

Literatur

Aktuell

BRUMFIEL 2011

Geoff Brumfiel, *Fukushima set for epic clean-up*. [nature 472 \(2011\), 146–147](#). Latest data suggest a Chernobyl-like effort will be needed. Given the complexity of the task ahead, some think it may be better to abandon Fukushima entirely – at least for the time being. “My bet would be: you seal it and wait a hundred years,” says Alan Johnson, a retired reactor physicist who was head of Britain’s Sellafield nuclear processing site in the late 1980s.

Sellafield, once known as Windscale, was in 1957 the site of the United Kingdom’s worst nuclear accident, when a reactor’s graphite core caught fire. Final decommissioning of the reactor is still at least 20 years away, but the hiatus has allowed radioactive materials to decay and given engineers time to develop the best clean-up strategies possible. “What’s the rush in doing it quicker?” asks Johnson.

FOX 2011

Douglas Fox, *Brain Buzz*. [nature 472 \(2011\), 156–158](#).

Scientists reviving a decades-old technique for brain stimulation have found that it can boost learning. So what else can be done with some wires and a nine-volt battery? The jury is still out on whether these results will translate into real-world benefits. Nitsche says that it will be harder to improve cognition in young, healthy people - whose minds are theoretically already optimized - than in elderly people or those with addictions, for instance. “I wouldn’t say it wouldn’t be possible,” says Nitsche. “But things might be a little more complicated.”

That’s not stopping some people from trying it at home. Discussions are already appearing on the Internet: buy a 9-volt battery, some wire and a resistor, and you’re theoretically there. One person, hoping to improve his concentration, was alarmed by the flashing lights he experienced – a commonly reported side effect, along with burning or itching at the site of the electrode. “I probably won’t be doing this again,” he said in a message posted online. Another wrote in an online patients’ forum that the tDCS treatments he was giving to his wife were alleviating her chronic pain. Safety is an important issue. “With wires and batteries and home hobbyists trying to run electricity through their heads, somebody could get hurt,” says Farah.

GIOIA 2011

Gustavo Gioia, Pinaki Chakraborty, Stefan F. Gary, Carlo Zuñiga Zamalloa & Richard D. Keane, *Residence time of buoyant objects in drowning machines*. [PNAS 108 \(2011\), 6361–6363](#).
[pnas108-06361-Supplement.pdf](#)

Hydraulic jumps are a common feature of rivers and waterways, where they can be found close to spillways, weirs, rocky ledges, and boulders. People adrift upstream of a hydraulic jump are liable to become trapped in the turbulent roller of the hydraulic jump. For this reason, hydraulic jumps have been termed “drowning machines” and are recognized as a public hazard. We use experiments and theory to show that on average a buoyant object spends a time T/p trapped in a jump, where T is the period of a harmonic process inherent in the jump, and p is the probability that the object will escape in any time interval T . The probability p is governed by the statistical theory of extreme values and depends

primarily on the ratio between the density of the object and the density of the fluid. We use our results to draw conclusions that might prove to be useful to public-safety agencies intent on carrying out tests in drowning machines. Our results can also be used to predict the amount of flotsam that accumulates at the toe of a hydraulic jump.

Thus the average residence time of a person should not exceed a few seconds, regardless of whether a life jacket is worn ($\rho_b/\rho \approx 0.85$) or not worn ($\rho_b/\rho \approx 0.95$), provided that the person remains passive (as the buoyant objects of our experiments). But far from remaining passive, people will typically swim frantically to stay away from the downward pull upstream of the jump, which is precisely where a chance may be had of escaping by being advected under the roller. Public-safety agencies might wish to carry out tests in which participants are instructed either to remain passive, perhaps curled in the fetal position, or to direct any expenditure of energy toward gaining depth under water. The notion that a life jacket can significantly delay escape from a drowning machine cannot be reconciled with our results.

dimensional analysis | extremal statistics | turbulence

KINTISCH 2011

Eli Kintisch, *Pool at Stricken Reactor #4 Holds Answers to Key Safety Questions*. [science](#) **332** (2011), 24–25.

One mystery about the #4 pool is how its water level fell so quickly. During normal operation, 7 meters of roughly 40°C water sit between the top of the fuel rods and the surface of the 1425-ton pool. The water is constantly circulated and replenished. There's little doubt that temperatures in the pool would have risen steadily after power was lost. But several scientists have independently calculated that it would take much longer than 4 days—perhaps as much as 3 weeks—for the heat of the fresh fuel in the #4 pool to evaporate or boil off the water.

LAWLER 2011

Andrew Lawler, *In Indus Times, the River Didn't Run Through It*. [science](#) **332** (2011), 23.

NORMILE 2011

Dennis Normile, *Scientific Consensus on Great Quake Came Too Late*. [science](#) **332** (2011), 22–23.

SCHIERMEIER 2011

Quirin Schiermeier, *Radiation release will hit marine life*. [nature](#) **472** (2011), 145–146.

Researchers call for extensive surveys to gauge ecological effects of Fukushima. Although radioisotope concentrations in fish, shellfish and seaweed could exceed limits for human consumption for weeks, Whicker thinks that it is unlikely that scientists would be able to detect any genetic effects on marine life. Any affected creatures would probably disperse into the Pacific, or die more quickly, he says. Moreover, teasing out radiological effects from other stresses, such as conventional water pollution and the damage caused by the tsunami, would be extremely difficult.

WISZEWSKA 2007

Agnieszka Wiszewska, Boguslaw Pawlowski & Lynda G. Boothroyd, *Father–daughter relationship as a moderator of sexual imprinting: a facialmetric study*. [Evolution and Human Behavior](#) **28** (2007), 248–252.

This study investigated sexual imprinting in human females. Facial proportions of fathers were compared to the proportions of stimulus faces the participants found attractive. Women who rated their childhood relationships with their father highly showed a significantly stronger relationship between the proportions of their father's face and their chosen stimulus than other women, primarily concerning the central face area. Women who rated their fathers less highly did not show similarity between fathers' and stimulus' faces. This supports previous research using photographs of parents' and spouses' faces.

Keywords: Facial attraction; Imprinting; Father-daughter relationship; Facial measurements; Mate preferences

Anthropologie

DING 2002

Yuan-Chun Ding et al., *Evidence of positive selection acting at the human dopamine receptor D4 gene locus*. [PNAS 99 \(2002\), 309–314](#).

Yuan-Chun Ding, Han-Chang Chi, Deborah L. Grady, Atsuyuki Morishima, Judith R. Kidd, Kenneth K. Kidd, Pamela Flodman, M. Anne Spence, Sabrina Schuck, James M. Swanson, Ya-Ping Zhang and Robert K. Moyzis

Associations have been reported of the seven-repeat (7R) allele of the human dopamine receptor D4 (DRD4) gene with both attention-deficit/hyperactivity disorder and the personality trait of novelty seeking. This polymorphism occurs in a 48-bp tandem repeat in the coding region of DRD4, with the most common allele containing four repeats (4R) and rarer variants containing 2-11. Here we show by DNA resequencing/haplotyping of 600 DRD4 alleles, representing a worldwide population sample, that the origin of 2R-6R alleles can be explained by simple one-step recombination/mutation events. In contrast, the 7R allele is not simply related to the other common alleles, differing by greater than six recombinations/mutations. Strong linkage disequilibrium was found between the 7R allele and surrounding DRD4 polymorphisms, suggesting that this allele is at least 5-10-fold "younger" than the common 4R allele. Based on an observed bias toward nonsynonymous amino acid changes, the unusual DNA sequence organization, and the strong linkage disequilibrium surrounding the DRD4 7R allele, we propose that this allele originated as a rare mutational event that nevertheless increased to high frequency in human populations by positive selection.

FESSLER 2006

Daniel M. T. Fessler, *A Burning Desire: Steps Toward an Evolutionary Psychology of Fire Learning*. [Journal of Cognition and Culture 6 \(2006\), 429–451](#).

Although fire is inherently dangerous, leading many animals to avoid it, for most of human history, mastery of fire has been critical to survival. Humans can therefore be expected to possess evolved psychological mechanisms dedicated to controlling fire. Because techniques for starting, maintaining, and using fire differ across ecosystems, the postulated adaptations can be expected to take the form of domain-specific learning mechanisms rather than fixed behavioral templates. After outlining features that such mechanisms are predicted to possess, I review the literature on fire play in western children, finding that attraction to and interest in fire is widespread, experimentation with fire often begins in early childhood, and fire play typically peaks in late childhood or early adolescence. The latter aspect stands in contrast to results from a survey of ethnographers which reveals that, in societies in which fire is routinely used as a tool, children typically master control of fire by middle childhood, at which point interest in fire is already declining. This suggests that fire learning is retarded in western children, arguably due to patterns of fire use in modern societies that are atypical when viewed from a broader cross-cultural perspective.

Together with the fact that western entertainment media provide a distorted portrait of the properties of fire, this pattern, while limiting the value of naturalistic observations of fire learning in the West, nevertheless has the benefit of providing a strong testing ground for future experiments exploring the universality of the psychology underlying the control of fire.

KEYWORDS: Fire, children, learning, fire play

GRAFEN 1990

Alan Grafen, *Biological Signals as Handicaps*. [Journal of Theoretical Biology](#) **144** (1990), 517–546.

An ESS model of Zahavi's handicap principle is constructed. This allows a formal exposition of how the handicap principle works, and shows that its essential elements are strategic. The handicap model is about signalling, and it is proved under fairly general conditions that if the handicap principle's conditions are met, then an evolutionarily stable signalling equilibrium exists in a biological signalling system, and that any signalling equilibrium satisfies the conditions of the handicap principle. Zahavi's major claims for the handicap principle are thus vindicated. The place of cheating is discussed in view of the honesty that follows from the handicap principle. Parallel signalling models in economics are discussed. Interpretations of the handicap principle are compared. The models are not fully explicit about how females use information about male quality, and, less seriously, have no genetics. A companion paper remedies both defects in a model of the handicap principle at work in sexual selection.

HARPENDING 2002

Henry Harpending & Gregory Cochran, *In our genes*. [PNAS](#) **99** (2002), 10–12.

Thus there are drab males working at subsistence among foragers and, at the other end of the density continuum, among intensive agriculturalists and peasants. In between we see decorative competitive males engaged in local male coalitional violence. There is an unsettling parallel with the dad males of the working class in contemporary industrial societies and the cad males of the underclass.

TRIVERS 2000

Robert Trivers, *The Elements of a Scientific Theory of Self-Deception*. [Annals of the New York Academy of Sciences](#) **907** (2000), 114–131.

An evolutionary theory of self-deception—the active misrepresentation of reality to the conscious mind—suggests that there may be multiple sources of self-deception in our own species, with important interactions between them. Self-deception (along with internal conflict and fragmentation) may serve to improve deception of others; this may include denial of ongoing deception, self-inflation, ego-biased social theory, false narratives of intention, and a conscious mind that operates via denial and projection to create a self-serving world. Self-deception may also result from internal representations of the voices of significant others, including parents, and may come from internal genetic conflict, the most important for our species arising from differentially imprinted maternal and paternal genes. Selection also favors suppressing negative phenotypic traits. Finally, a positive form of self-deception may serve to orient the organism favorably toward the future. Self-deception can be analyzed in groups and is done so here with special attention to its costs.

Energie

BAVERSTOCK 2006

Keith Baverstock & Dillwyn Williams, *The Chernobyl Accident 20 Years On:*

An Assessment of the Health Consequences and the International Response. Environmental Health Perspectives **114** (2006), 1312–1317.

BACKGROUND: The Chernobyl accident in 1986 caused widespread radioactive contamination and enormous concern. Twenty years later, the World Health Organization and the International Atomic Energy Authority issued a generally reassuring statement about the consequences. Accurate assessment of the consequences is important to the current debate on nuclear power.

OBJECTIVES: Our objectives in this study were to evaluate the health impact of the Chernobyl accident, assess the international response to the accident, and consider how to improve responses to future accidents.

DISCUSSION: So far, radiation to the thyroid from radioisotopes of iodine has caused several thousand cases of thyroid cancer but very few deaths; exposed children were most susceptible. The focus on thyroid cancer has diverted attention from possible nonthyroid effects, such as mini-satellite instability, which is potentially important. The international response to the accident was inadequate and uncoordinated, and has been unjustifiably reassuring. Accurate assessment of Chernobyl's future health effects is not currently possible in the light of dose uncertainties, current debates over radiation actions, and the lessons from the late consequences of atomic bomb exposure.

CONCLUSIONS: Because of the uncertainties over the dose from and the consequences of the Chernobyl accident, it is essential that investigations of its effects should be broadened and supported for the long term. Because of the problems with the international response to Chernobyl, the United Nations should initiate an independent review of the actions and assignments of the agencies concerned, with recommendations for dealing with future international-scale accidents. These should involve independent scientists and ensure cooperation rather than rivalry.

KEY WORDS: Chernobyl, disaster response, nuclear accidents, radiation, thyroid cancer, United Nations.

Isotope

DIEFENDORF 2010

Aaron F. Diefendorf, Kevin E. Mueller, Scott. L. Wing, Paul L. Koch, & Katherine H. Freeman, *Global patterns in leaf ^{13}C discrimination and implications for studies of past and future climate*. *PNAS* **107** (2010), 5738–5743. [pnas107-05738-Supplement1.pdf](#), [pnas107-05738-Supplement2.xls](#)

Fractionation of carbon isotopes by plants during CO_2 uptake and fixation (Dleaf) varies with environmental conditions, but quantitative patterns of Dleaf across environmental gradients at the global scale are lacking. This impedes interpretation of variability in ancient terrestrial organic matter, which encodes climatic and ecological signals. To address this problem, we converted 3,310 published leaf d^{13}C values into mean Dleaf values for 334 woody plant species at 105 locations (yielding 570 species-site combinations) representing a wide range of environmental conditions. Our analyses reveal a strong positive correlation between Dleaf and mean annual precipitation (MAP; $R^2 = 0.55$), mirroring global trends in gross primary production and indicating stomatal constraints on leaf gas-exchange, mediated by water supply, are the dominant control of Dleaf at large spatial scales. Independent of MAP, we show a lesser, negative effect of altitude on Dleaf and minor effects of temperature and latitude. After accounting for these factors, mean Dleaf of evergreen gymnosperms is lower (by 1–2.7‰) than for other woody plant functional types (PFT), likely due to greater leaf-level water-use efficiency. Together, environmental and PFT effects contribute to differences in mean Dleaf of up to 6‰ between biomes. Coupling geologic indicators of ancient precipitation and PFT (or biome) with modern Dleaf patterns has potential to yield more robust reconstructions of atmospheric d^{13}C values, leading to

better constraints on past greenhouse-gas perturbations. Accordingly, we estimate a 4.6‰ decline in the $\delta^{13}\text{C}$ of atmospheric CO_2 at the onset of the Paleocene-Eocene Thermal Maximum, an abrupt global warming event ≈ 55.8 Ma.
biogeochemistry | ecophysiology | fractionation | PETM

Klima

UNO 2011

Kevin T. Uno, Thure E. Cerling, John M. Harris, Yutaka Kunimatsu, Meave G. Leakey, Masato Nakatsukasa & Hideo Nakaya, *Late Miocene to Pliocene carbon isotope record of differential diet change among East African herbivores*. [PNAS 108 \(2011\), 6509–6514](#).

[pnas108-06509-Supplement.pdf](#)

Stable isotope and molecular data suggest that C4 grasses first appeared globally in the Oligocene. In East Africa, stable isotope data from pedogenic carbonate and fossil tooth enamel suggest a first appearance between 15–10 Ma and subsequent expansion during the Plio-Pleistocene. The fossil enamel record has the potential to provide detailed information about the rates of dietary adaptation to this new resource among different herbivore lineages. We present carbon isotope data from 452 fossil teeth that record differential rates of diet change from C3 to mixed C3/C4 or C4 diets among East African herbivore families at seven different time periods during the Late Miocene to the Pliocene (9.9–3.2 Ma). Significant amounts of C4 grasses were present in equid diets beginning at 9.9 Ma and in rhinocerotid diets by 9.6 Ma, although there is no isotopic evidence for expansive C4 grasslands in this part of the Late Miocene. Bovids and hippopotamids followed suit with individuals that had C4-dominated (>65%) diets by 7.4 Ma. Suids adopted C4-dominated diets between 6.5 and 4.2 Ma. Gomphotheriids and elephantids had mostly C3-dominated diets through 9.3 Ma, but became dedicated C4 grazers by 6.5 Ma. Deinotheriids and giraffids maintained a predominantly C3 diet throughout the record. The sequence of differential diet change among herbivore lineages provides ecological insight into a key period of hominid evolution and valuable information for future studies that focus on morphological changes associated with diet change.

carbon isotopes | herbivore diet | bioapatite | paleodiet | mammal

Kultur

SOSIS 2007

Richard Sosis, Howard C. Kress & James S. Boster, *Scars for war: evaluating alternative signaling explanations for cross-cultural variance in ritual costs*. [Evolution and Human Behavior 28 \(2007\), 234–247](#).

While males in many societies endure traumatic and painful rites, in other societies male rites are mild or completely absent. To explain these cross-cultural differences, we use data collected from the Human Relations Area Files electronic databases (eHRAF) to test two sets of hypotheses derived from signaling theory. If costly male rites serve to signal mate quality, they would be expected to correlate with the intensity of mating competition. If they serve to signal group commitments, they would be expected to be associated with the importance of overcoming problems of collective action. Our results support the latter set of hypotheses: males in societies that engage in warfare endure the costliest rites. Moreover, we show that whether wars are fought within cultural groups or against other cultural groups is an important determinant of whether or not male rites result in permanent visible marks, such as ritual scars. We argue that costly male rites signal commitment and promote solidarity among males who must organize for warfare.

Keywords: Cooperation; Costly signaling theory; Ritual; Religion; Warfare

STAPEL 2011

Diederik A. Stapel & Siegwart Lindenberg, *Coping with Chaos: How Disordered Contexts Promote Stereotyping and Discrimination*. *science* **332** (2011), 251–253.

s332-0251-Supplement.pdf

Being the victim of discrimination can have serious negative health- and quality-of-life-related consequences. Yet, could being discriminated against depend on such seemingly trivial matters as garbage on the streets? In this study, we show, in two field experiments, that disordered contexts (such as litter or a broken-up sidewalk and an abandoned bicycle) indeed promote stereotyping and discrimination in real-world situations and, in three lab experiments, that it is a heightened need for structure that mediates these effects (number of subjects: between 40 and 70 per experiment). These findings considerably advance our knowledge of the impact of the physical environment on stereotyping and discrimination and have clear policy implications: Diagnose environmental disorder early and intervene immediately.

XIE 2011

J. Xie, S. Sreenivasan, G. Korniss, W. Zhang, C. Lim & B.K. Szymanski, *Social consensus through the influence of committed minorities*. *arXiv* (2011), 1102.3931. <<http://arxiv.org/pdf/1102.3931>>.

We show how the prevailing majority opinion in a population can be rapidly reversed by a small fraction p of randomly distributed committed agents who consistently proselytize the opposing opinion and are immune to influence. Specifically, we show that when the committed fraction grows beyond a critical value $p_c \approx 10\%$, there is a dramatic decrease in the time, T_c , taken for the entire population to adopt the committed opinion. In particular, for complete graphs we show that when $p < p_c$, $T_c \approx \exp(N)$, while for $p > p_c$, $T_c \approx \ln N$. We conclude with simulation results for Erdős-Rényi random graphs which show qualitatively similar behavior.

Physik

WIGNER 1960

Eugene P. Wigner, *The Unreasonable Effectiveness of Mathematics in the Natural Sciences*, *Richard Courant Lecture in Mathematical Sciences delivered at New York University, May 11, 1959*. *Communications on Pure and Applied Mathematics* **13** (1960), 1–14.

Religion

ALCORTA 2005

Candace S. Alcorta & Richard Sosis, *Ritual, Emotion, and Sacred Symbols, The Evolution of Religion as an Adaptive Complex*. *Human Nature* **16** (2005), 323–359.

This paper considers religion in relation to four recurrent traits: belief systems incorporating supernatural agents and counterintuitive concepts, communal ritual, separation of the sacred and the profane, and adolescence as a preferred developmental period for religious transmission. These co-occurring traits are viewed as an adaptive complex that offers

clues to the evolution of religion from its nonhuman ritual roots. We consider the critical element differentiating religious from nonhuman ritual to be the conditioned association of emotion and abstract symbols. We propose neurophysiological mechanisms underlying such associations and argue that the brain plasticity of human adolescence constitutes an “experience expectant” developmental period for ritual conditioning of sacred symbols. We suggest that such symbols evolved to solve an ecological problem by extending communication and coordination of social relations across time and space.

KEY WORDS: Adolescence; Costly signals; Emotion; Neuropsychology; Religion; Ritual; Symbolic thought

BARRETT 2001

Justin L. Barrett, Rebekah A. Richert & Amanda Driesenga, *God’s Beliefs versus Mother’s: The Development of Nonhuman Agent Concepts*. *Child Development* **72** (2001), 50–65.

Little research exists on how children understand the actions of nonhuman agents. Researchers often assume that children overgeneralize and attribute human properties such as false beliefs to nonhuman agents. In this study, three experiments were conducted to test this assumption. The experiments used 24 children in New York (aged 2,11-6,11 years), 52 children in Michigan (aged 3,5-6,11 years), and a second group of 45 children in Michigan (3,4-8,5 years) from Christian backgrounds. In the first two experiments, children participated in false-belief tests in which they were asked about human and various nonhuman agents including animals and God. Experiment 3 consisted of a modified perspective-taking task, also including nonhuman agents. The results of the study suggest that children do not consistently use human agent concepts but instead can use different agent concepts for some nonhuman agents like God and special animals. Children are not bound to anthropomorphize, but they often do.

BERING 2004

Jesse M. Bering & David F. Bjorklund, *The Natural Emergence of Reasoning About the Afterlife as a Developmental Regularity*. *Developmental Psychology* **40** (2004), 217–233.

Participants were interviewed about the biological and psychological functioning of a dead agent. In Experiment 1, even 4- to 6-year-olds stated that biological processes ceased at death, although this trend was more apparent among 6- to 8-year-olds. In Experiment 2, 4- to 12-year-olds were asked about psychological functioning. The youngest children were equally likely to state that both cognitive and psychobiological states continued at death, whereas the oldest children were more likely to state that cognitive states continued. In Experiment 3, children and adults were asked about an array of psychological states. With the exception of preschoolers, who did not differentiate most of the psychological states, older children and adults were likely to attribute epistemic, emotional, and desire states to dead agents. These findings suggest that developmental mechanisms underlie intuitive accounts of dead agents’ minds.

BERING 2005

Jesse M. Bering, Katrina MeLeod & Todd K. Shackelford, *Reasoning about Dead Agents Reveals Possible Adaptive Trends*. *Human Nature* **16** (2005), 360–381.

We investigated whether (a) people positively reevaluate the characters of recently dead others and (b) supernatural primes concerning an ambient dead agent serve to curb selfish intentions. In Study 1, participants made trait attributions to three strangers depicted in photographs; one week later, they returned to do the same but were informed that one of the strangers had died over the weekend. Participants rated the decedent target

more favorably after learning of his death whereas ratings for the control targets remained unchanged between sessions. This effect was especially pronounced for traits dealing with the decedent's prosocial tendencies (e.g., ethical, kind). In Study 2, a content analysis of obituaries revealed a similar emphasis on decedents' prosocial attributes over other personality dimensions (e.g., achievement-relatedness, social skills). Finally, in Study 3, participants who were told of an alleged ghost in the laboratory were less likely to cheat on a competitive task than those who did not receive this supernatural prime. The findings are interpreted as evidence suggestive of adaptive design.

KEY WORDS: Afterlife; Attribution; Cooperation; Death; Evolutionary theory; Religion; Theory of Mind

COMINGS 2000

David E. Comings, Nancy Gonzales, Gerard Saucier, J. Patrick Johnson & James P. MacMurray, *The DRD4 gene and the spiritual transcendence scale of the character temperament index*. *Psychiatric Genetics* **10** (2000), 185–189. Two hundred male subjects (81 college students and 119 subjects from an addiction treatment unit) were administered the Temperament and Character Inventory (TCI) and genotyped at the 48 base pair repeat polymorphism of the DRD4 gene. Subjects were divided by genotype into those carrying any < 4 repeat allele, those homozygous for the 4 repeat allele, and those with any > 4 repeat allele. The total MANCOVA of seven TCI summary scores, with age and diagnostic group as covariates, was significant ($p < 0.001$). The largest effect was with self-transcendence ($P < 0.001$). The total MANCOVA for the three self-transcendence subscores was significant ($P < 0.017$), with the spiritual acceptance subscore showing the most effect ($P < 0.001$, power = 0.91). These results suggest the DRD4 gene may play a role in the personality trait of spiritual acceptance. This may be a function of the high concentration of the dopamine D4 receptor in the cortical areas, especially the frontal cortex.

Keywords: dopamine, receptor, gene, DRD4, spirituality, religion

DOBLIN 1991

Rick Doblin, *Pahnke's "Good Friday Experiment": A long-term follow-up and methodological critique*. *Journal of Transpersonal Psychology* **23** (1991), 1–28.

JOHNSON 2005

Dominic D.P. Johnson, *God's Punishment and Public Goods, A Test of the Supernatural Punishment Hypothesis in 186 World Cultures*. *Human Nature* **16** (2005), 410–446.

Cooperation towards public goods relies on credible threats of punishment to deter cheats. However, punishing is costly, so it remains unclear who incurred the costs of enforcement in our evolutionary past. Theoretical work suggests that human cooperation may be promoted if people believe in supernatural punishment for moral transgressions. This theory is supported by new work in cognitive psychology and by anecdotal ethnographic evidence, but formal quantitative tests remain to be done. Using data from 186 societies around the globe, I test whether the likelihood of supernatural punishment—indexed by the importance of moralizing “high gods—is associated with cooperation.

KEY WORDS: Cooperation; Evolution of cooperation; Gods; High gods; Intentionality system; Religion; Sanctions; Standard Cross-Cultural Sample; Supernatural punishment; World cultures

KELEMEN 2004

Deborah Kelemen, *Are Children "Intuitive Theists"? Reasoning About Purpose and Design in Nature*. *Psychological Science* **15** (2004), 295–301.

Separate bodies of research suggest that young children have a broad tendency to reason about natural phenomena in terms of purpose and an orientation toward intention-based accounts of the origins of natural entities. This article explores these results further by drawing together recent findings from various areas of cognitive developmental research to address the following question: Rather than being “artificialists” in Piagetian terms, are children “intuitive theists”-disposed to view natural phenomena as resulting from nonhuman design? A review of research on children’s concepts of agency, imaginary companions, and understanding of artifacts suggests that by the time children are around 5 years of age, this description of them may have explanatory value and practical relevance.

SHARIFF 2007

Azim F. Shariff & Ara Norenzayan, *God Is Watching You, Priming God Concepts Increases Prosocial Behavior in an Anonymous Economic Game*. *Psychological Science* **18** (2007), 803–809.

We present two studies aimed at resolving experimentally whether religion increases prosocial behavior in the anonymous dictator game. Subjects allocated more money to anonymous strangers when God concepts were implicitly activated than when neutral or no concepts were activated. This effect was at least as large as that obtained when concepts associated with secular moral institutions were primed. A trait measure of self-reported religiosity did not seem to be associated with prosocial behavior. We discuss different possible mechanisms that may underlie this effect, focusing on the hypotheses that the religious prime had an ideomotor effect on generosity or that it activated a felt presence of supernatural watchers. We then discuss implications for theories positing religion as a facilitator of the emergence of early large-scale societies of cooperators.

SOSIS 2003

Richard Sosis & Candace Alcorta, *Signaling, Solidarity, and the Sacred: The Evolution of Religious Behavior*. *Evolutionary Anthropology* **12** (2003), 264–274.

Anthropologists have repeatedly noted that there has been little theoretical progress in the anthropology of religion over the past fifty years.¹⁻⁷ By the 1960s, Geertz² had pronounced the field dead. Recently, however, evolutionary researchers have turned their attention toward understanding the selective pressures that have shaped the human capacity for religious thoughts and behaviors, and appear to be resurrecting this long-dormant but important area of research.⁸⁻¹⁹ This work, which focuses on ultimate evolutionary explanations, is being complemented by advances in neuropsychology and a growing interest among neuroscientists in how ritual, trance, meditation, and other altered states affect brain functioning and development.²⁰⁻²⁶ This latter research is providing critical insights into the evolution of the proximate mechanisms responsible for religious behavior. Here we review these literatures and examine both the proximate mechanisms and ultimate evolutionary processes essential for developing a comprehensive evolutionary explanation of religion.

SOSIS 2007

Richard Sosis, *Psalms for Safety, Magico-Religious Responses to Threats of Terror*. *Current Anthropology* **48** (2007), 903–911.

Examination of the extent to which women in the northern Israeli town of Tzfat recited psalms to cope with the stress of the Second Palestinian Intifada reveals that knowing someone who was killed in the Intifada, experiencing an income loss, and believing that Tzfat would be attacked by terrorists were strong predictors of psalm recitation among self-identified secular but not religious interviewees. Among secular interviewees who believed that Tzfat would be attacked, psalm recitation was negatively correlated with

short- and long-term precautionary behavioral strategies such as caution after an attack and avoiding buses, restaurants, and large crowds. No such relationship was found among religious interviewees, although they were less likely to make precautionary behavioral changes. These findings underscore the importance of magico-religious practices as coping mechanisms that may reduce anxiety and provide perceptions of control under conditions of high stress and uncertainty.

WILSON 2005

David Sloan Wilson, *Testing Major Evolutionary Hypotheses about Religion with a Random Sample*. *Human Nature* **16** (2005), 382–409.

Theories of religion that are supported with selected examples can be criticized for selection bias. This paper evaluates major evolutionary hypotheses about religion with a random sample of 35 religions drawn from a 16-volume encyclopedia of world religions. The results are supportive of the group-level adaptation hypothesis developed in Darwin “s Cathedral: Evolution, Religion, and the Nature of Society (Wilson 2002). Most religions in the sample have what Durkheim called secular utility. Their otherworldly elements can be largely understood as proximate mechanisms that motivate adaptive behaviors. Jainism, the religion in the sample that initially appeared most challenging to the group-level adaptation hypothesis, is highly supportive upon close examination. The results of the survey are preliminary and should be built upon by a multidisciplinary community as part of a field of evolutionary religious studies.

KEY WORDS: Adaptation; Evolution; Evolutionary religious studies; Group Selection; Religion

Zündung

LEHMANN 1993

Axel Lehmann, Herbert Wilhelmi, Stefan Schneider & Gerhard Lepperhoff, *Plasmastrahl-Zündsystem*. *Motortechnische Zeitschrift* **54** (1993), 508–513.

Im Rahmen des Sonderforschungsbereiches 224 wurde am Lehrstuhl für Angewandte Thermodynamik und am Institut für Industrieofenbau der RWTH Aachen ein Plasmastrahl-Zündsystem aufgebaut, dessen Zündenergie und Baugröße im Bereich konventioneller Zündsysteme liegen. Zur Untersuchung einer weiteren Verbesserung der Zündeigenschaften wurde das Plasmastrahl-Zündsystem als Doppelfunken-Zündanlage mit variablem Funkenabstand weiterentwickelt.

Schlierenoptische Messungen zeigen einen Vorteil des Plasmastrahl-Zündsystems hinsichtlich der Flammenkernbildung. Bei motorischen Messungen an konventionellen Viertakt-Ottomotoren liegt der Vorteil der Plasmastrahlzündung mit konventioneller elektrischer Zündenergie von etwa 70 bis 100 mJ vor allem in der unteren Teillast und bei Leerlast. Die Abgasrückführtrate wurde um zirka 30 % erhöht.

Eine zweite Funkenentladung bewirkt eine weitere Stabilisierung des Verbrennungsprozesses bei reaktionsträgen Gemischen.