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References

Aktuell

Dolgin 2015

Elie Dolgin, *Safety boost for GM organisms*. nature **517** (2015), 423.

Engineered microbes kept in check with a synthetic building block.

The bacteria thrive in the laboratory, growing robustly as long as the unnatural amino acid is included in their diet. But several experiments involving 100 billion or more cells and lasting up to 20 days did not reveal a single microbe capable of surviving in the absence of the artificial supplement. The microbes also do not swap their engineered DNA with natural counterparts because they no longer speak life's shared biochemical language.

Michel-Kerjan 2015

Erwann Michel-Kerjan, *Effective risk response needs a prepared mindset*. nature **517** (2015), 413.

Leaders and risk strategists must collaborate effectively on decisions of global importance, says Erwann Michel-Kerjan.

Think beyond tomorrow. Short-term thinking is natural for politicians with an eye on the next election or business leaders concerned with next quarter's results. Risks do not materialize overnight. Look at evolving trends over the past ten years and expected ones for the next ten.

The Global Risks Report, now in its tenth year, groups 30–50 global risks into five categories: economic, environmental, geopolitical, societal and technological. It compares their likelihood and severity on a ten-year horizon and builds a map of their interdependencies. It combines results of a risk-perception survey of nearly 1,000 leaders in academia, business, government and nonprofit circles with technical assessments and several workshops during the year. The findings are written in non-technical terms and accessible to all on the Internet, from global leaders to concerned citizens. A leading risk from the 2007 report was 'asset price collapse' — an unpopular forecast at a time of great exuberance. A year later, we all witnessed the systemic downfall of the financial system.

Youyou 2015

Wu Youyou, Michal Kosinski & David Stillwell, *Computer-based personality judgments are more accurate than those made by humans*. PNAS **112** (2015), 1036–1040.

Judging others' personalities is an essential skill in successful social living, as personality is a key driver behind people's interactions, behaviors, and emotions. Although accurate personality judgments stem from social-cognitive skills, developments in machine learning show that computer models can also make valid judgments. This study compares the accuracy of human and computerbased personality judgments, using a sample of 86,220 volunteers who completed a 100-item personality questionnaire. We show that (i) computer predictions based on a generic digital footprint (Facebook Likes) are more accurate (r = 0.56) than those made by the participants' Facebook friends using a personality questionnaire (r = 0.49); (ii) computer models show higher interjudge agreement; and (iii) computer personality judgments have higher external validity when predicting life outcomes

such as substance use, political attitudes, and physical health; for some outcomes, they even outperform the self-rated personality scores. Computers outpacing humans in personality judgment presents significant opportunities and challenges in the areas of psychological assessment, marketing, and privacy.

personality judgment | social media | computational social science | artificial intelligence | big data

Biologie

HIRAYAMA 1981

Takeshi Hirayama, *Non-smoking wives of heavy smokers have a higher risk of lung cancer, A study from Japan.* British Medical Journal **282** (1981), 183–185.

bmj282-00183-Comment1.pdf, bmj282-00183-Comment2.pdf

In a study in 29 health centre districts in Japan 91 540 non-smoking wives aged 40 and above were followed up for 14 years (1966-79), and standardised mortality rates for lung cancer were assessed according to the smoking habits of their husbands. Wives of heavy smokers were found to have a higher risk of developing lung cancer and a dose-response relation was observed. The relation between the husband's smoking and the wife's risk of developing lung cancer showed a similar pattern when analysed by age and occupation of the husband. The risk was particularly great in agricultural families when the husbands were aged 40-59 at enrolment. The husbands' smoking habit did not affect their wives' risk of dying from other disease such as stomach cancer, cervical cancer, and ischaemic heart disease. The risk of developing emphysema and asthma seemed to be higher in nonsmoking wives of heavy smokers but the effect was not statistically significant.

The husband's drinking habit seemed to have no effect on any causes of death in their wives, including lung cancer.

These results indicate the possible importance of passive or indirect smoking as one of the causal factors of lung cancer. They also appear to explain the long-standing riddle of why many women develop lung cancer although they themselves are non-smokers. These results also cast doubt on the practice of assessing the relative risk of developing lung cancer in smokers by comparing them with non-smokers.

LING 2015

Losee L. Ling et al., *A new antibiotic kills pathogens without detectable resistance.* nature **517** (2015), 455–459.

n517-0455-Supplement.pdf

Losee L. Ling, Tanja Schneider, Aaron J. Peoples, Amy L. Spoering, Ina Engels, Brian P. Conlon, Anna Mueller, Till F. Schäberle, Dallas E. Hughes, Slava Epstein, Michael Jones, Linos Lazarides, Victoria A. Steadman, Douglas R. Cohen, Cintia R. Felix, K. Ashley Fetterman, William P. Millett, Anthony G. Nitti, Ashley M. Zullo, Chao Chen & Kim Lewis

Antibiotic resistance is spreading faster than the introduction of new compounds into clinical practice, causing a public health crisis. Most antibiotics were produced by screening soil microorganisms, but this limited resource of cultivable bacteria was overmined by the 1960s. Synthetic approaches to produce antibiotics have been unable to replace this platform. Uncultured bacteria make up approximately 99 % of all species in external environments, and are an untapped source of new antibiotics. Wedeveloped several methods to grow uncultured organisms by cultivation in situ or by using specific growth factors. Here we report a new

antibiotic that we term teixobactin, discovered in a screen of uncultured bacteria. Teixobactin inhibits cell wall synthesis by binding to a highly conserved motif of lipid II (precursor of peptidoglycan) and lipid III (precursor of cell wall teichoic acid). We did not obtain any mutants of Staphylococcus aureus or Mycobacterium tuberculosis resistant to teixobactin. The properties of this compound suggest a path towards developing antibiotics that are likely to avoid development of resistance.

Wright 2015

Gerard Wright, *An irresistible newcomer*. nature **517** (2015), 442–443.

A screen of 10,000 bacterial strains, cultured in their normal soil, has uncovered an antibiotic with broad and potent activity. And because the compound targets lipid molecules, developing resistance is probably difficult.

Datierung

Bueno 2013

Lucas Bueno, Adriana Schmidt Dias & James Steele, *The Late Pleistocene/Early Holocene archaeological record in Brazil, A geo-referenced database*. Quaternary International **301** (2013), 74–93.

QuatInt301-074-Comment.jpg

Fig. 2a shows the summed probability distributions of the occupation events in the present database. The distribution has several clear 'spikes' or peaks, but these are likely to be artefacts of the calibration curve. Fig. 2b shows that the peaks in the summed probability plot for occupations in the database align almost perfectly with the times when dates simulated from an underlying uniform distribution will have very low age uncertainty. The spikes or peaks in the summed probability plot are therefore probably just artefacts of the inflections of the calibration curve.

Between 13,000 and 8000 14C BP, eastern South America was settled by a stable and diversified population of hunter-gatherers. Archaeological excavation in the past twenty years has yielded increasingly consistent evidence of occupation in different regions of Brazil since the end of the Pleistocene, with dates at least contemporary to the Clovis Horizon in North America. This is addressed by documenting and analysing the quantity, quality and distribution of archaeological 14C dates from Brazil during this period. A total of 277 dates from 90 sites are tabulated, mapped, and included in the analysis. During the Late Pleistocene there was a pioneer phase of human colonization, with dispersal inland through the major river systems. Subsequently, the Early Holocene saw the first phase of established settlement of Brazil's interior. There seems to be an archaeological threshold reached at ca. 10,500 years 14C BP: numbers of sites increase, there is evidence of settlement of all major biomes, and there is clear evidence of inter-regional cultural diversity.

Lewis 2014

Nic Lewis, *Radiocarbon calibration – is use of subjective Bayesian inference with a uniform prior appropriate?* unknown **2014**, Apr. 17, 1–21.

In the case of climate sensitivity, I have been arguing for a long time that Bayesian methods are only appropriate if one takes an objective approach, using a noninformative prior, rather than a subjective approach (using, typically, a uniform or expert prior). Unfortunately, many statisticians (and all but a few climate scientists) seem not to understand, or at least not to accept, the arguments

in favour of an objective Bayesian approach. Most climate sensitivity studies still use subjective Bayesian methods.

I have accordingly carried out frequentist coverage testing, using 10,000 samples drawn at random uniformly from both the full extent of my calibration curve and from various sub-regions of it. For each sampled true calendar age, a 14C determination age is sampled randomly from a Gaussian error distribution. I've assumed an error standard deviation of 30 14C years, to include calibration curve uncertainty as well as that in the 14C determination.

How do the SRLR and objective Bayesian methods provide exact probability matching for each individual calendar date? It is easier to see that for the SRLR method. Suppose samples having the same fixed calendar date are repeatedly drawn from the radiocarbon and calibration uncertainty distributions. The radiocarbon determination will be more than two standard deviations (of the combined radiocarbon and calibration uncertainty level) below the exact calibration curve value for the true calendar date in 2.3 % of samples. The SRLR method sets its 97.7 % bound at two standard deviations above the radiocarbon determination, using the exact calibration curve to convert this to a calendar date. That bound must necessarily lie at or above the calibration curve value for the true calendar date in 97.7 % of samples. Ignoring non-monotonicity, it follows that the true calendar date will not exceed the upper bound in 97.7 % of cases. The bound is, given the statistical model, an exact confidence limit by construction. Essentially Jeffreys' prior achieves the same result in the objective Bayesian case, but through operating on probability density rather than on its integral, cumulative probability.

Energie

Harrison 1970

Halstead Harrison, *Stratospheric Ozone with Added Water Vapor, Influence of High-Altitude Aircraft.* science **170** (1970), 734–736.

Simple, steady-state models for ozone photochemistry, radiative heat balance, and eddy-diffusive mass transport can be combined to estimate water-induced changes in the stratospheric ozone concentrations and temperatures, the integrated ozone column, the solar power transmitted to the earth's surface, and the surface temperature. These changes have been computed parametrically for mixing fractions of water vapor between 3 x 10-6 and 6.5 x 10-6. With added water from the exhausts of projected fleets of stratospheric aircraft, the ozone column may diminish by 3.8 percent, the transmitted solar power increase by 0.07 percent, and the surface temperature rise by 0.04°K in the Northern Hemisphere. Due to a cancellation of terms, temperatures in the lower stratosphere remain essentially unchanged. These results are sensitive to the form of the water profile and emphasize the potential role of convective transients near 30 kilometers.

Nierenberg 1983

William A. Nierenberg et al. (Hrsg.), *Changing Climate, Report of the Carbon Dioxide Assessment Committeee.* (Washington 1983).

Rotty 1977

Ralph M. Rotty & Alvin M. Weinberg, *How long is coal's future?* Climatic Change **1** (1977), 45–57.

Nearly all scenarios for future U.S. energy supply systems show heavy dependence on coal. The magnitude depends on assumptions as to reliance on nuclear

fission, degree of electrification, and rate of GNP growth, and ranges from 700 million tons to 2300 million tons per year. However, potential climate change resulting from increasing atmospheric carbon dioxide concentrations may prevent coal from playing a major role. The carbon in the carbon dioxide produced from fossil fuels each year is about 1/10 the net primary production by terrestrial plants, but the fossil fuel production has been growing exponentially at 4.3 % per year. Observed atmospheric CO2 concentrations have increased from 315 ppm in 1958 to 330 ppm in 1974 – in 1900, before much fossil fuel was burned, it was about 290-295 ppm. Slightly over one-half the CO2 released from fossil fuels is accounted for by the increase observed in the atmosphere; at present growth rates the quantities are doubling every 15-18 years. Atmospheric models suggest a global warming of about 2 K if the concentration were to rise to two times its pre-1900 value – enough to change the global climate in major (but largely unknown) ways. With the current rate of increase in fossil fuel use, the atmospheric concentration should reach these levels by about 2030. A shift to coal as a replacement for oil and gas gives more carbon dioxide per unit of energy; thus if energy growth continues with a concurrent shift toward coal, high concentrations can be reached somewhat earlier. Even projections with very heavy reliance on non-fossil energy (Neihaus) after 2000 show atmospheric carbon dioxide concentrations reaching 475 ppm.

Weinberg 1974
Alvin M. Weinberg, *Global Effects of Man's Production of Energy*. science **186** (1974), 205.

Klima

Caley 2014
Thibaut Caley, Didier M. Roche & Hans Renssen, *Orbital Asian summer monsoon dynamics revealed using an isotope-enabled global climate model*. Nature Communications **5** (2014), 5371. DOI:10.1038/ncomms6371.
NatComm05-5371-Supplement.pdf
The Asian summer monsoon dynamics at the orbital scale are a subject of considerable debate. The validity of Asian speleothem d18O records as a proxy for summer monsoon intensity is questioned together with the ultimate forcing and timing of the monsoon. Here, using the results of a 150,000-year transient simulation including water isotopes, we demonstrate that Asian speleothem d18O records are not a valid proxy for summer monsoon intensity only at the orbital timescale. Rather, our results show that these records reflect annual variations in hydrologic processes and circulation regime over a large part of the Indo-Asian region. Our results support the role of internal forcing, such as sea surface temperature in the equatorial Pacific, to modulate the timing of monsoon precipitation recorded in paleo-proxies inside the Asian region.

Hay 2015
Carling C. Hay, Eric Morrow, Robert E. Kopp & Jerry X. Mitrovica, *Probabilistic reanalysis of twentieth-century sea-level rise*. nature **517** (2015), 481–484.
Estimating and accounting for twentieth-century global mean sealevel (GMSL) rise is critical to characterizing current and future human-induced sea-level change. Several previous analyses of tide gauge records—employing differentmethods to

accommodate the spatial sparsity and temporal incompleteness of the data and to constrain the geometry of long-term sea-level change—have concluded that GMSL rose over the twentieth century at a mean rate of 1.6 to 1.9 millimetres per year. Efforts to account for this rate by summing estimates of individual contributions from glacier and ice-sheet mass loss, ocean thermal expansion, and changes in land water storage fall significantly short in the period before 1990. The failure to close the budget of GMSL during this period has led to suggestions that several contributions may have been systematically underestimated. However, the extent to which the limitations of tide gauge analyses have affected estimates of the GMSL rate of change is unclear. Here we revisit estimates of twentieth-century GMSL rise using probabilistic techniques and find a rate of GMSL rise from 1901 to 1990 of 1.2 ± 0.2 millimetres per year (90 % confidence interval). Based on individual contributions tabulated in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, this estimate closes the twentieth-century sea-level budget. Our analysis, which combines tide gauge records with physics-based and model-derived geometries of the various contributing signals, also indicates that GMSL rose at a rate of 3.0 ± 0.7 millimetres per year between 1993 and 2010, consistent with prior estimates from tide gauge records. The increase in rate relative to the 1901–90 trend is accordingly larger than previously thought; this revision may affect some projections of future sea-level rise.

Konecky 2015

Bronwen Konecky, *Monsoon matters*. nature **517** (2015), 445–446.

A simplified global climate model that keeps track of water as it moves through Earth's water cycle throws fresh light on how the Asian summer monsoon has varied during the past 150,000 years.

Importantly, the authors argue that annual d18O variations in iLOVECLIM match Chinese-cave records better than summer d18O variations — contradicting the common interpretation of cave records as an ASM proxy. Modern data support the idea that annual rainfall d18O in China reflects both monsoonal and non-monsoonal processes. Non-monsoonal sources of moisture, along with their transport paths and the types of precipitation they produce, account for a large proportion of d18O variability. Infiltration of water through limestone en route to a cave further integrates rainwater d18O signals over many seasons. Hence, ASM rainfall drives much of the yeartoyear variability in annual d18O, but it is not the only contributor.

Lewis 2014

Nicholas Lewis & Judith A. Curry, *The implications for climate sensitivity of AR5 forcing and heat uptake estimates*. Climate Dynamics (2014), preprint, 1–15. DOI:10.1007/s00382-014-2342-y.

ClimDyn2015-Lewis-Supplement.zip

Energy budget estimates of equilibrium climate sensitivity (ECS) and transient climate response (TCR) are derived using the comprehensive 1750–2011 time series and the uncertainty ranges for forcing components provided in the Intergovernmental Panel on Climate Change Fifth Assessment Working Group I Report, along with its estimates of heat accumulation in the climate system. The resulting estimates are less dependent on global climate models and allow more realistically for forcing uncertainties than similar estimates based on forcings diagnosed from simulations by such models. Base and final periods are selected that have well matched volcanic activity and influence from internal variability. Using 1859–1882 for the base period and 1995–2011 for the final period, thus avoiding major volcanic activity, median estimates are derived for ECS of 1.64 K and for TCR of 1.33

K. ECS 17–83 and 5–95 % uncertainty ranges are 1.25–2.45 and 1.05–4.05 K; the corresponding TCR ranges are 1.05–1.80 and 0.90–2.50 K. Results using alternative well-matched base and final periods provide similar best estimates but give wider uncertainty ranges, principally reflecting smaller changes in average forcing. Uncertainty in aerosol forcing is the dominant contribution to the ECS and TCR uncertainty ranges.

Keywords: Climate sensitivity | Transient climate response | Energy budget | AR5

Kultur

Rahmstorf 2014

Lorenz Rahmstorf, *„Pebble weights" aus Mitteleuropa und Waagebalken aus der jüngeren Bronzezeit (ca. 14.–12. Jh. v. Chr.)*. In: Bianka Nessel, Immo Heske & Dirk Brandherm (Hrsg.), *Ressourcen und Rohstoffe in der Bronzezeit: Nutzung – Distribution – Kontrolle*, *Arbeitsgemeinschaft Bronzezeit, Jahrestagung des MOVA in Brandenburg an der Havel, 16. bis 17. April 2012*. Arbeitsberichte zur Bodendenkmalpflege in Brandenburg 26 (Wünsdorf 2014), 109–120.

Ähnlich wie bei den Kieselsteingewichten ("pebble weights") aus einer Siedlungsgrube in Bordjoš in Serbien kann nun auch für sechs "Glättsteine" aus Grab 298 aus Migennes in Ostfrankreich eine metrologische Gewichtsfunktion wahrscheinlich gemacht werden. Neben der logischen Sequenz der Gewichtswerte legt dies in beiden Fällen der Fundzusammenhang mit einem Waagebalken nahe. Bislang sind nur in einer ungleichmäßigen Verteilung über Europa relativ wenige definitive Metallgewichte aus der jüngeren Bronzezeit in Mitteleuropa und Portugal sowie durchbohrte Steingewichte aus Italien durch die Forschungen einzelner Autoren identifiziert worden. Die Verbreitung der bislang bekannten Waagebalken deckt sich zudem nicht mit jener der Gewichte. Möglicherweise könnten sich unter Befunden von gehäuften Kieselsteinen in Siedlungen und Gräbern weitere metrologische Gewichte verbergen. Einstweilen verhindert jedoch der Publikationsstand eine Beurteilung, ob das Phänomen der "pebble weights" als eine weit verbreitete Erscheinung in der jüngeren Bronzezeit Europas angenommen werden darf.

<http://www.academia.edu/10349741/>

Methoden

Nierenberg 2010

Nicolas Nierenberg, Walter R. Tschinkel & Victoria J. Tschinkel, *Early Climate Change Consensus at the National Academy, The Origins and Making of Changing Climate*. Historical Studies in the Natural Sciences **40** (2010), 318–349.

The 1983 National Academy of Sciences report entitled Changing Climate, authored by a committee of physical and social scientists chaired by William Nierenberg, was an early comprehensive review of the effects of human-caused increases in the levels of atmospheric CO2. Study of the events surrounding the committee's creation, deliberations, and subsequent report demonstrates that the conclusions of the report were the consensus of the entire committee and in line with the scientific consensus of the time. This result contraverts a 2008 paper in which Naomi

Oreskes, Erik M. Conway, and Matthew Shindell asserted that the report contradicted a growing consensus about climate change, and that Nierenberg for political reasons deliberately altered the summary and conclusions of the report in a way that played down the concerns of the other physical scientists on the committee. Examining the production of the report and contextualizing it in contemporaneous scientific and political discussion, we instead show how it was a multi-year effort with work divided among the various members of the committee according to their expertise. The synthesis and conclusions were expressly a joint statement of the committee and were consistent with other assessments of that time expressing deep concern over the potential issues while stopping short of recommending major policy changes due to the uncertainties, and to a lack of good alternatives.

Keywords: global warming, climate, controversy, debate, National Academy

Oreskes 2010

Naomi Oreskes & Erik M. Conway, *Merchants of doubt*, *How a handful of scientists obscured the truth on issues from tobacco smoke to global warming.* (London 2012).

Merchants of Doubt tells the story of how a loose-knit group of high-level scientists and scientific advisers, with deep connections in politics and industry, ran effective campaigns to mislead the public and deny well-established scientific knowledge over four decades. Remarkably, the same individuals surface repeatedly—some of the same figures who have claimed that the science of global warming is "not settled" denied the truth of studies linking smoking to lung cancer, coal smoke to acid rain, and CFCs to the ozone hole. "Doubt is our product," wrote one tobacco executive. These "experts" supplied it.

Weinberg 1976

Alvin M. Weinberg, *Science in the Public Forum: Keeping It Honest.* science **191** (1976), 341.

Ozeanien

Stevenson 2015

Christopher M. Stevenson, Cedric O. Puleston, Peter M. Vitousek, Oliver A. Chadwick, Sonia Haoa & Thegn N. Ladefoged, *Variation in Rapa Nui (Easter Island) land use indicates production and population peaks prior to European contact.* PNAS **112** (2015), 1025–1030.

Many researchers believe that prehistoric Rapa Nui society collapsed because of centuries of unchecked population growth within a fragile environment. Recently, the notion of societal collapse has been questioned with the suggestion that extreme societal and demographic change occurred only after European contact in AD 1722. Establishing the veracity of demographic dynamics has been hindered by the lack of empirical evidence and the inability to establish a precise chronological framework. We use chronometric dates from hydrated obsidian artifacts recovered from habitation sites in regional study areas to evaluate regional land-use within Rapa Nui. The analysis suggests region-specific dynamics including precontact land use decline in some nearcoastal and upland areas and postcontact increases and subsequent declines in other coastal locations. These temporal landuse patterns correlate with rainfall variation and soil quality, with poorer environmental locations declining earlier. This analysis confirms that the intensity of land use decreased substantially in some areas of the island before European contact.

Rapa Nui | population | obsidian | dating | collapse

Politik

Atran 2014

Scott Atran, Hammad Sheikh & Angel Gomez, *Devoted actors sacrifice for close comrades and sacred cause*. PNAS **111** (2014), 17702–17703.

One drawback in the article by Whitehouse et al. is lack of a comparison group: practically everyone is fused and involved in the fighting, a situation similar to that of the Kurds on the front lines around Mosul in Iraq where our research team is currently working. This aspect precludes strong conclusions about the path and process from fusion to willingness to fight. Studying susceptible populations before engagement with active violence and battle can help fill this gap.

Clauset 2013

Aaron Clauset & Ryan Woodard, *Estimating the historical and future probabilities of large terrorist events*. Annals of Applied Statistics **7** (2013), 1838–1865.

Quantities with right-skewed distributions are ubiquitous in complex social systems, including political conflict, economics and social networks, and these systems sometimes produce extremely large events. For instance, the 9/11 terrorist events produced nearly 3000 fatalities, nearly six times more than the next largest event. But, was this enormous loss of life statistically unlikely given modern terrorism's historical record? Accurately estimating the probability of such an event is complicated by the large fluctuations in the empirical distribution's upper tail. We present a generic statistical algorithm for making such estimates, which combines semi-parametric models of tail behavior and a nonparametric bootstrap. Applied to a global database of terrorist events, we estimate the worldwide historical probability of observing at least one 9/11-sized or larger event since 1968 to be 11–35 %. These results are robust to conditioning on global variations in economic development, domestic versus international events, the type of weapon used and a truncated history that stops at 1998. We then use this procedure to make a data-driven statistical forecast of at least one similar event over the next decade.

Reardon 2015

Sara Reardon, *Science seeks roots of terror*. nature **517** (2015), 420–421.

Psychological studies raise prospect of intervention in the radicalization process.

Even identifying which individuals might become terrorists is a difficult task. For instance, millions of people support the kind of militant Islam espoused by organizations such as alQaeda, but only a small percentage would be willing to kill for it, says Atran. Two studies that he published last month suggest that extremism arises, in part, when membership in a group reinforces deeply held ideals, and an individual's identity merges with the group's (S. Atran et al. Cliodynamics 5, 41–57; 2014; S. Atran et al. Proc. Natl Acad. Sci. USA 111, 17702–17703; 2014). "They can be lowlifes, but once they lock into these values it doesn't matter, because they become heroic warriors," says Atran.

Schiermeier 2015

Quirin Schiermeier, *Terror prediction hits limits*. nature **517** (2015), 419–420.

Erratic human behaviour and incomplete information plague efforts to model risk.

Aaron Clauset, a computer scientist at the University of Colorado Boulder, found in 2013 that the likelihood and magnitude of terrorist attacks are related by a phenomenon known as a power law. Smaller strikes with relatively few fatalities, such as in Paris, are sooner or later followed by a rare event with extremely high severity, such as 9/11 (A. Clauset and R. Woodard Ann. Appl. Stat. 7, 1838–1865; 2013). Power laws are a source of mathematical fascination because they describe a wide range of phenomena, including earthquakes and stockmarket collapses. But Clauset used the relationship to predict that, given the historic rate of smallscale attacks, there is at least a 30 % chance of another attack on the scale of 9/11 in the next decade somewhere in the world. He also points out that very large events are more likely under a power law than they would be under a bellshaped distribution — something that counterterrorism authorities should consider.

Whitehouse 2014

Harvey Whitehouse, Brian McQuinn, Michael Buhrmester & William B. Swann Jr., *Brothers in arms, Libyan revolutionaries bond like family.* PNAS **111** (2014), 17783–17785.

What motivates ordinary civilians to sacrifice their lives for revolutionary causes? We surveyed 179 Libyan revolutionaries during the 2011 conflict in Libya. These civilians-turned-fighters rejected Gaddafi's jamahiriyya (state of the masses) and formed highly cohesive fighting units typical of intense conflicts. Fighters reported high levels of "identity fusion"—visceral, family-like bonds between fighters and their battalions. Fusion of revolutionaries with their local battalions and their own families were extremely high, especially relative to Libyans who favored the revolution but did not join battalions. Additionally, frontline combatants were as strongly bonded to their battalion as they were to their own families, but battalion members who provided logistical support were more fused with their families than battalions. Together, these findings help illuminate the social bonds that seem to motivate combatants to risk their lives for the group during wartime.

revolutionary war | intergroup conflict | group identity | self-sacrifice | identity fusion