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Literatur

Aktuell

Gillen-O'Neel 2012

Cari Gillen-O'Neel, Virginia W. Huynh & Andrew J. Fuligni, *To Study or to Sleep? The Academic Costs of Extra Studying at the Expense of Sleep*. Child Development (2012) preprint, 1–10. DOI:10.1111/j.1467-8624.2012.01834.x.

This longitudinal study examined how nightly variations in adolescents' study and sleep time are associated with academic problems on the following day. Participants (N = 535, 9th grade Mage = 14.88) completed daily diaries every day for 14 days in 9th, 10th, and 12th grades. Results suggest that regardless of how much a student generally studies each day, if that student sacrifices sleep time to study more than usual, he or she will have more trouble understanding material taught in class and be more likely to struggle on an assignment or test the following day. Because students are increasingly likely to sacrifice sleep time for studying in the latter years of high school, this negative dynamic becomes increasingly prevalent over time.

Schiermeier 2012

Quirin Schiermeier, *Man of the Desert, Stefan Kröpelin has carved out a career where few dare to tread – in the heart of the Sahara.* nature **488** (2012), 272–274.

In 30 years of research, Stefan Kröpelin has conducted expeditions to dozens of sites in the eastern Sahara. His research has helped to reveal the humid past of what is today one the driest spots on the planet.

Siddiq Abd Algadir, president of the Sudanese Geologists' Union in Khartoum and a fellow student with Kröpelin in the 1980s, says that the German researcher has added immeasurably to Saharan science. "Much of what we now know about the geology, the environments and even the people in some of the most remote parts of the Sahara, we really owe to him and the expeditions he has led."

Amerika

Reich 2012

David Reich et al., *Reconstructing Native American population history*. nature **488** (2012), 370–374.

n488-0370-Supplement.pdf

David Reich, Nick Patterson, Desmond Campbell, Arti Tandon, Stéphane Mazieres, Nicolas Ray, Maria V. Parra, Winston Rojas, Constanza Duque, Natalia Mesa, Luis F. García, Omar Triana, Silvia Blair, Amanda Maestre, Juan C. Dib, Claudio M. Bravi, Graciela Bailliet, Daniel Corach, Tábita Hünemeier, Maria Cátira Bortolini, Francisco M. Salzano, María Luiza Petzl-Erler, Victor Acuña-Alonzo, Carlos Aguilar-Salinas, Samuel Canizales-Quinteros, Teresa Tusié-Luna, Laura Riba, Maricela Rodríguez-Cruz, Mardia Lopez-Alarcón, Ramón Coral-Vazquez, Thelma Canto-Cetina, Irma Silva-Zolezzi, Juan Carlos Fernandez-Lopez, Alejandra V. Contreras, Gerardo Jimenez-Sanchez, Maria José Gómez-Vázquez, Julio Molina, IJngel Carracedo, Antonio Salas, Carla Gallo, Giovanni Poletti, David B.Witonsky, Gorka Alkorta-Aranburu, Rem I. Sukernik, Ludmila Osipova,

Sardana A. Fedorova, René Vasquez, Mercedes Villena, Claudia Moreau, Ramiro Barrantes, David Pauls, Laurent Excoffier, Gabriel Bedoya, Francisco Rothhammer, Jean-Michel Dugoujon, Georges Larrouy, William Klitz, Damian Labuda, Judith Kidd, Kenneth Kidd, Anna Di Rienzo, Nelson B. Freimer, Alkes L. Price and Andrés Ruiz-Linares
The peopling of the Americas has been the subject of extensive genetic, archaeological and linguistic research; however, central questions remain unresolved1-5. One contentious issue is whether the settlement occurred by means of a single6-8 migration or multiple streams of migration from Siberia9-15. The pattern of dispersals within the Americas is also poorly understood. To address these questions at a higher resolution than was previously possible, we assembled data from 52 Native American and 17 Siberian groups genotyped at 364,470 single nucleotide polymorphisms. Here we show that Native Americans descend from at least three streams of Asian gene flow. Most descend entirely from a single ancestral population that we call 'First American'. However, speakers of Eskimo-Aleut languages from the Arctic inherit almost half their ancestry from a second stream of Asian gene flow, and the Na-Dene-speaking Chipewyan from Canada inherit roughly one-tenth of their ancestry from a third stream. We show that the initial peopling followed a southward expansion facilitated by the coast, with sequential population splits and little gene flow after divergence, especially in South America.A major exception is in Chibchan speakers on both sides of the Panama isthmus, who have ancestry from both North and South America.

Anthropologie

Gracia-Lázaro 2012

Carlos Gracia-Lázaro, Alfredo Ferrer, Gonzalo Ruiz, Alfonso Tarancón, José A. Cuesta, Angel Sánchez & Yamir Moreno, *Heterogeneous networks do not promote cooperation when humans play a Prisoner's Dilemma*. PNAS **109** (2012), 12922–12926.

It is not fully understood why we cooperate with strangers on a daily basis. In an increasingly global world, where interaction networks and relationships between individuals are becoming more complex, different hypotheses have been put forward to explain the foundations of human cooperation on a large scale and to account for the true motivations that are behind this phenomenon. In this context, population structure has been suggested to foster cooperation in social dilemmas, but theoretical studies of this mechanism have yielded contradictory results so far; additionally, the issue lacks a proper experimental test in large systems. We have performed the largest experiments to date with humans playing a spatial Prisoner's Dilemma on a lattice and a scale-free network (1,229 subjects). We observed that the level of cooperation reached in both networks is the same, comparable with the level of cooperation of smaller networks or unstructured populations. We have also found that subjects respond to the cooperation that they observe in a reciprocal manner, being more likely to cooperate if, in the previous round, many of their neighbors and themselves did so, which implies that humans do not consider neighbors' payoffs when making their decisions in this dilemma but only their actions. Our results, which are in agreement with recent theoretical predictions based on this behavioral rule, suggest that population structure has little relevance as a cooperation promoter or inhibitor among humans.
evolutionary game dynamics | network reciprocity | conditional cooperation

Grujić 2010

Jelena Grujić, Constanza Fosco, Lourdes Araujo, José A. Cuesta & Angel Sánchez, *Social Experiments in the Mesoscale: Humans Play-*

ing a Spatial Prisoner's Dilemma. PLoS ONE **5** (2010), e13749. DOI:10.1371/journal.pone.0013749.

Background: The evolutionary origin of cooperation among unrelated individuals remains a key unsolved issue across several disciplines. Prominent among the several mechanisms proposed to explain how cooperation can emerge is the existence of a population structure that determines the interactions among individuals. Many models have explored analytically and by simulation the effects of such a structure, particularly in the framework of the Prisoner's Dilemma, but the results of these models largely depend on details such as the type of spatial structure or the evolutionary dynamics. Therefore, experimental work suitably designed to address this question is needed to probe these issues.
Methods and Findings: We have designed an experiment to test the emergence of cooperation when humans play Prisoner's Dilemma on a network whose size is comparable to that of simulations. We find that the cooperation level declines to an asymptotic state with low but nonzero cooperation. Regarding players' behavior, we observe that the population is heterogeneous, consisting of a high percentage of defectors, a smaller one of cooperators, and a large group that shares features of the conditional cooperators of public goods games. We propose an agent-based model based on the coexistence of these different strategies that is in good agreement with all the experimental observations.
Conclusions: In our large experimental setup, cooperation was not promoted by the existence of a lattice beyond a residual level (around 20 %) typical of public goods experiments. Our findings also indicate that both heterogeneity and a "moody" conditional cooperation strategy, in which the probability of cooperating also depends on the player's previous action, are required to understand the outcome of the experiment. These results could impact the way game theory on graphs is used to model human interactions in structured groups.

Semmann 2012

Dirk Semmann, *Conditional cooperation can hinder network reciprocity*. PNAS **109** (2012), 12846–12847.

Gracia-Lázaro et al. present a very convincing, large-scale experimental study that shows that static population structure is not affecting cooperation in public goods-like social dilemmas. According to network reciprocity, the formation of clusters should help sustain cooperation in this dilemma situation and increase cooperation on the global level. However, the potential effects of the underlying structure are precluded in the experiment because the participants behaved as conditional cooperators. The participants reacted in both networks-homogeneous and heterogeneous-to the level of cooperation in the neighborhood. The resulting cooperation levels are the same for both network types, and are comparable to those in smaller network sizes and unstructured populations. This study bridges, to a large extent, the gap between theoretical models sizes and experimental group sizes.

Vouloumanos 2012

Athena Vouloumanos, Kristine H. Onishi & Amanda Pogue, *Twelve-month-old infants recognize that speech can communicate unobservable intentions*. PNAS **109** (2012), 12933–12937.

Much of our knowledge is acquired not from direct experience but through the speech of others. Speech allows rapid and efficient transfer of information that is otherwise not directly observable. Do infants recognize that speech, even if unfamiliar, can communicate about an important aspect of the world that cannot be directly observed: a person's intentions? Twelve-month-olds saw a person (the Communicator) attempt but fail to achieve a target action (stacking a ring on a funnel). The Communicator subsequently directed either speech or a nonspeech vocalization to another person (the Recipient) who had not observed the attempts. The Recipient either successfully stacked the ring

(Intended outcome), attempted but failed to stack the ring (Observable outcome), or performed a different stacking action (Related outcome). Infants recognized that speech could communicate about unobservable intentions, looking longer at Observable and Related outcomes than the Intended outcome when the Communicator used speech. However, when the Communicator used nonspeech, infants looked equally at the three outcomes. Thus, for 12-montholds, speech can transfer information about unobservable aspects of the world such as internal mental states, which provides preverbal infants with a tool for acquiring information beyond their immediate experience.
infant cognitive development | infant speech perception | knowledge acquisition | psychological reasoning | communication

Datierung

Pearson 2012

Charlotte L. Pearson, Carol B. Griggs, Peter I. Kuniholm, Peter W. Brewer, Tomasz Ważny & LeAnn Canady, *Dendroarchaeology of the mid-first millennium AD in Constantinople*. Journal of Archaeological Science **39** (2012), 3402–3414.

The 1st millennium AD was a time of great transition in Europe and the Mediterranean. At the heart of the Byzantine Empire, Constantinople (modern day Istanbul) was a pivotal trade hub for the Aegean region. Establishing a precise and accurate dating framework for the development of this remarkable city and a chronological reference for this critical time period for the Mediterranean region is of great importance to a wide range of scholars. Here we present a new 213 year tree-ring record from 89 oak samples placed in time by dendrochronology and supported by radiocarbon analysis and historical documentation. It represents the middle of the first millennium AD in Constantinople. The tree-ring series are derived from pilings recovered from the extraordinary excavations of the so-called "Theodosian harbor" at Yenikapı, Istanbul, along with timbers from other sites and buildings around the city, including one of the most famous sites on the Istanbul sky-lined—Hagia Sophia. They provide potential for new insight into a time period in which earthquakes, the Justinianic plague, and even a possible tsunami struck the city, and during which dramatic changes in climate have been recorded in other paleoenvironmental proxies. The chronology is the first published tree-ring series from the Aegean region to cover the 'event' years of AD 536–7 and 542 which are characterized by anomalous growth in other treering series from around the world, but interestingly these event years are not evident in this tree-ring sequence.
Keywords: Dendrochronology | Constantinople | Istanbul | Yenikapı | Hagia Sophia | First millennium AD

Energie

Chu 2012

Steven Chu & Arun Majumdar, *Opportunities and challenges for a sustainable energy future*. nature **488** (2012), 294–303.

Access to clean, affordable and reliable energy has been a cornerstone of the world's increasing prosperity and economic growth since the beginning of the industrial revolution. Our use of energy in the twenty-first century must also be sustainable. Solar and water-based energy generation, and engineering of microbes to produce biofuels are a few examples of the alternatives. This Perspective puts these opportunities into a larger context by relating them to a number of aspects in the transportation and electricity

generation sectors. It also provides a snapshot of the current energy landscape and discusses several research and development opportunities and pathways that could lead to a prosperous, sustainable and secure energy future for the world.

Klima

Bathiany 2012

S. Bathiany, M. Claussen & K. Fraedrich, *Implications of climate variability for the detection of multiple equilibria and for rapid transitions in the atmosphere-vegetation system.* Climate Dynamics **38** (2012), 1775–1790.

Paleoclimatic records indicate a decline of vegetation cover in the Western Sahara at the end of the African Humid Period (about 5,500 years before present). Modelling studies have shown that this phenomenon may be interpreted as a critical transition that results from a bifurcation in the atmosphere-vegetation system. However, the stability properties of this system are closely linked to climate variability and depend on the climate model and the methods of analysis. By coupling the Planet Simulator (PlaSim), an atmosphere model of intermediate complexity, with the simple dynamic vegetation model VECODE, we assess previous methods for the detection of multiple equilibria, and demonstrate their limitations. In particular, a stability diagram can yield misleading results because of spatial interactions, and the system's steady state and its dependency on initial conditions are affected by atmospheric variability and nonlinearities. In addition, we analyse the implications of climate variability for the abruptness of a vegetation decline. We find that a vegetation collapse can happen at different locations at different times. These collapses are possible despite large and uncorrelated climate variability. Because of the nonlinear relation between vegetation dynamics and precipitation the green state is initially stabilised by the high variability. When precipitation falls below a critical threshold, the desert state is stabilised as variability is then also decreased.

Keywords: Green Sahara | Bifurcation | Multistability | Vegetation collapse | Tipping point | Stochastic dynamical system

Lenton 2008

Timothy M. Lenton et al., *Tipping elements in the Earth's climate system.* PNAS **105** (2008), 1786–1793.

Timothy M. Lenton, Hermann Held, Elmar Kriegler, Jim W. Hall, Wolfgang Lucht, Stefan Rahmstorf and Hans Joachim Schellnhuber

The term "tipping point" commonly refers to a critical threshold at which a tiny perturbation can qualitatively alter the state or development of a system. Here we introduce the term "tipping element" to describe large-scale components of the Earth system that may pass a tipping point. We critically evaluate potential policy-relevant tipping elements in the climate system under anthropogenic forcing, drawing on the pertinent literature and a recent international workshop to compile a short list, and we assess where their tipping points lie. An expert elicitation is used to help rank their sensitivity to global warming and the uncertainty about the underlying physical mechanisms. Then we explain how, in principle, early warning systems could be established to detect the proximity of some tipping points.

Earth system | tipping points | climate change | large-scale impacts | climate policy

Pachur 1987

H.-J. Pachur & S. Kröpelin, *Wadi Howar: Paleoclimatic Evidence from an Extinct River System in the Southeastern Sahara.* science **237** (1987), 298–300.

Field research into the climatic history and shifting of the East Saharan desert has furnished evidence that during Quaternary time the present extremely arid western part of Upper Nubia (northern Sudan) was temporarily linked to the Nile by way of a hitherto unknown 400 kilometer long tributary. From about 9500 to 4500 years ago, lower Wadi Howar flowed through an environment characterized by numerous ground water outlets and freshwater lakes. Savanna fauna and cattle-herders occupied this region, which today receives at most 25 millimeters of rainfall per year. At that period the southern edge of the eastern Sahara was some 500 kilometers further north than today and ground water resources were recharged for the last time.

Mathematik

Gracia-Lázaro 2012

Carlos Gracia-Lázaro, José A. Cuesta, Angel Sánchez & Yamir Moreno, *Human behavior in Prisoner's Dilemma experiments suppresses network reciprocity*. Scientific Reports **2** (2012), 325. DOI:10.1038/srep00325.

During the last few years, much research has been devoted to strategic interactions on complex networks. In this context, the Prisoner's Dilemma has become a paradigmatic model, and it has been established that imitative evolutionary dynamics lead to very different outcomes depending on the details of the network. We here report that when one takes into account the real behavior of people observed in the experiments, both at the mean-field level and on utterly different networks, the observed level of cooperation is the same. We thus show that when human subjects interact in a heterogeneous mix including cooperators, defectors and moody conditional cooperators, the structure of the population does not promote or inhibit cooperation with respect to a well mixed population.

Methoden

Chase 2012

Arlen F. Chase, Diane Z. Chase, Christopher T. Fisher, Stephen J. Leisz & John F. Weishampel, *Geospatial revolution and remote sensing LiDAR in Mesoamerican archaeology*. PNAS **109** (2012), 12916–12921.

The application of light detection and ranging (LiDAR), a laserbased remote-sensing technology that is capable of penetrating overlying vegetation and forest canopies, is generating a fundamental shift in Mesoamerican archaeology and has the potential to transform research in forested areas world-wide. Much as radiocarbon dating that half a century ago moved archaeology forward by grounding archaeological remains in time, LiDAR is proving to be a catalyst for an improved spatial understanding of the past. With LiDAR, ancient societies can be contextualized within a fully defined landscape. Interpretations about the scale and organization of densely forested sites no longer are constrained by sample size, as they were when mapping required laborious on-ground survey. The ability to articulate ancient landscapes fully permits a better understanding of the complexity of ancient Mesoamerican urbanism and also aids in modern conservation efforts. The importance of this geospatial innovation is demonstrated with newly acquired LiDAR data from the archaeological sites of Caracol, Cayo, Belize and Angamuco, Michoacán, Mexico. These data illustrate the potential of technology to act as a catalytic enabler of rapid transformational change in archaeological research and interpretation and also underscore the value of on-the-ground archaeological investigation in validating and contextualizing results.

Maya | Mesoamerica | paradigm shift | remote sensing | digital elevation model

Štular 2012

Benjamin Štular, Žiga Kokalj, Krištof Oštir & Laure Nuninger, *Visualization of lidar-derived relief models for detection of archaeological features*. Journal of Archaeological Science **39** (2012), 3354–3360.

This paper presents visualisation techniques of high-resolution digital elevation models (DEMs) for visual detection of archaeological features. The methods commonly used in archaeology are reviewed and improvements are suggested. One straightforward technique that has so far not been used in archaeology – the shift method – is presented. The main purpose of this article is to compare and evaluate different visualisation methods. Two conclusions have been reached. Where a single method must be chosen – for printing or producing digital images for non-professionals – the use of sky view factor or slope gradient is endorsed, both presented in greyscale. Otherwise interpreters should choose different techniques on different terrain types: shift on flat terrain, sky viewfactor on mixed terrain, slope gradient on sloped terrain and sky view factor (preferably as a composite image with slope gradient) on rugged terrain.

Keywords: Archaeology | Methodology | High-resolution DEM | Lidar | Visualisation