it contains the only mystery" and that "nobody can give you a deeper explanation of this phenomenon than I have given; that is, a description of it" [Feynman R, Leighton R, Sands M (1965) The Feynman Lectures on Physics]. We rise to the challenge with an alternative to the wave function-centered interpretations: instead of a quantum wave passing through both slits, we have a localized particle with nonlocal interactions with the other slit. Key to this explanation is dynamical nonlocality, which naturally appears in the Heisenberg picture as nonlocal equations of motion. This insight led us to develop an approach to quantum mechanics which relies on preand postselection, weak measurements, deterministic, and modular variables. We consider those properties of a single particle that are deterministic to be primal. The Heisenberg picture allows us to specify the most complete enumeration of such deterministic properties in contrast to the Schr ¿ odinger wave function, which remains an ensemble property. We exercise this approach by analyzing a version of the double-slit experiment augmented with postselection, showing that only it and not the wave function approach can be accommodated within a time-symmetric interpretation, where interference appears even when the particle is localized. Although the Heisenberg and Schr ¿ odinger pictures are equivalent formulations, nevertheless, the framework presented here has led to insights, intuitions, and experiments that were missed from the old perspective.

Keywords: Heisenberg picture | two-state vector formalism | modular momentum | double slit experiment

Significance: We put forth a time-symmetric interpretation of quantum mechanics that does not stem from the wave properties of the particle. Rather, it posits corpuscular properties along with nonlocal properties, all of which are deterministic. This change of perspective points to deterministic properties in the Heisenberg picture as primitive instead of the wave function, which remains an ensemble property. This way, within a double-slit experiment, the particle goes only through one of the slits. In addition, a nonlocal property originating from the other distant slit has been affected through the Heisenberg equations of motion. Under the assumption of nonlocality, uncertainty turns out to be crucial to preserve causality. Hence, a (qualitative) uncertainty principle can be derived rather than assumed.